

THE CLEVELAND - CLIFFS IRON COMPANY
ORE MINING DEPARTMENT
ANNUAL REPORT OF GENERAL MANAGER
For Year Ending December 31st, 1935

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THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT
MANAGER'S ANNUAL REPORT
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Ishpeming, Michigan
February, 10, 1936

Mr. Greene

2-10-36

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

Dear Sir:-

	Labor	Supplies Total	Blacksmith Shop	Carpenter Shop	Labor	Supplies Total
5 months						
1934	.571517	.10536	.877236	.56271	.10208	.66481
12 months						
1935				.540999	.064361	.605360

I beg to submit the report of the operations of the Mining Department for the year 1935.

The inventories, maps, statements relative to the 1935 report have gone forward to you under separate cover.

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

From January 1st to February 11, all soft ore mines operated on one eight hour shift two days per week. After this date to the end of the year, the operation was on a three day basis. These mines actually worked two crews six days per week, each crew getting three days per week. This plan is far better than leaving the mines idle three days as by this method, the necessary mechanical equipment is cut in half. It naturally also reduced the number of working places by 50%. The six day operation, largely on account of the reduction in number of working places, greatly reduces retimbering. Naturally by the reduction of working places and the fact that there is a gang in each of them six days per week, the places do not have an opportunity to crush so readily. The six day operation also made it possible to employ a larger number of men other than miners. This has been a great help to the community during these years of depression. Due to natural conditions in the Cliffs Shaft Mine, where there is no crushing, this property worked on one eight hour shift with a full crew, two days per week from January 1 to February 11, three days from February 12 to October 1st and four days to the end of the year. When the ore was available, we also hoisted with a small crew of men one extra shift.

In the 1934 report, I called attention to the centralizing at the General Shops of all machine, blacksmith and carpenter shop work. This was started in August, 1934 and each month that this practice is continued, we are more convinced than ever of the wisdom of our position. On two different occasions in former years, we tried to work this plan out but for some unknown reason, it failed. I think former failures were due to lack of coordination and cooperation. We are now making many of the parts of standard equipment in these shops and it is gratifying to note a constant decrease in the cost. It is, of course, necessary to still maintain blacksmiths and carpenters at our mines but all of the machine shop work and all of the heavy work on cages, skips, cars, etc. is done at the General Shops. I give below a brief statement showing

Mr. Greene

2-10-36

the saving in the cost per hour of labor and supplies for these three shops for five months of 1934 as compared with twelve months of 1935:

	<u>Machine Shop</u>			<u>Blacksmith Shop</u>			<u>Carpenter Shop</u>		
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
5 months									
1934	.63537	.114883	.750247	.571317	.10598	.677295	.56271	.10208	.66481
12 months									
1935	.59803	.072776	.670806	.539570	.116466	.656036	.540899	.064361	.605260
Increase					.010486				
Decrease	.03734	.042107	.079441	.031747		.021259	.021811	.037719	.059550

In the report will be found a statement showing the total of payrolls of the Storehouse and Shops, supplies issued and warehouse expense, for 1935. You will note that for each \$1.00 of payroll and supplies, the cost is \$.035. In former years for the handling of supplies 6% of the cost was added to take care of overhead expense. Due to the fact that this operation has been thoroughly coordinated and properly supervised, this marked reduction in cost has been possible.

In the report will also be found a statement showing comparison of supply inventory balances December 31st from 1930 to 1935 inclusive. I particularly call your attention to the fact that these balances have been cut 50%. This is a very fine showing as it is evident that there must be a large saving due to this reduction of inventories.

We have continued our intensive safety campaign and are doing everything in our power to reduce accidents to a minimum. The details will be found in Mr. Conibear's report.

Our Employees Representation plan has continued to function during the year in a most satisfactory manner. A few minor **complaints** have necessarily come in but in practically every instance these have been immediately settled to the mutual satisfaction of both parties by the Superintendents. Ordinarily they are of the simple nature. For example, a Representative might report that on a certain occasion, due to the carelessness of the dryman, there was not sufficient hot water, or the fireman might have allowed the steam to get too low in cold weather. Any matters of policy would naturally be taken up with me. I am convinced the main reason why this Employees Representation plan has functioned so well is the fact for many years our employees have had the privilege of coming to the office and telling the management of any grievance they might have. I have been told by other companies that when their Employees Representatives meet, they have many complaints to make. This has certainly not been our experience as month after

Mr. Greene

2-10-36

month they hold their meetings, going through the formality of reporting there are no complaints. Apparently as time goes on our employees are taking a keener interest in the nomination and election of their Representatives. We naturally have done everything in our power to foster this interest. During the summer we encouraged our employees, under the leadership of their own Representatives, who as a rule served as the arrangement committee, to hold picnics. In some cases, these were stag picnics and in others, the wives and children were present. We are thoroughly in accord with such activities which bring large crowds together as we are convinced that things of this kind result in some good.

We continued to examine our men under the arrangement with the Trudeau Institute. The outstanding fact in these examinations is we are actually able to help many employees and I am positive in a considerable number of cases, we have been able to save mens lives by informing them of their disability and asking their cooperation to improve their health under the advice of our doctors. Instead of the examinations being resented, they are actually welcomed by our employees. These examinations have not resulted in the laying off of a single man but in many cases we have found it necessary to change their occupation for their benefit and for the protection of the Company.

Our experience with Jackbits at the Cliffs Shaft Mine has been eminently satisfactory. Not only the Cliffs Shaft but in all other properties we are using jackbits for either rock or very hard ore. Mr. Stakel report gives the details. Our equipment for sharpening and tempering these bits at the Cliffs Shaft Mine is as fine an installation as can be found anywhere. All jackbits used by us are sharpened and tempered at this central shop. The direct saving in cost has been proven to be at least 50%.

In the report is included a statement showing the assessed valuation and taxes for the past four years. This gives the complete picture. The City of Negaunee is still the thorn in our flesh. Although we have been able in previous years to keep the budget down, the politicians in control, regardless of whether it was our side or the opposition, paid no attention to the budget and continued to spend in excess of the money that was raised. In 1935 in the middle of the summer, the City was without funds. Nevertheless, in spite of everything I could do, they continued to spend although they had no money. Certain big bills were unpaid and at one time they were in debt to the First National Bank of Negaunee for \$65,000. If it had not been for my continual nagging, they probably would have borrowed more than this. In 1934 the budget for city expenses was \$150,000 and in 1935 the budget was \$185,000. The whole trouble, there are too many people feeding at the tax trough. The valuation of property other than mining has been

reduced to a ridiculously low figure. The net result is regardless of what budget is raised, the burden is so light on the ordinary taxpayer he does not feel it. There is only one cure for this situation, have the Tax Commission revalue all property in the City of Negaunee. The simplest method to bring this about is to have a revaluation of Marquette County.

Early in the spring, things had gotten pretty much out of hand on the Gogebic Range and paid representatives of a labor union, the Mine, Mill and Smelter Workers Union, had pretty thoroughly organized the district. In a number of mines, anywhere between 75 and 90% of the employees had joined this union. Practically the same condition existed in the Iron River District but the organization there was not quite so complete. We kept in close touch with this situation and tried to lay the ground work to prevent the union from getting a foothold in Marquette County. We first appealed to our Employees Representatives, gave them the full story, telling them plainly what the strike would mean to them. These men, 20 in number, were very outspoken and even adopted a resolution which they sent to the Company to the effect they were satisfied with their present working conditions and with their Employees Representation Plan and would use their influence among their fellow workers to prevent the organization of our mines. The next appeal was to all bosses, captains, in fact any man who had control of even a small group of men. This group also were very outspoken in their determination to prevent any kind of outside organization. As a further precaution, in order to win the sympathy of the wives, merchants and as many others as possible in Marquette County, the Manager made an appeal over the radio. This was given enough publicity so it was heard by a very large number of people. As far as I could learn, the reaction was favorable. We do know scouts came to Marquette County and evidently must have returned to their headquarters with unfavorable reports, as no effort was made to organize.

I have every reason to believe our mines are in the finest kind of condition and I think when you examine the cost sheets you will agree with me that excellent results have been obtained. I am firmly of the opinion that there is no mining organization in the entire Lake Superior country which is better than that of the Cleveland-Cliffs Iron Company. In making this statement, it is not my intention to include my self.

Respectfully submitted,



Manager

SRE: DP

COMPARASON OF TOTAL DAYS WORKED AND TONS OF ORE MINED FOR THE YEAR 1935 AND 1934.

	1935 Days	1934 Days	1935 Days	1934 Days.
<u>NON-PRODUCTIVE UNITS.</u>				
Stephenson.....	291	230 $\frac{1}{2}$		
Princeton.....	333 $\frac{3}{4}$	260 $\frac{1}{4}$		
Miscellaneous Pay-Roll.....	1,748	1,932 $\frac{1}{4}$		
Shops & Storehouse.....	1,980 $\frac{3}{4}$	5,638 $\frac{1}{4}$		
C. C. I. Co., Miscellaneous & General.....	31,099	21,302 $\frac{3}{4}$		
Negaunee Mine " " " ".....	1,781	1,200 $\frac{3}{4}$		
Athens " " " ".....	699 $\frac{3}{4}$	966 $\frac{3}{4}$		
Cliffs Power & Light.....	13,067 $\frac{3}{4}$	13,494 $\frac{1}{2}$		
Mesaba Range Properties.....	22,154 $\frac{1}{2}$	24,782 $\frac{1}{4}$		
General Roll-Undistributed.....	25,425 $\frac{1}{2}$	20,925 $\frac{3}{4}$		
Lloyd Mine- Developing 6th Level.....	-	3,188 $\frac{3}{4}$		
Spies-Virgil- Idle.....	2,186 $\frac{1}{2}$	1,942 $\frac{1}{4}$		
Francis Mine.....	-	17		
Total deductions.....	100,767 $\frac{3}{4}$	95,881 $\frac{1}{2}$		
Grand Total- All Operations.....	393,972 $\frac{1}{4}$	321,975 $\frac{1}{2}$		
Net for Operating Mines.....	293,204 $\frac{1}{2}$	226,094	293,204 $\frac{1}{2}$	226,094
Total Tons.....	2,272,451	1,803,120		
Tons per man per day.....	7.750	7.975		
<u>OPEN PIT PRODUCTION-TONS</u>				
Tilden.....	190,511	167,688	5,388 $\frac{1}{2}$	4,154 $\frac{3}{4}$
Canisteo.....	605,095	430,142	34,362	20,934 $\frac{1}{4}$
Drew.....	-	103,531	-	7,094 $\frac{1}{2}$
Total.....	795,606	701,361	39,750 $\frac{1}{2}$	32,183 $\frac{1}{2}$
Open pit tons per man per day.....	20.01	21.79		
Net Underground days.....			253,454	193,910 $\frac{1}{2}$
" " production.....	1,476,845	1,101,759		
Underground tons per man per day.....	5.827	5.682		

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

	1932	1933	1934	1935
PRODUCT-Tons.....	82,119	55,939	223,245	268,921
<u>POWDER.</u>				
Pounds- Gelamite "A".....	29,500	17,400		
Gelamite "2X".....	32,000	34,200	37,550	
50% L.F.....	8,350	-	120,600	128,750
60% L.F.....	3,800	-	-	-
60% Gelatine.....	6,500	-	49,650	145,950
Total powder pounds.....	80,150	51,600	207,800	274,700
Total cost.....	\$10,047.13	\$6,330.75	\$23,426.05	\$32,531.91
Fuse- Feet.....	128,157	96,450	293,600	394,100
Caps-Number.....	24,488	16,972	70,450	75,350
Duplex Shot Wire.....	-	-	-	-
Connecting Wire-Pounds.....	11	6	64	-
Delay Fuses.....	275	200	925	3,324
Fuse Lighters.....	2,500	3,000	17,000	21,500
Fuse Containers.....	-	3	-	-
Total Cost- Fuse, Caps Etc.....	\$1,031.02	\$ 763.02	\$ 2,716.81	\$ 3,831.04
Total Cost- All Explosives.....	\$11,078.15	\$ 7,093.77	\$26,142.86	\$36,362.95
Average Price per pound-Powder....	.125	.122	.113	.117
Cost per ton- Powder.....	.1223	.1132	.1049	.1209
" " " - Fuse Etc.....	.0126	.0136	.0122	.0143
" " " - All Explosives.....	.1349	.1268	.1171	.1352
Pounds Powder per ton of ore.....	.9760	.9224	.9308	1.021

1934 Product increased over 1933 by 167,306 tons or 300%
 1935 20.4% increase in production over 1934.
 Increase in cost per ton for explosives due to increase in rock development in 1935.

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

	1932	1933	1934	1935
PRODUCT- Tons.....	372,348	252,833	878,514	1,207,924
<u>POWDER</u>				
Pounds- 40%.....	8,725	1,503	1,950	-
50%.....	87,400	87,025	296,050	445,302
60%.....	3,690	8,350	92,075	86,400
1X and 2X Gelamite.....	73,875	11,350	50,250	88,535
Gelamite "A".....	25,240	23,150	-	-
Total Powder-Pounds.....	198,930	131,378	440,325	620,237
Total Cost- Powder.....	\$24,696.02	\$15,635.14	\$49,691.73	\$73,992.18
Fuse- Feet.....	516,363	431,903	1,347,997	1,824,134
Caps- Number.....	98,058	68,119	213,859	293,882
Leading Wire- Feet.....	-	-	-	1,000
Connecting Wire- Pounds.....	-	10	20	64
Tamping Bags.....	27,400	11,300	45,600	43,650
Sealing Compound- Pints.....	2	2	20	12
Powder Bags.....	7	18	54	58
Fuse & Cap containers.....	2	-	-	-
Fuse Lighters.....	7,450	5,850	22,600	31,600
Electric Exploders.....	130	-	3,325	2,275
Blasting Machines.....	-	-	2	-
Total cost fuses etc.....	\$ 4,756.35	3,360.55	10,925.17	14,435.57
Total Cost- All Explosives.....	29,452.37	18,995.69	60,616.90	88,427.75
Average price per lb., Powder.....	.1241	.1199	.1129	.1193
Cost per ton- Powder.....	.0663	.0618	.0566	.0613
" " " Fuse, Etc.....	.0128	.0133	.0124	.0119
" " " All Explosives.....	.0791	.0751	.0690	.0732
Pounds of Powder per ton of ore.....	.5243	.5196	.5012	.5135

1934 Product increased over 1933 by 625,681 ton or 247%
 1935 " " " " 1934 by 329,410 " " 37 1/2%
 The cost per ton for all explosives decreased .006 or 8% 1934 compared with 1933.

m.c. .004 1935 1934

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

	1932	1933	1934	1935
PRODUCT-TONS.....	347,579	252,833	878,514	1,207,924
<u>TIMBER.</u>				
Feet 6-8.....	94,373	170,798	318,262	289,951
8-10.....	362,778	40,634	97,544	176,298
10-12.....	64,492	79,993	169,588	236,489
12-14.....	50,821	60,595	97,760	84,977
14-16.....	5,152	17,102	5,321	1,232
7-9.....	-	-	-	-
Treated Timber.....		711	-	2,847
Total Feet.....	278,327	369,122	691,322	801,554
Total cost.....	\$21,585.99	\$30,769.30	\$42,142.29	\$49,854.05
<u>LAGGING.</u>				
Feet 5'.....	27,625	-	45,800	31,725
6'.....	2,144			
7'.....	969,062	909,998	2,268,496	2,827,973
8'.....	13,704		40,973	
Total Feet.....	1,012,535	909,998	2,355,269	2,859,698
Total Cost.....	\$6,748.16	\$6,048.14	\$16,282.15	\$20,181.79
Poles- Feet.....	665,435	577,707	1,637,522	2,187,074
" - Cost.....	\$9,135.63	\$6,950.03	\$19,644.23	\$24,111.30
WIRE FENCING.- Rods.....	370	110	665	1,081
" " - Cost.....	\$,315.49	\$ 95.45	\$567.77	\$895.13
Total cost for all Timber.....	37,785.27	43,862.92	78,636.44	95,042.27
Average Cost per foot- Timber...	.0776	.0833	.061	.062
" " " 100 "- Lagging..	.666	.6646	.691	.706
" " " - Poles....	1.373	1.203	1.200	1.102
" " " Rods-Fencing....	.853	.867	.853	.828
Feet of Timber per ton of ore....	.8007	1.459	.787	.664
" " Lagging " " " "....	2.913	3,599	2.681	2.367
" " Poles.. " " " "....	1.914	2.284	1.863	1.811
" " Wire Fencing " " "....	.0176	.007	.0125	.015
Cost per ton for Timber.....	.0621	.1217	.0480	.0414
" " " " Lagging.....	.0194	.0239	.0185	.0167
" " " " Poles.....	.0263	.0275	.0224	.0199
" " " " Wire Fencing...	.0009	.0004	.0006	.0007
TOTAL COST PER TON.....	.1087	.1735	.0895	.0787

1934 Product increased over 1933 by 625,681 tons or 24 $\frac{1}{2}$ %
 1935 Product increased over 1934 by 329,410 tons or 37 $\frac{1}{2}$ %

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

SOFT ORE MINES.

YEAR	1932			1933			1934			1935		
PRODUCT-TONS	372,348			581,210			878,514			1,207,924		
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON		
General Supplies.....	19,482.83	.0523	19,914.25	.0522	46,160.93	.0525	55,656.09	.0461				
Iron & Steel.....	4,691.68	.0128	4,363.60	.0114	10,974.63	.0125	22,174.50	.0184				
Machinery.....	12,457.69	.0334	8,735.40	.0229	24,439.92	.0278	55,855.54	.0462				
Explosives.....	27,100.07	.0727	20,310.67	.0533	58,938.05	.0671	89,053.60	.0737				
Lumber & Timber.....	41,529.30	.1115	50,459.11	.1324	94,709.27	.1078	108,752.97	.0900				
Fuel.....	13,376.96	.0359	9,927.61	.0260	12,211.98	.0139	14,960.77	.0124				
Electric Power.....	123,365.53	.3313	147,269.45	.3863	23,416.12	.2680	255,339.52	.2114				
Miscellaneous.....	4,117.38	.0111	6,169.57	.0161	25,464.74	.0290	18,772.50	.0155				
Total	246,121.44	.6610	254,810.52	.6684	508,315.64	.5786	620,565.49	.5137				

HARD ORE MINES.

YEAR	1932			1933			1934			1935		
PRODUCT-TONS	82,119			55,939			223,245			268,921		
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON		
General Supplies.....	4,581.34	.056	3,613.35	.065	13,095.67	.059	26,797.41	.100				
Iron & Steel.....	1,960.90	.024	923.86	.016	8,825.18	.039	16,001.23	.059				
Machinery.....	3,000.15	.036	3,142.11	.056	13,273.54	.059	27,582.16	.102				
Explosives.....	11,078.15	.135	7,093.77	.127	26,142.86	.117	36,362.95	.135				
Lumber & Timber.....	1,555.34	.019	1,787.57	.032	3,943.05	.018	7,776.48	.029				
Fuel.....	3,532.52	.043	1,870.49	.033	2,247.02	.010	4,574.29	.017				
Electric Power.....	23,259.17	.283	14,971.89	.268	53,915.24	.241	58,550.36	.218				
Miscellaneous.....	1,044.71	.013	8,276.21	.005	1,727.36	.008	438.49	.002				
Total	50,812.38	.609	33,679.25	.602	123,169.92	.551	178,083.37	.662				

THE CLEVELAND-CLIFFS IRON COMPANY
MINING DEPARTMENT.

LABOR SUMMARY-ALL COMPANIES

PRODUCT-TONS.	1932		1933		1934		1935	
	474,424		796,715		1,803,120		2,272,451	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface.....	65,217 $\frac{3}{4}$	250,112.23	86,757 $\frac{3}{4}$	329,491.79	116,526 $\frac{1}{2}$	492,758.23	137,153 $\frac{3}{4}$	584,992.08
Cost per Ton.....		.5272		.4136		.273		.257
Underground.....	94,885 $\frac{1}{4}$	401,467.75	77,045 $\frac{3}{4}$	316,543.46	175,002	834,929.43	320,336 $\frac{1}{4}$	1,088,540.81
Cost per Ton.....		.8462		.3973		.463		.479
Sup't & General Roll.....	28,683 $\frac{3}{4}$	138,460.30	25,074 $\frac{1}{4}$	104,801.78	30,447	143,502.86	36,483 $\frac{1}{4}$	230,965.46
Cost Per Ton.....		.2918		.1315		.080		.102
Grand Total.....	188,786 $\frac{3}{4}$	760,040.28	188,877 $\frac{3}{4}$	750,837.03	321,975 $\frac{1}{2}$	1,471,190.52	393,972 $\frac{1}{4}$	1,904,498.35
Cost Per Ton.....		1.6652		.9424		.816		.838
Average Rate Per Day.....		4.17		3.98		4.57		4.83
Total Per Man Per Day.....		2.51		4.22		5.60		5.77

NOTE: The above is the total of all wages and salaries for employee's of the Mining Department, including the Cliffs Power & Light Company.
In 1934 there was an increase in wages of approximately 10%.

WORKING SCHEDULE -1935-

All active mines operated 1-8 hour shift, 2 days per week from January 1st to February 11th 1935, when the schedule was increased to 3 days per week. This schedule continued throughout the balance of the year with the exception of Cliffs Shaft which operated on a 4 day week schedule from October 1st to the balance of the year. During the course of 2 and 3 day operations in all mines with the exception of Cliffs Shaft, the mines actually worked 4 and 6 days per week $\frac{1}{2}$ of the normal crew working each day- in this way each man averaged 2 and 3 days work each week.

SPIES-VIRGIL: Idle- Pumping during year 1935.

MINNESOTA PROPERTIES: Canisteo Mine started operations May 8th, and operated on a 3- 8 hour shift basis 4 days per week. Operations finished Sep't 19th.
Holman Cliffs and Hill-Trumbull idle during year 1935.

THE CLEVELAND CLIFFS IRON COMPANY
A COMPARISON OF MINING DEPARTMENT, MICHIGAN TAXES, FOR THE PAST FOUR YEARS.
FOR COMPLETE DETAIL SEE THIS AND PREVIOUS TAX STATEMENTS.

ASSESSED VALUATION	1935	1934	1933	1932
The C.C.I. Co.....	10,117,036	10,013,575	10,866,238	12,826,545
The Negaunee Mine Co.....	3,057,770	3,196,400	3,554,400	4,185,700
The Athens Iron Mining Co.....	1,929,520	2,077,800	2,036,500	2,266,500
The Cliffs Power & Light Co...	1,424,711	1,418,887	1,415,063	1,443,226
The Cliffs Electric Co.....	-	-	4,500	4,500
Total Michigan Mining Dept....	16,529,037	16,706,662	17,876,701	20,726,471
Decrease from Previous year...	177,625	1,170,039	2,849,770	1,863,753
Decrease from 1932.....	4,197,434	5,883,562	-	-
Per Cent decrease from 1932...	20.2%	26%		

TOTAL TAXES PAID.

The C.C.I. Co.....	286,303.64	267,750.15	283,160.67	378,136.12
The Negaunee Mine Co.....	95,226.14	86,527.53	99,599.60	120,527.71
The Athens Iron Mining Co.....	60,089.81	56,246.84	57,065.71	65,264.22
The Cliffs Power & Light Co...	29,817.75	31,256.06	35,992.72	46,752.02
The Cliffs Electric Co.....	-	-	74.54	145.75
Total Michigan Mining Dept Tax.	471,437.34	441,780.58	475,893.24	610,825.82
Increase- 1935 1934.....	29,656.76			
Decrease from previous year....	-	34,112.66	134,932.58	245,596.31
Decrease from 1932.....	139,388.48	414,641.55		
Per cent Decrease from 1931....	22.8%	48.4%		
Average Tax Rate per \$100.00 ..	2.852	2.644	2.662	2.947

STATEMENT SHOWING COMPARASON OF SUPPLY INVENTORY BALANCES DECEMBER 31ST.
FOR THE ACTIVE MINES IN MARQUETTE COUNTY.

	1935	1934	1933	1932	1931	1930
CLIFFS SHAFT.....	\$20,170.51	\$19,591.85	\$24,543.40	\$26,470.78	\$33,705.32	\$49,441.15
GARDNER-MACKINAW.....	7,280.43	6,704.89	5,609.46	8,045.07	9,330.59	10,757.49
STOREHOUSE.....	84,296.83	52,890.34	47,189.87	52,428.19	58,300.62	62,470.63
LLOYD.....	10,694.49	8,031.75	13,003.34	31,592.00	46,839.57	54,376.14
MAAS.....	14,976.36	18,158.33	19,998.73	36,194.14	49,219.35	55,780.70
<u>TOTAL C. C. I. CO.</u>	<u>137,418.62</u>	<u>105,377.16</u>	<u>110,344.80</u>	<u>154,730.98</u>	<u>197,395.45</u>	<u>232,728.11</u>
PER CENT.....	59.0	45.3	47.4	66.4	84.8	100.
ATHENS.....	13,809.40	13,143.60	12,783.28	30,963.42	41,253.59	43,383.11
NEGAUNEE.....	15,095.63	19,663.16	24,846.04	34,974.27	48,297.51	61,144.92
<u>GRAND TOTAL.....</u>	<u>166,323.65</u>	<u>138,183.92</u>	<u>147,974.12</u>	<u>220,668.67</u>	<u>286,946.55</u>	<u>337,256.14</u>
PER CENT.....	49.3	41.0	43.9	65.4	95.0	100.
GRAND TOTAL-ALL MINES-)						
All COMPANIES.)	275,597.69	259,632.12	277,702.84	384,846.39	476,871.22	521,557.10
PER CENT.....	52.8	49.8	53.4	73.8	91.4	100.

NOTE;- Storehouse inventory somewhat higher than usual due to anticipating price advances on Copper Wire, Electrical Supplies, some Iron and Steel items and the purchase of Lumber from local small operators at very greatly reduced prices.
Cliffs Shaft inventory somewhat higher due to the purchase of scraper parts and drill steel \$1,800.00 and Trestle Timber \$400.00 in December 1935.

GENERAL STOREHOUSE AND SHOPS STATEMENT SHOWING TOTAL OF PAYROLLS,
SUPPLIES ISSUED AND WAREHOUSE EXPENSE FOR YEAR 1935

<u>CHARGED TO:</u>	<u>PAYROLL</u>	<u>SUPPLIES ISSUED</u>	<u>TOTAL</u>
Cliffs Shaft Mine	7,303.09	39,038.01	46,341.10
Lloyd Mine	7,711.11	26,844.47	34,555.58
Tilden Mine	2,400.83	5,935.48	8,336.31
Maas Mine	4,314.25	33,306.87	37,621.12
Negaunee Mine	3,583.34	24,922.02	28,505.36
Athens Mine	2,728.52	18,220.18	20,948.70
Gardner-Mackinaw Mine	758.80	12,045.29	12,804.09
Cliffs Power & Light Company	617.23	9,817.81	10,435.04
Operating Steam Shovels	14,490.58	5,351.77	19,842.35
Other Accounts and Outside Parties	23,063.80	50,748.23	73,812.03
<u>GRAND TOTAL</u>	<u>66,971.55</u>	<u>226,230.13</u>	<u>293,201.68</u>

WAREHOUSE OVERHEAD EXPENSE

Labor	8,420.21
Supplies and Expense	<u>1,821.26</u>
TOTAL	10,241.47

NOTES:- Cost per Dollar of Payroll and Supplies Issued .035

Total production from above mines for 1935 - 1,667,356, or a total cost per ton of .00614 if all the overhead expense had been charged to these operating mines.

CLIFFS SHAFT MINE

ANNUAL REPORT

YEAR 1935

1. GENERAL:

The operating schedule of this property was increased three times during the year. The year started with a two day per week operation. On Feb. 11th the mine went on a three day per week basis and this schedule was stepped up to four days a week on October 1st.

The year 1935 is also responsible for some radical changes in methods and procedure. Detachable bits became standard underground practice. For the first time in years a trammer boss was employed. We also put a surface foreman back on the job. "A" shaft was also under the direct charge of Capt. John Olds, while "B" shaft was supervised by Capt. William Nault. The diamond drill was also put into operation late in the year.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

<u>Grade</u>	<u>Tons</u>	<u>% of Total</u>
Cliffs Shaft Lump	170,674	
Cliffs Shaft Crushed	70,800	
Total Cliffs Shaft Ore	241,474	89.8
Bancroft Lump	19,209	
Bancroft Crushed	8,238	
Total Bancroft Ore	27,447	10.2
GRAND TOTAL ORE	268,921	100.0

Production by grades for five years follows:

<u>Year</u>	<u>Lump Ore</u>	<u>Crushed</u>	<u>Run-of-Mine</u>	<u>Total</u>
	<u>Tons</u>	<u>Ore Tons</u>	<u>Ore Tons</u>	<u>Tons</u>
1931	153,717	65,113	72,227	291,057
1932	57,104	24,442	566	82,119
1933	39,101	16,838		55,939
1934	156,776	66,469		223,245
1935	189,883	79,038		268,921

The following table shows the ratio of lump and crushed ore since we discontinued making run-of-mine ore:

<u>Year</u>	<u>LUMP</u>		<u>CRUSHED</u>	
	<u>Tons</u>	<u>% of Total</u>	<u>Tons</u>	<u>% of Total</u>
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

CLIFFS SHAFT MINE
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YEAR 1935

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

The figures that follow show for five years past the percent of ore mined from the Cliffs Shaft Mine, free from royalty payments, and the percent of the total from the Bancroft Lease.

Year	Cliffs Shaft Ore	% of Total	Bancroft Ore	% of Total
1931	100,639	89.0	12,181	11.0
1932	71,155	86.6	10,964	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

The above figures might indicate that the percentage of ore mined from the Bancroft Lease is getting less year by year, which is true of the past, but not indicative of the future. The 1936 figures will show a substantial increase, which means that we will pay royalty on a larger tonnage in 1936.

b. Shipments:

Grade	Pocket Tons	Stockpile Tons	Total Tons	Last Year
Cliffs Shaft Lump	116,047	135,199	251,246	142,891
Cliffs Shaft Crushed	38,904	52,692	91,596	47,607
Bancroft Lump	9,840	25,297	35,137	30,238
Bancroft Crushed	5,980	14,543	20,523	16,703
T O T A L	170,771	227,731	398,502	237,439
Total Last Year	114,949	122,490	237,439	
INCREASE IN SHIPMENTS	55,822	105,241	161,063	

Shipments for the past five years follow:

Year	CLIFFS SHAFT			BANCROFT			Total
	Lump	Crushed	Run-of-Mine	Lump	Crushed	Run-of-Mine	
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

Shipments in 1935 were the best in the past five years.

c. Stockpile Balances:

The ore carried over for 1936 shows a material decrease over the ore in stock at any time in the past five years.

Balance in Stock, Dec. 31st, 1931	342,860 Tons
" " " Dec. 31st, 1932	395,173 "
" " " Dec. 31st, 1933	299,585 "
" " " Dec. 31st, 1934	275,391 "
" " " Dec. 31st, 1935	145,810 "

A detail of the 145,810 tons shown on hand at the end of 1935 follows:

Cliffs Shaft Lump	47,780 Tons
Cliffs Shaft Crushed	80,970 "
Bancroft Lump	3,300 "
Bancroft Crushed	13,760 "
T O T A L	145,810 "

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

d. Division of Product by Levels:

<u>Level</u>	<u>"A" Shaft</u>	<u>"B" Shaft</u>	<u>Total</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
First	9,148	17,746	26,894
Second	18,585	1,454	20,039
Third	4,876	5,602	10,478
Fourth	6,136	551	6,687
Fifth	27,440		27,440
Sixth	36,991	8,690	45,681
Seventh	14,624	11,203	25,827
Eighth	11,907	4,709	16,616
Ninth	25,090		25,090
Tenth	31,508	728	32,236
Eleventh	8,384		8,384
Twelfth	71	10,925	10,996
Thirteenth		9,055	9,055
Fourteenth		3,411	3,411
Fifteenth	87		87
T O T A L	194,847	74,074	268,921
R O C K			19,126
TOTAL ORE & ROCK			288,047

The following table shows the product from "A" and "B" shafts for the past five years:

<u>YEAR</u>	<u>"A" SHAFT TONS</u>		<u>"B" SHAFT TONS</u>		<u>TOTAL TONS</u>
1935	194,847	72.3%	74,074	27.7%	268,921
1934	157,835	70.8%	65,410	29.2%	223,245
1933	39,816	71.3%	16,123	28.7%	55,939
1932	56,533	68.7%	25,586	31.3%	82,219
1931	193,747	66.5%	97,310	33.5%	291,057

The figures indicate that gradually "A" shaft is furnishing a larger percentage of the total ore mined.

e. Production by Months:

<u>Month</u>	<u>Opt.</u>	<u>C.S.</u>	<u>C.S.</u>	<u>Ben.</u>	<u>Ben.</u>	<u>Rock</u>
	<u>Days</u>	<u>Lump</u>	<u>Crushed</u>	<u>Lump</u>	<u>Crushed</u>	
January	10	9476	4054	1020	430	1432
February	10	9140	3905	964	406	1338
March	13	12750	5448	1714	723	1494
April	13	14088	5482	2159	903	996
May	14	13322	5905	1874	1005	1884
June	12	11718	4814	1595	853	1512
July	14	14329	6346	1749	1052	1628
August	13	12562	5682	1615	1025	1928
September	13	12386	5392	1883	1003	1358
October	18	18647	8236	2962	1336	1914
November	17	17718	7230	3037	1322	1554
December	20	17808	7632	2956	1265	2088
Y E A R	167	170674	70800	19209	8238	19126

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

f. Ore Statement;

	C.S. Lump	C.S. Crushed	Ban. Lump	Ban. Crushed	Total	Last Year
On Hand Jan. 1, 1935	128352	101766	19228	26045	275391	282585
Output for Year	163944	70126	23528	11323	268921	223245
Transfers	6730	674	4319	3085		
Total	299026	172566	38437	34283	544312	512830
Shipments	251246	91596	35137	20523	398502	237439
Balance on Hand	47780	80970	3300	13760	145810	275391
Increase in Output					45676	

g. Delays:

Date	Hours	Tons Lost	Cause
Feb. 4	4	600	Trestle leg broken on lump pile.
Feb. 15	$\frac{3}{4}$	100	No current.
May 8	2	250	Equalizer on cage broken.
May 15	$1\frac{1}{2}$	200	Broken strand on hoisting rope.
June 12	$3\frac{3}{4}$	600	Starter on crusher switch broken.
July 10	$1\frac{3}{4}$	100	"A" shaft delayed taking injured man to surface.
Oct. 29	1	100	Skip dumping axle broken.
YEAR	$14\frac{1}{4}$	1950	

3. ANALYSIS:

a. Average Analysis on 1935 Output:

	Iron	Phos.	Silica
Cliffs Shaft Lump	58.61	.110	7.77
Cliffs Shaft Crushed	55.57	.113	11.25
Bancroft Lump	59.86	.102	6.26
Bancroft Crushed	56.38	.107	9.48

b. Average Analysis on Straight Cargoes:

Grade	MINE			LAKE ERIE	
	Iron	Phos.	Silica	Iron	Moist.
Cliffs Shaft Lump*	58.87	.108	7.45	59.33	.42
Cliffs Shaft Crushed*	56.58	.112	9.90	56.55	2.02

*Includes Bancroft Grades

Complete Analysis for 1935 Season:

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Lump Ore	59.00	.110	7.57	.46	2.30	1.50	1.06	.015	2.11
Crushed Ore	56.30	.111	10.50	.47	2.60	1.56	1.15	.018	2.32

Average Analysis on Mixed Cargoes as Sampled by Lake Erie Chemists:

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Lump Cargoes	59.25	.108	7.18	.50	2.24	1.48	1.03	.014	2.06

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1935

3. ANALYSIS:

d. Analysis of Ore in Stock Dec. 31st, 1935:

Grade		Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
C.S. Lump	Dried	59.10	.109	7.26	.46	2.55	1.20	.92	.019	2.10	
	Natural	58.80	.108	7.22	.46	2.54	1.19	.91	.019	2.09	.50
C.S. Crushed	Dried	56.15	.112	10.02	.52	2.61	1.46	1.19	.019	2.36	
	Natural	55.23	.110	9.86	.51	2.57	1.44	1.17	.019	2.32	1.63
Ban. Lump	Dried	60.53	.108	5.94	.31	2.50	1.30	.99	.017	1.65	
	Natural	60.26	.108	5.91	.31	2.49	1.29	.98	.017	1.64	.45
Ban. Crushed	Dried	57.11	.116	8.63	.34	3.06	1.40	1.11	.020	2.00	
	Natural	56.09	.114	8.48	.33	3.01	1.38	1.09	.020	1.96	1.78

e. Analysis of Ore Reserves:

Run-of-Mine Ore:

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Dried	58.30	.108	6.71	.40	2.45	1.50	1.20	.018	2.25	
Natural	57.02	.106	6.56	.39	2.40	1.47	1.17	.018	2.20	2.20

4. ESTIMATE OF ORE RESERVES:

Assumptions: 8, 9, and 10 cu. ft. per ton
10% Deduction for Rock
10% " " Loss in Mining

a. Ore in Sight as of Dec. 31st, 1935:

Cliffs Shaft Ore: "A" & "B" Shafts:

"A" SHAFT: AVAILABLE ORE:

	<u>Developed</u>		<u>Prospective</u>	<u>Total</u>
	<u>Floors</u>	<u>Pillars</u>		
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
1st Level		7,700		7,700
2nd "	13,600			13,600
3rd "	7,700			7,700
4th "	2,800			2,800
5th "	10,200	23,300		33,500
6th "	82,300	89,800	20,000	192,100
7th "	180,100	19,400	2,000	201,500
8th "	134,500	16,700	4,000	155,200
9th "	157,800	7,300	4,000	169,100
10th "	66,300	139,700	4,000	210,000
11th "	47,700	167,600	6,000	221,300
12th "	47,600	67,000		114,600
15th "	37,000			37,000
T O T A L	787,600	538,500	40,000	1,366,100

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4. ESTIMATE OF
ORE RESERVES:

a. Ore in Sight as of Dec. 31st, 1935: (Cont.)
Cliffs Shaft Ore: "A" and "B" Shafts:

	<u>"B" SHAFT: AVAILABLE ORE:</u>		<u>Prospective</u> <u>Breasts</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
	<u>Developed:</u>			
	<u>Floors</u> <u>Tons</u>	<u>Pillars</u> <u>Tons</u>		
1st Level	7,300	2,700		10,000
2nd "	3,000			3,000
3rd "	12,500	10,400	4,000	26,900
4th "			2,000	2,000
5th "	5,300			5,300
6th "	2,000	2,700		4,700
7th "	15,500	4,200		19,700
8th "	50,100	7,800	4,000	61,900
9th "	15,800			15,800
10th "	23,000			23,000
11th "	20,700	2,800		23,500
12th "	4,300	2,200	2,000	8,500
13th "	11,400	5,500	2,000	18,900
14th "	27,900	2,000		29,900
15th "	30,800	14,600		45,400
T O T A L	229,600	54,900	14,000	298,500

	<u>Available</u> <u>"A" Shaft</u> <u>Tons</u>	<u>Available</u> <u>"B" Shaft</u> <u>Tons</u>	<u>Total</u> <u>Available</u> <u>Tons</u>
<u>RECAPITULATION:</u>			
Cliffs Shaft Ore	1,366,100	298,500	1,664,600
Less 10% for Rock & 10% for Loss in Mining	259,560	56,715	316,275
Tons Available	1,106,540	241,785	1,348,325
Less December Production			25,440
Net Tons Available			1,322,885

Ore in Sight as of Dec. 31st, 1935:
Bancroft Grade:

	<u>AVAILABLE ORE:</u>		<u>Prospective</u> <u>Breasts</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
	<u>Developed</u>			
	<u>Floors</u> <u>Tons</u>	<u>Pillars</u> <u>Tons</u>		
1st Level		1,800	2,000	3,800
2nd "	10,500		2,000	12,500
3rd "	6,400	800		7,200
4th "	8,900	2,900	2,000	13,800
5th "	2,400	800	2,000	5,200
6th "	16,700	13,600		30,300
7th "	10,900		2,000	12,900
8th "	2,400	8,000	4,000	14,400
9th "	10,100			10,100
10th "		108,800		108,800
11th "	46,000			46,000
T O T A L	114,300	136,700	14,000	265,000

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4. ESTIMATE OF ORE RESERVES:

a. Ore in Sight as of Dec. 31st, 1935: Bancroft Grade: (Cont.)

<u>RECAPITULATION:</u>	
Bancroft Ore Available	265,000 Tons
Less 10% for Rock & 10% for Loss in Mining	50,350 "
Tons Available	214,650 "
Less December Production	4,221 "
Net Tons Available	210,429 "

<u>SUMMARY:</u>	
Cliffs Shaft Ore Available	1,322,885 Tons
Bancroft Ore Available	210,429 "
GRAND TOTAL	1,533,314 "

For purposes of comparison we are showing below the ore estimate for 1934 compared with last year's estimate.

	<u>1935</u>	<u>1934</u>
	<u>Tons</u>	<u>Tons</u>
Cliffs Shaft Ore Available	1,322,885	1,342,187
Bancroft Ore Available	210,429	204,730
Total Ore Available	1,533,314	1,546,917
Decrease for the Year 1935	13,603	

It will be noted that we have kept the ore reserves fairly constant because the amount of ore in sight at the end of 1935 was only 13,603 tons less than the tonnage available on Dec. 31st, 1934.

The following table gives some comparative figures for the past four years:

	<u>1930</u>	<u>1931</u>	<u>1932-34</u>	<u>1935</u>
Ore in Mine Jan. 1st	1,388,316	1,506,700	1,541,050	1,546,917
Production	412,786	303,638	361,303	268,921
Balance	975,530	1,203,062	1,179,747	1,277,996
Ore in Mine Dec. 31st	1,506,700	1,541,050	1,546,917	1,533,314
New Ore Developed	531,170	337,988	367,170	255,318
Excess over Production	118,384	34,350	5,867	13,603

The following table clearly shows how the ore reserves have been kept fairly constant in the Cliffs Shaft Mine for the past 14 years:

AVAILABLE ORE IN MINE END OF EACH YEAR:

1935	1,533,314 Tons
1934	1,546,917 "
1931	1,541,050 "
1930	1,506,700 "
1929	1,388,316 "
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 "

It is interesting to note that there are another 3,411,400 tons of ore underground tied up in pillars and floors about equally divided between "A" and "B" shafts.

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5. LABOR
AND
WAGES:

a. General:

The employees of the Cliffs Shaft Mine have averaged more days worked per year than have the men at the soft ore properties because of the speeding up of our working schedule. Furthermore, because we have hoisted overtime on an average of one extra day per week, about half the regular crew has benefited by working one more shift each week.

b. Comparative Statement of Wages and Product:

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	268,921	223,245	45,676	
No. of Shifts & Hours	1-8	1-8		
No. of Days Operated	167	140	27	
<u>AVG. NO. OF MEN EMPLOYED:</u>				
Surface	65	57	8	
Underground	242	231	11	
Total	307	288	19	
<u>AVG. WAGES PER DAY:</u>				
Surface	4.03	3.81	.22	
Underground	4.92	4.70	.22	
Total	4.70	4.48	.22	
<u>WAGES PER MO. OF 25 DAYS:</u>				
Surface	100.75	95.25	5.50	
Underground	123.00	117.50	5.50	
Total	117.50	112.00	5.50	
<u>WAGES PER MO. OF 22 DAYS:</u>				
Surface	88.66	83.82	4.84	
Underground	108.24	103.40	4.84	
Total	103.40	98.56	4.84	
<u>WAGES PER MO. OF 17 DAYS:</u>				
Surface	68.51	64.77	3.74	
Underground	83.64	79.90	3.74	
Total	79.90	76.16	3.74	
<u>WAGES PER MO. OF 13 DAYS:</u>				
Surface	52.39	49.53	2.86	
Underground	63.96	61.10	2.86	
Total	61.10	58.24	2.86	
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	17.42	19.60		2.18
Underground	6.08	6.46		.38
Total	4.51	4.86		.35

For sake of comparison, other years are tabulated taking us back to the pre-depression days:

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5. LABOR
AND
WAGES:

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

<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>
1935	17.42	6.08	4.51
1934	19.60	6.46	4.86
1933	8.65	4.57	2.99
1932	12.27	4.69	3.39
1931	18.75	5.62	4.26
1930	20.08	5.65	4.41
1929	20.67	5.86	4.56
1928	20.53	5.80	4.52

The comparative table would indicate that our efficiency has dropped sharply from the 1934 figures. True as far as figures are concerned, but figures take no account of the rehabilitation process going on at the Cliffs Shaft Mine in 1935. The Cliffs Shaft Mine is peculiar unto itself, in that there is no large ore reserve in sight at any one time. In 1932, 1933, and 1934 as little cash as possible was spent on development, replacement or repairs. Later in this report it will be shown that we have spent approximately \$ 50,000 more in 1935 than 1934 on development drifts and raises. That means more man shifts on dead work, but the productive capacity of this property in the next year and years to follow is dependent on the ore that we may find in our development campaign. The report also shows the great amount of labor spent underground repairing steel and wooden motor cars, repairing tracks, chutes, underground power system, etc.

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
<u>LABOR COST PER TON:</u>				
Surface	.232	.194	.038	
Underground	.809	.728	.081	
Total	1.041	.922	.119	

Following are comparative figures for the past eight years:

<u>Year</u>	<u>Surface Labor</u>	<u>Underground Labor</u>	<u>Total Labor</u>	<u>Labor Index*</u>
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
1928	.214	.861	1.075	161.70

*Labor Index compares yearly wage rate with that in effect June 30th, 1916.

Labor costs per ton are meaningless if the wage index is disregarded.

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5. LABOR
AND
WAGES:

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

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
Average Product Stopping and Trammig	16.10	16.81		.71
Average Product Stopping & Trammig Including Haulage Men	13.24	13.41		.17
Avg. Wages Cont. Miners	\$ 5.54	\$ 5.15	.39	
Avg. Wages Cont. Trammers	6.33	5.72	.61	
Avg. Wages Cont. Labor	5.67	5.25	.42	

TOTAL NO. OF DAYS:

Surface	15,436	11,389 $\frac{1}{2}$	4,046 $\frac{1}{2}$
Underground	44,161	34,520 $\frac{1}{2}$	9,640 $\frac{1}{2}$
Total	59,597	45,910	13,687

AMOUNT FOR LABOR:

Surface	62,302.40	43,402.16	18,900.24
Underground	217,647.51	162,410.14	55,237.37
Total	279,949.91	205,812.30	74,137.61

PROPORTION OF SURFACE TO UNDERGROUND MEN:

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 and Repairs:

Following is comparative data for five years:

	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
Office Building	280.72	590.14	46.15	49.24	149.03
Shops	410.10	1.80	65.34	16.38	121.33
Shaft Houses	404.32	127.51	120.91	62.00	66.39
Engine House	66.97	114.71	61.46	42.94	440.87
Dry House	823.32	224.16	202.34	68.17	455.38
Coal Dock	146.79	892.50	27.82	36.68	108.57
Miscellaneous	409.85	414.22	120.20	15.19	132.57
Fire Protection	97.05	14.48	43.28	22.34	26.13
T O T A L	2639.12	2379.52	687.50	312.94	1500.27

SHOPS:

A new "Moloch" stoker was installed in the basement of the shop building to serve the shop heating plant.

The west end of the machine shop was revamped to make room for the Jackbit grinding shop. The lathes, pipe cutter and threading machine, and cut off saw were moved, the lathes being stored and the other machines shifted to new locations. A partition was built across the centre of the room and three Jackbit grinders installed along the south wall. The new Westinghouse electric tempering and drawing furnace was set up in the centre of the area reserved for the Jackbits,

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6. SURFACE:

SHOPS: (Cont.)

the oil and water tempering tanks being placed along the north wall. A new concrete floor was laid over all the old floor of the shop.

In order to take care of the water and cuttings from the Jackbit grinders, a new six-inch sewer was laid along the south side of the north pocket track from the back of the shop building to the "A" shaft launder, directly south of "A" shaft. A settling tank was also provided near the south wall of the shops, which is housed in to prevent freezing in the winter months. The cuttings from the grinders are so heavy that they would quickly block a sewer pipe. Our installation allows us to segregate the cuttings in one spot.

The drill shop near "A" shaft was also rebuilt to provide for a new crushing room for the preparation of the samples for the central laboratory. The west one-third of the shops was partitioned off with sheetrock and machinery in duplicate installed to prevent any delay in the drying and preparing of the ore samples for the laboratory. The equipment was not all completely installed by the end of the year, because the Electrical Department and the Main Shops had not finished building a drying unit and a set of rolls.

SHAFT HOUSES:

Repairs were made on the planked floors and stairways in both "A" and "B" shafts. We also rebuilt the mouths of both storage pockets at the skip dumps and redesigned and replaced the steel fingers at the bottoms of the pockets.

DRY HOUSE:

A new hot water heating tank was installed and the piping rearranged so that the shower-baths are now supplied with hot water independently of the hot water taps for the wash troughs.

We also laid a new two-inch copper pipe from the City main to the dry to give us a more plentiful supply of cold water and to increase the pressure. This was done largely to improve the bath facilities.

COAL DOCK:

A portion of the east end of the old coal dock was torn down to make room for the rock from the picking belt. The idea is to eventually extend the rock trestle out into the old gravel pit area.

7. UNDERGROUND:

a. Development:

There are a number of classifications under which development work can be considered, viz., rock drifting, rock raising, ore drifting, ore raising, and ore stoping, provided in the case of the latter classification any contract is raising or breasted in a stope of our standard width, which is 25 ft., into territory that is not included in the previous year's estimate. We have found from experience that the ore reserves can be maintained in the Cliffs Shaft Mine provided that half of the stoping gangs are working in advancing headings, while the other half are mining backs or floors. A contract that is driving an advancing stope or stope raising ordinarily develops about twice as much ore as they mine out during the year, because usually the ore in the floor, back, and breast of the stope offsets what they actually mine out. Inasmuch as we usually carry the stopes around 15 or 16 ft. in height and as usually the same thickness of ore is left in place in the floor and back, and because a gang mining out floors or backs in a year mines out approximately the same tonnage as the development stoping gang, it will be apparent that if only half of the contracts in the mine producing

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7. UNDERGROUND:

a. Development: (Cont.)

the bulk of the tonnage are mining floors, then the ore reserves will be maintained at about the same tonnage.

There were (16) contracts doing development work in "A" shaft. I will not attempt to describe under the heading "Development" the gangs that are stope raising or breasting ahead into new territory, because these contracts should be more properly classified with the regular stoping gangs.

The development work in detail is as follows:

Sixth Level - "A" Shaft:

In the North Vein contract No. 28 in the extreme northeast corner of the 6th level East drifted northeasterly in mixed siderite and dike between the 3200 and 3400 East coordinate lines. After driving their drift ahead for a distance of 90 ft., they encountered a little ore in the back, and they spent the latter part of the year raising in ore. Along in about November the orebody began to open up and get wider, and by the end of the year this contract had developed a considerable tonnage of high grade ore a short distance above the sixth level.

In the Southeast Vein, two contracts, Nos. 45 and 60, did a considerable amount of ore raising during the year.

No. 60 put up two raises from the seventh to the fifth level along in about the center of the Southeast Vein. The purpose of these raises was to make the fifth level floor available for mining.

300 ft. east of No. 60's most easterly raise near the 2500 East coordinate line, No. 45 contract put up a raise from the 7th to the 5th level, thereby making it possible to mine out the large floor in the extreme east end of the Southeast Vein on the 6th level and also making it possible to mine what little ore is left in this same area on the 5th level.

Eighth Level - "A" Shaft:

There were four gangs doing development work in the North Vein on the 8th level. Two of these gangs, Nos. 4 and 5, were employed on the west side of the vein, while Nos. 23 and 44 were developing in the extreme east end of the 8th level.

No. 44 raised from the 8th level to No. 20's old sub above the 7th level. As mentioned in the monthly reports the first (50) ft. of this raise was mixed ore and rock, but the top of the raise, that is, from the 7th level elevation to the sub, which is 15 or 16 ft. above the 7th, was all in high grade ore.

400 ft. to the east of No. 4's raise, contract No. 5 drove a short rock drift north and south parallel with the 2100 East coordinate line. This drift is to provide room for a storage track at the foot of a new raise.

On the extreme east end of the 8th level East contract No. 23 drove a drift into the footwall between the 3000 and 3200 East coordinate lines. This drift was being driven in the hopes of finding the ore that was discovered by drilling a great many years ago in the old drill-holes in No. 3 Mine. Inasmuch as we were exploring on the 6th level with No. 28 contract in this same territory, we decided that it might be unwise to duplicate the efforts on the 8th level, and so No. 23 was moved to the 10th level.

A short distance south of No. 23, contract No. 44 put up a new raise, most of it in rock, from the 8th to the 6th level. The idea of this raise was to hole into the bottom of No. 8's raise so that the ore mined by No. 8 near the 4th level elevation could be dropped directly to the 8th level instead of transferring it on the 6th level.

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7. UNDERGROUND:

a. Development:

Tenth Level - "A" Shaft:

There were more developing gangs on the 10th level than there were on any other level in the mine. In the Bancroft Vein we had four gangs. No. 10, over on the west side of the Bancroft Lens, discovered the most ore. No. 10 put up three raises and then started a new stope at the 9th level elevation.

No. 70 contract holed a new raise in ore from the 10th to the 8th level, proving that near the 2200 East coordinate line the Bancroft ore is continuous from the 8th level all the way down to the 10th, 100 ft. below the 8th.

Over on the east side of the same orebody, which we call the "North Vein," because it is our own fee property, and in order to avoid confusion all of the ore in the Cliffs Shaft Mine near the Bancroft Lease boundary lines is called the "North Vein," we had two gangs, Nos. 23 and 64. No. 23 is drifting due east in footwall jasper in order to provide a new outlet for No. 25's ore on the 8th level.

In the extreme northeast corner, No. 64 after raising a short distance in rock, turned to the west and hit the ore, and then raised in ore pretty close to the 8th level elevation before running back into rock. Down on the sill floor of the 10th level No. 23 also found some ore that probably connects with No. 64's orebody in the raise.

In the Main Vein over in the extreme east end of the 10th level East, two gangs, Nos. 35 and 50, have been developing in ore. No. 35 found some magnetite on the sill floor of the level and also developed some slate ore near the 3000 East coordinate line; they also raised from the 10th to the 9th level.

Directly south of No. 35, No. 50 contract raised in ore from the 11th level to the 10th and then drifted southeasterly from the top of their raise in ore towards Diamond-Drill Hole No. 234, which shows 25 ft. of high grade ore at the 10th level elevation.

Twelfth Level - "A" Shaft:

On the 12th level No. 5 contract put up three raises to the 11th and also extended their footwall drift for a short distance to the south. All of the raises were in rock or mixed ore and jasper. Diamond drilling done the latter part of the year developed the fact that the orebody, which comes down from the 9th level to the 11th, pinches out a short distance below the latter elevation.

Fifteenth Level - "A" Shaft:

Quite an extensive development campaign was carried on on the 15th level. The biggest project was the driving of the main drift due east for a distance of 500 ft. This work was done by No. 71 contract and by using Jackbits we were able to speed up the work in this drift materially. When you keep in mind that the Cliffs Shaft Mine for the year only actually worked half time, the driving of a drift 500 ft. and in addition putting up a considerable footage of raises, the total footage involved is more than we have ever been able to report at any previous time. Later in this report we will go into considerable detail showing how the introduction of the Jackbit or detachable bit has increased the footage and cut the cost per foot. The purpose of this drift was to make it possible to put up the raise or raises under the extreme east end of the 11th and 12th levels so that the ore from the bottom of the "A" shaft territory could be transferred over to "B" shaft to balance the hoist. We mean by that, it is necessary to take

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7. UNDERGROUND:

a. Development:

Fifteenth Level - "A" Shaft: (Cont.)

considerable ore from some of the contracts in "A" shaft and send it over to "B" shaft so that a full skip of ore can be hoisted alternately in each shaft throughout the entire day.

In the extreme northeast corner of the 15th level No. 58 contract put up two raises, the raise going east being up in rock to the 13th level elevation; the raise pitching west is up to the 12th level and the last 50 ft. of the raise has shown up considerable ore. At the close of the year this contract was drifting on a sub-level corresponding to the 12th level elevation in high grade ore.

In the "B" shaft territory naturally because of the shape and size of the ore-bearing horizon there is not so much opportunity to have as many gangs on development work as there is on the "A" shaft side of the mine. However, we have made every effort to develop all the tonnage possible and opened up all the new working places that we possibly could in "B" shaft. An examination of the ore trammed on the different levels shows that the production from "B" shaft is gradually decreasing.

Fifth Level - "B" Shaft:

On the 5th level in the Main Vein a short distance northwest of "B" shaft, contract No. 63 drove a new drift parallel with the 200 South coordinate line and then put up a new raise to the 2nd level. Most of the raise was in ore the entire distance from the 5th to the 2nd level. The purpose of this development program was to stop the transferring of the ore discovered in the new stope in the northwest limb of the ore syncline. It would appear that contract No. 72 has great possibilities and the new drift and raise make it possible to scrape this ore so that we can get it into motor cars close to the shaft on the 5th level.

Tenth Level - "B" Shaft:

On the 10th level No. 47 contract has been doing considerable development work. They have been employed in two places; they are driving a drift west towards the ore found in the drill-holes on the west side of Section 9 and they also drove a crosscut north between the 600 and 800 West coordinate lines in order to get a raise up under No. 36 on the 8th level, which is the downward extension of No. 37's ore on the 6th level. Early in the year No. 47, drifting west, ran into ore and for a month and a half we were able to keep the main drift in the ore. The orebody, however, swung off to the northwest and after following it a short distance in that direction it appeared to pinch out. Drifting on the regular line of the drift was then resumed, because our real objective still lies about a quarter of a mile ahead of the breast.

Twelfth Level - "B" Shaft:

On the 12th level in the Fault Vein No. 14 contract drifted south, mostly in ore, parallel with the 1200 West coordinate line and then raised in ore to the 10th. The purpose of this drift and raise is to make the ore in the floor of old No. 14's stope available for mining.

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7. UNDERGROUND:

b. Stoping:

First Level - "A" Shaft:

There are two contracts on or above the 1st level, Nos. 9 and 34.

No. 9 in the extreme east end of the North Vein mined floors the entire year. They spent, however, considerable time during the year removing rock in order to make the ore in the floor beneath the rock pile available. This rock had accumulated while the drifts were driven a great many years ago over what was then the Oliver Iron Mining Co.'s property in order to provide diamond-drill stations for the latter company.

No. 34 put up a new stope raise on the footwall close to the 600 East coordinate line and also mined out the bottom of their other raising stopes, taking the ore on the footwall in the two stopes lying to the east or close to the 700 East coordinate line.

Second Level - "A" Shaft:

On the 2nd level we find three gangs, No. 34 in the Bancroft Vein, No. 30 in the North Vein, and No. 27 in the Main Vein.

The first named contract, working about 300 ft. north of the south boundary of the Bancroft Lease, put up a raising stope on the footwall and also drove two crosscuts, leaving pillars enough to support the back. This particular orebody is not very high grade and neither is it very wide.

In the North Vein and a short distance away from the southwest corner of the Bancroft Lease, No. 30 mined the floor from the 2nd level down to the 3rd, taking the floor as far east as they possibly could without interfering with No. 34 contract on the 1st level.

In the south side of the Main Vein about halfway between "A" and "B" shaft, No. 27 contract, one of the very best in the mine, mined floors and also put up two raising stopes during the year 1935. The area where this contract works in is far from being exhausted and at the end of the year conditions looked just as favorable for finding additional ore near the 3rd level as they looked at the beginning of the year.

Third Level - "A" Shaft:

During the year 1935 two gangs, Nos. 29 and 30, worked the entire year in the Bancroft territory. No. 29 was employed on a sub above the 3rd, while No. 30 worked between the 2nd and 3rd levels. No. 29 not only drove a breast stope both east and west on their sub, but also put up one stope raise through to the 2nd level. No. 30 mined known reserves very close to the south boundary of the Bancroft Lease and took out most of their production during the year from the back of the old stopes.

Fourth Level - "A" Shaft:

We had only one gang on the 4th level during the year and that was No. 22. This gang in the extreme east end of the North Vein did not add to our ore reserves, being a depleting gang, that is, they mined the entire year in either the floor or back of the old stopes.

I just remarked that there was only one gang working at the 4th level elevation, but actually there were three contracts, but the other two are the two halves of No. 8 contract, which have always been described under the "6th Level" caption. That is due to the fact that they belong to the 6th level territory and the only way that you can get into these gangs is to climb up through the main raise from the 6th level. However, inasmuch as the two miners in No. 8 contract are actually working at the 4th level elevation between the 3100 and 3300 East coordinate lines, it might be well to point

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7. UNDERGROUND:

b. Stoping:

Fourth Level - "A" Shaft: (Cont.)

out that both these gangs are so-called "development stoping" contracts, that is, they are mining ore not included in last year's ore estimate. It would appear at the present moment that we have a new orebody back in behind the footwall of old No. 8's stope running all the way from the 4th down to the 6th, and we know 15 or 20 ft. below the 6th, because of the ore found in No. 44's raise described previously in this report.

Fifth Level - "A" Shaft:

On the 5th level six gangs were employed during the year.

In the extreme southeast corner of the Bancroft Lease we find two contracts, Nos. 51 and 66. Both of these gangs are mining developed reserves, although No. 66 might properly also be called a developing stoping gang during a portion of the year, because they did extend the southwest side of their stope beyond the limits of the orebody shown on last year's report.

In the North Vein, which in this case is merely an extension of the Bancroft ore, we find two No. 32 contracts; one of the No. 32's spent the entire year mining in the back, while the other No. 32 took out some floors and also drove their breast stope to the east. The latter contract also drove a drift back into the footwall and found some ore mixed with the footwall rock, but not enough to warrant further exploration.

Over in the extreme northwest corner of the level, No. 57, which is sometimes classified as a "B" shaft contract, is mining floors between the 5th and 6th levels. Although the contract is tributary to "A" shaft, the "B" shaft operating personnel supervises this contract; all the ore from this contract is also hoisted through "B" shaft. This contract is also in the North Vein.

In the Southeast Vein contract No. 2 has finished taking out all the available ore above the 5th level. During the latter part of the year this contract was stopped pending the completion of No. 60's raise. Near the close of the year this contract resumed mining.

Sixth Level - "A" Shaft:

On the 6th level we had quite a number of gangs in the North Vein during the year.

Starting over on the west side between "A" and "B" shaft, No. 40, another "B" shaft gang in "A" shaft territory, drove their west breast to the limit and then came back and started mining out the floor of this sub between the 6th and 7th levels.

1400 ft. east of No. 40, No. 16 contract also took out floors near the 1800 East coordinate line. In addition to taking out floors this contract also breast stoped both north and east. During the latter part of the year their raise became plugged and they were moved down to a lower elevation, where they started driving a breast stope in ore over to a knuckle in the raise.

200 ft. south of No. 16 is No. 20 contract, another so-called "depleting gang." A short distance we find No. 59 mining floors, and then jumping 400 ft. further east, No. 52 is mining floors and took out a considerable tonnage between the 6th and 7th levels. Directly northeast of No. 52 near the 2500 East coordinate line, No. 66 contract mentioned before as mining on the 5th, also started stoping at the 6th level elevation. With all the contracts mentioned on the 6th level, No. 66 is the only one working in the Bancroft Lens, all the others being employed in the North Vein.

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7. UNDERGROUND:

b. Stoping:

Sixth Level - "A" Shaft: (Cont.)

Continuing east and going to the extreme southeast corner of the level, No. 12 was really a developing gang, because they put up a stope raise to almost the 4th level elevation. At the end of the year they were beginning to crosscut towards the old 4th level in the Incline Mine. We now plan on making a connection with the old Incline, which will make it possible for this miner to get all his tools and supplies and to bring his air lines in from the top, which will make him a more efficient miner because for sometime he has to remove everything from his working place prior to a blast, and with the new scheme he will not have to do that.

In the Southeast Vein two gangs, Nos. 6 and 45, have also been mining ore included in last year's estimate. No. 6 has been taking floors between the 6th and 7th levels over on the west side of the Southeast Vein, while No. 45 mined out a considerable floor area close to the 2500 East coordinate line in the east end of the Southeast Vein. This latter contract also did considerable raising as mentioned previously in this report.

Seventh Level - "A" Shaft:

There are only two gangs on the 7th level, Nos. 15 and 67. No. 15 is a depleting gang mining floors, while No. 67 is a developing stoping contract. The latter contract spent most of the year putting up a stope raise between the 3100 and 3200 East coordinate lines.

Eighth Level - "A" Shaft:

There were four gangs stoping on the 8th level in three widely separated areas.

No. 25 contract, which is a double gang over in the extreme northeast corner of the level in the North Vein, opened up two good size development stopes. This portion of the mine looks extremely favorable for future explorations, as both the No. 25 gangs seem to have discovered good, strong, healthy veins of ore.

In the northwest corner of the level in the Bancroft Vein No. 62 has been mining floors between the 7th and 8th levels.

In the southwest corner of the level No. 41 worked the entire year scrambling. During the past year No. 41 has given us more tonnage per day than at any time during the previous four or five years, but by the end of the year their working place was pretty well exhausted.

Ninth Level - "A" Shaft:

In the Main Vein there were two gangs, Nos. 24 and 55, both of them mining floors during the entire year 1935.

A short distance to the southeast of No. 55, No. 65 in the west end of the Southeast Vein also spent most of the year taking out developed reserves in the floor of the old stope. We think, however, that there is considerable ore underneath the footwall, which No. 65 has been working on, and that this section of the mine is far from being exhausted.

Tenth Level - "A" Shaft:

The 10th level is one of the busiest in the mine because there are so many gangs working in the Main Vein. Furthermore, some of the most productive gangs in the Cliffs Shaft Mine work in this area.

Beginning on the west side of the 10th level, No. 53 in addition to taking floors also drove a breast stope west on their sub above the 10th level. A short distance to the southeast of No. 53, we find No. 3 putting up stope raises during the entire year. All of these raises

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7. UNDERGROUND:

b. Stoping:

Tenth Level - "A" Shaft: (Cont.)

went up on the footwall towards No. 55. A short distance to the north of No. 3, we find four contracts running east and west, viz., Nos. 39, 21, 11, and 26. The first three gangs named are mining floors, but No. 26 is really a developing stoping gang. The latter contract drove their breast stope south for a considerable distance into what we supposed to be the hanging and an examination of the geological section in this area reveals the fact that it might be possible for this stope to run another 125 ft. still further to the south. If that is the case and the same thing happens in the new stope that No. 26 has started still further to the east, it may be possible to develop an ore area here 200 ft. square. It might be interesting to say in passing right at this point that an ore area 200 ft. square and 90 ft. high would furnish a year's production working six days a week.

Eleventh Level - "A" Shaft:

Both of the gangs working on the 11th level, Nos. 7 and 68, can be classified as development stoping gangs. No. 7 has pushed its breast out farther north than we anticipated the ore would go and No. 68 is developing considerable new tonnage over on the extreme east side of the Main Vein on the 11th level. No. 68 is not only exploring north, but also driving breast stopes both east and west. In order to improve the ventilation in the bottom of the "A" shaft territory No. 68 also put up a raise to the 10th level.

First Level - "B" Shaft:

There were three stoping gangs employed during the entire year on the 1st level or the subs above, viz., Nos. 1, 17, and 18. The first named mined floors in the Southeast Vein close to the south boundary of the Cliffs Shaft Mine. The other two gangs, Nos. 17 and 18, were up on the subs above the 1st level. No. 17, southeast of "B" shaft, not only mined floors, but also did considerable breast stoping so that they actually developed more new ore than they mined during the year. No. 18 contract during the year mined floors from the 1204 to the 1245 ft. sub directly south of "B" shaft. At the end of the year conditions in this particular contract did not look very favorable for finding much additional ore.

Second Level - "B" Shaft:

On the second level in the Main Vein a short distance northwest of "B" shaft, contract No. 73 mined out floors. They also spent the latter portion of the year barring and moving rock in order to make additional floors available and then it was also decided to put up a new raise from the 4th level in order to make it easier to handle the ore that No. 73 would mine in the future.

Third Level - "B" Shaft:

Over in the northwest corner of the 3rd level No. 72 contract has been finding some very interesting developments. This contract after driving a breast stope nearly 60 ft. wide on the 3rd level, put up two raises, which go up to over the 1st level elevation. At the top of these raises a sub-level has been driven and now they have resumed raising, because we have lost both foot and contact and so have no idea how large the orebody might be. Before finding this large orebody No. 72 drifted west on the 3rd level for over 600 ft. following a leader about a drift wide, and the strange thing is that the two drill-holes drilled years ago out into this same area do not show any evidence of having hit this particular orebody.

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7. UNDERGROUND:

b. Stoping:

Third Level - "B" Shaft: (Cont.)

No. 33 contract, another development gang, spent part of the year on the level below stope raising and also during the early part of 1935 mined a small floor on the 3rd level.

Sixth Level - "B" Shaft:

On the 6th level directly northeast of "B" shaft, contract No. 42 continued to mine floors as they have for the past six or seven years, spending most of their time at or near the 6th level elevation. This contract is mining in the North Vein.

Seventh Level - "B" Shaft:

There are three contracts employed on or above the 7th level, Nos. 13, 38, and 69. No. 13 mined floors or developed reserves, while the other two gangs, Nos. 38 and 69, have been stope raising. Both of the latter gangs are in the Main Vein. No. 38 was not a very heavy producer during the year, as they spent a great deal of their time barring. No. 69 during 1935 devoted a great deal of their time to raising, but at the end of the year had apparently discovered a new ore lens lying north of the Main Vein. It is probably merely an extension of the Main Vein, separated from the latter by a seam of rock.

Eighth Level - "B" Shaft:

In the northwest corner of the 8th level contract No. 36 has been developing a considerable tonnage of new ore. They have been breast stoping both east and west and the west breast looks particularly good. The ore in the east side at the end of the year was showing some signs of pinching out.

Ninth Level - "B" Shaft:

At the close of the year No. 19 contract was stope raising in the Main Vein near the 1200 West coordinate line. During the early part of the year this contract was mining floors between the 4th and 6th levels over in the extreme west end of the Main Vein. The ore that No. 19 was stope raising in in December we have apparently found on the 10th level and also on the 8th, and we now plan on going down to the bottom level and start raising from the bottom of the deposit.

Twelfth Level - "B" Shaft:

There were two gangs on the 12th level a portion of the year. Contract No. 31 scammed what ore was left on the sub above the 12th south of the Main Vein near the 1000 West coordinate line. No. 43, 400 ft. farther west, mined floors the entire year between the 12th and 14th levels in the Fault Vein.

Thirteenth Level - "B" Shaft:

On the 13th level four gangs were employed during the year, all of them mining developed reserves. To be accurate one of these gangs spent the entire year barring to make the back safe preparatory to mining out floors. Two of these gangs, Nos. 37 and 46, took out floors on the north side of the Main Deposit, while the other two contracts, Nos. 48 and 56, were over on the south side.

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7. UNDERGROUND:b. Stoping:Resume:

A summary of the contracts on ore and rock development and also including the ore stoping gangs that were stope raising or breasting shows the following gangs so employed during the entire year:

Developing Drifts or Raises:"A" Shaft:

Contract No. 4	North Vein
" " 5	Southeast Vein
" " 10	Bancroft Vein
" " 23	North Vein
" " 28	" "
" " 35	Main Vein
" " 44	North Vein
" " 50	Main Vein
" " 58	Bancroft Vein
" " 60	Southeast Vein
" " 64	North Vein
" " 70	Bancroft Vein
" " 71	Main Vein

"B" Shaft:

Contract No. 14	Fault Vein
" " 47	Section 9 Exploration
" " 63	Main Vein
" " 69	Main Vein
" " 72	North Vein

Developing Breasting or Raising Stopes:"A" Shaft:

Contract No. 7	Main Vein
" " 8	(2) Gangs - North Vein
" " 12	Incline Vein
" " 16	North Vein
" " 25	(2) Gangs - North Vein
" " 26	Main Vein
" " 29	Bancroft Vein
" " 32	North Vein
" " 34	Bancroft Vein
" " 68	Main Vein

"B" Shaft:

Contract No. 17	Main Vein
" " 33	Fault Vein
" " 36	North Vein
" " 57	North Vein

The foregoing contracts, (34) in number, are those that spent the entire year looking for or developing new ore areas, and in addition there were (15) other gangs that spent part of the year on the development program. The rest of the (73) contracts, or actually (76) gangs because three of them are double contracts, mined out developed reserves. That means that (27) miners spent the entire year mining floors and backs or barring loose.

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7. UNDERGROUND:

b. Stoping: (Cont.)

It might be interesting to compare the tons per man per day stoping with previous years:

<u>Year</u>	<u>Tons per Man per Day Stopping</u>
1935	25.93
1934	24.74
1933	20.00
1932	23.02
1931	23.19
1930	23.80
1929	22.41
1928	21.15

The above figures show how the year 1935 stands clearly ahead of any of the previous years.

c. Drifting and Raising:

The total amount of drifting and raising done in 1935 equals 5689 ft. compared with 3170 ft. in 1934. The shifts operated in 1934 were (140) compared with (167) in 1935, so it is very apparent that we did more development work per shift last year than the year before. More tonnage is desired in 1936 and you cannot get ore from a hard ore mine with scattered lenses and veins without considerable preparatory development work. One might well ask how it was possible since 1931 to keep up the reserves with the small amount of development that is indicated in the table that follows, and the answer is that we were extremely fortunate to discover and develop the large Bancroft ore area on the 10th level "A" shaft in those years. A new ore strike of that size is extremely rare, as usually the ore lenses discovered during the year consist of a number of comparatively small ore areas. A large ore lens runs into tonnage pretty fast as the height and depth are determined.

<u>Year</u>	<u>Rock Drifts & Raises</u>	<u>Ore Drifts & Raises</u>	<u>Total</u>
1935	3043 Ft.	2646 Ft.	5689 Ft.
1934	2061 "	1109 "	3170 "
1933	615 "	372 "	987 "
1932	1357 "	585 "	1942 "
1931	3577 "	3212 "	6789 "
1930	6496 "	3704 "	10200 "
1929	5443 "	3082 "	8525 "
1928	4762 "	1848 "	6610 "
1927	4874 "	2494 "	7368 "
1926	3051 "	2907 "	5958 "

It will be noted that you have to go back to 1931 to find a record comparable to 1935, and even 1931 does not quite equal 1935, because the mine worked 201 days in 1931. To put it another way, the footage of development work per shift was 33.95 in 1935 compared with 33.70 in 1931.

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7. UNDERGROUND:

d. Explosives, Drilling and Blasting:

Explosives Statement for Year 1935:

Stopping and Development in Ore:

<u>Kind</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1935</u>	<u>Amount 1934</u>
50% LF Ex. Gelatine				115.50
Gelamite "2X"				4002.00
50% LF Standard	128,100	11.133	14261.29	11807.01
60% LF Extra Gelatin	97,450	12.48	12154.08	3689.40
Total Powder	225,550	11.71	26415.37	19613.91
Proportion Battery Cost			28.01	26.25
No. 6 Blasting Caps	65,750	11.10 M	729.83	652.16
Eagle Brand Fuse	326,100	5.70 M	1858.77	1350.18
Connecting Wire				19.04
Duplex Shot Wire	8,240	10.17 M	83.85	13.75
Electric Blasting Caps	1,700	11.10 C	188.72	62.83
Fuse Lighters	19,500	6.82 M	133.12	57.70
Fuse Igniters				20.00
Match Sticks				6.25
Duplex Lead Wire				3.50
California Cap Crimper			21.59	
Total Blasting Supplies			3043.89	2211.66
<u>TOTAL ALL EXPLOSIVES</u>			<u>29459.26</u>	<u>21825.57</u>
PRODUCT			268921	223245
Lbs. Powder per Ton of Ore			.8387	.7838
Cost per Ton for Powder			.0982	.0879
Cost per Ton for Fuse, Etc.			.0113	.0099
Cost per Ton for All Explosives			.1095	.0978
<u>Development in Rock:</u>				
Gelamite "2X"				504.00
50% LF Extra	650	11.06	71.87	1043.04
60% LF Extra Gelatin	48500	12.46	6044.67	2265.10
Total Powder	49150	12.44	6116.54	3812.14
Prop. Blasting Machines			24.00	15.00
No. 6 Blasting Caps	9600	11.14 M	106.97	113.86
Eagle Brand Fuse	68000	5.70 M	387.60	306.66
Connecting Wire				4.48
Duplex Shot Wire	8680	9.26 M	80.45	10.20
Electric Blasting Caps	1624	10.35 C	168.01	19.86
Fuse Lighters	2000	5.06 M	10.12	13.18
Fuse Lighters, Paper & Powder				6.66
Match Sticks				1.25
Leading Wire	350		5.00	14.00
Prop. Crimper Cost			5.00	
Total Blasting Supplies			787.15	505.15
<u>TOTAL ALL EXPLOSIVES</u>			<u>6903.69</u>	<u>4317.29</u>
FOOTAGE			3043	2061
Cost per Ft. for All Explosives			2.268	2.09
Total Explosives as per Cost Sheet			36362.95	26142.86
Avg. Cost per Pound for Powder			.117	.112

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7. UNDERGROUND:d. Explosives, Drilling and Blasting: (Cont.)

Following are comparative figures for the past six years:

<u>Year</u>	<u>Lbs. Powder per Ton of Ore</u>	<u>Cost per Ton for Powder</u>
1935	.8387	\$.0982
1934	.7838	.0879
1933	.7561	.0927
1932	.7312	.0914
1931	.8512	.1080
1930	.8738	.1128

The comparative figures indicate that the miners used powder more generously in 1935 than they did in the three prior years. I would, however, like to call attention to the larger development program in 1935 and it will be noted if one compares the ore development work done in 1935 with 1931 and 1930, that those years also show a higher consumption of powder per ton of ore. Another factor enters into the problem, and that is, the additional number of gangs mining hard steel ore. We have been placing an increasing number of contracts in the old workings, which were abandoned years ago because with the equipment then in use it was not possible to drill holes deep enough in the hard steel ore. Consequently many of the old stopes were not mined out. Right at the present time in the "B" shaft territory, where our working places are none too numerous, we have nine gangs out of a total of twenty-five mining in the old workings.

There is still another reason for the lower powder consumption in 1932 to 1934, and that is, that the block-holing in the Cliffs Shaft Mine can be done to better advantage when the mine does not operate to exceed three days per week. If the miners blast their regular stope holes on Monday, Wednesday, and Friday afternoons, we could then block-hole the large chunks on the intervening days. One of the shift bosses and a miner, for instance, could drill the large chunks preparatory to blasting. With the mine operating nearly every day, we do not have the opportunity to block-hole on the day shift, and as a result, more bulldozing is done to prevent delays in scraping. We are now planning on getting a couple of extra gangs of miners to try and do the chunk blasting on the night shift. To make this effective, however, requires the services of at least two men who know the entire mine and all the traveling roads.

The following table shows the quantity of powder used in rock drifting and raising for the past six years:

<u>Year</u>	<u>Footage</u>	<u>Lbs. of Powder</u>	<u>Lbs. per Foot</u>
1935	3,043	49,150	16.1
1934	2,061	32,800	15.9
1933	615	9,200	15.0
1932	1,357	20,100	14.8
1931	3,577	63,150	17.6
1930	6,426	103,500	15.9

The amount of powder used per foot of drift shows a slight increase per foot. Again figures are not comparative unless one knows the ratio of the hard jasper, conglomerate, and siderite drifted and raised in compared with the softer dike, slate, and quartzite, although the latter can be quite tough and hard.

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8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	268,921	223,245	45,676	
Underground Costs	1.430	1.258	.172	
Surface Costs	.224	.200	.024	
General Mine Expenses	.262	.294		.032
Cost of Production	1.916	1.752	.164	
Depreciation	.002	.004		.002
Taxes	.378	.445		.067
Loading and Shipping	.043	.033	.010	
TOTAL COST AT MINE	2.339	2.234	.105	
No. of Days Operating	167	140	27	
No. of Shifts & Hours	1-8	1-8		
Avg. Daily Product	1610	1595	15	

The above figures show that the average daily product is higher than last year and it might be interesting at this point to tabulate the average daily hoist for a few years back.

<u>Year</u>	<u>Avg. Daily Product</u>
1935	1610
1934	1595
1933	1331
1932	1368
1931	1448
1930	1383
1929	1400

There has been no change in the number of contracts working underground in the past seven years, because in 1929 we had (72) contracts underground and in 1935 (73) gangs, but for a large portion of 1935 there was no No. 37 contract. The increase in tonnage is due to more mechanical equipment, better drills and the use of Jackbits. The detachable bits had very little chance to prove their real worth in the ore stopes last year, because we concentrated on speeding up the development work and later in this report that fact will be brought out very clearly.

The cost of production shows an increase, however, due to a number of factors; the principal ones being the difference in wage rates; providing employment for old employees; repairs and replacement of equipment and the speeding up of rock and ore development projects.

In foregoing annual reports we have taken each separate account on the last year's cost sheet and compared it with the year previous, but it seems futile to do this this year because the comparison would in most cases be meaningless on account of the difference in working schedule.

However, there are items that should be explained and these will be taken up individually.

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6. COST OF OPERATING:

EXPLORING IN MINE:

A diamond drill was put into operation in December after a shut-down of five years. Drilling is an indispensable operation if we are expected to keep up the ore reserves and also avoid driving useless rock drifts and raises. This mine has for years really owed its life and its continued operation to the ore found by diamond drilling.

DEVELOPMENT IN ROCK:

A comparison of the costs for the years 1934 and 1935 follows:

Year	Footage	Labor Costs		Supply Costs		Total Costs	
		Total	Per Foot	Total	Per Foot	Total	Per Foot
1934	1932	14556.29	7.53	7341.89	3.80	21898.18	11.33
1935	3043	19725.90	6.48	11486.68	3.77	31212.58	10.25

The man days worked by the contract miners and the feet per man days follows:

Year	Footage	Man Days	Feet per Shift
1934	1932	1567 $\frac{3}{4}$	1.23
1935	3043	1756 $\frac{1}{2}$	1.74

Assuming that the various footages of jasper, dike, slate, quartzite, etc. drifted through in 1935 bear the same relation to each other that they did in 1934, then we can state that the 42% increase in footage per miner per day is entirely due to the use of "Jackbits." Please bear in mind that we did not get the full value of the "Jackbits" in 1935 because not all the development contracts were equipped with them until Dec. 3rd, 1935. Some of the gangs, like No. 23 for instance, had detachable bits since December 1934. No. 71, for example, did not get trained in their use until April 1935, so we ought to improve still further our footage per man per shift in 1936. As a result also of the use of "Jackbits" the cost per foot shows a decrease of a little over a dollar per foot. Some of the individual records of the gangs before and after using "Jackbits" may be of interest.

Contract No. 5 - "A" Shaft:

Material in Drift - Siderite
Footage with Ordinary Mine Steel - .93 ft. per day
Cost per Foot with Ordinary Mine Steel - \$ 7.25
Average Wages of Miner with Ordinary Mine Steel - \$ 4.96
Footage with Jackbits - 1.65 ft. per day
Cost per Foot with Jackbits - \$ 4.98
Average Wages of Miner with Jackbits - \$ 5.79

Contract No. 23 - "A" Shaft:

Material in Drift - Dike and Siderite Mixed
Footage with Ordinary Mine Steel - .93 ft. per day
Cost per Foot with Ordinary Mine Steel - \$ 8.41
Average Wages of Miner with Ordinary Mine Steel - \$ 4.99
Footage with Jackbits - 2.22 ft. per day
Cost per Foot with Jackbits - \$ 5.11
Average Wages of Miner with Jackbits - \$ 6.04

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8. COST OF OPERATING:

DEVELOPMENT IN ROCK: (Cont.)

Contract No. 28 in siderite increased their footage from 1.55 to 2.29 ft. per day; the cost per foot dropped from \$ 5.89 to \$ 5.29 and the wages of the miner increased from \$ 5.31 to \$ 6.24 per day.

Other similar instances could be given, but the foregoing gives a general idea of the improvement that is noted in some of the individual cases. Both the company and the men have benefited from the change. The footage increased, the cost per foot decreased, and the miner earned larger wages.

DEVELOPMENT IN ORE:

Total costs for 1934 were \$ 10,979.67 for 1109 ft. compared with \$ 25,254.37 in 1935 for 2646 ft. It can be seen at a glance that the footage is almost in the same ratio as the costs. Cost per foot was \$ 9.90 in 1934 and \$ 9.44 in 1935 or a small decrease for the latter year.

STOPPING:

Following are the detailed figures for 1934 and 1935:

	<u>1 9 3 5</u>		<u>1 9 3 4</u>	
	<u>Total</u>	<u>Cost per Ton</u>	<u>Total</u>	<u>Cost per Ton</u>
<u>Labor:</u>				
Contract Miners	54029.67	.208	41496.32	.186
Other Labor	14797.25	.056	10179.85	.045
Total Labor	68826.92	.264	51676.17	.231
<u>Supplies:</u>				
General Supplies	686.17	.002	770.36	.004
Iron & Steel	3492.71	.013	1816.46	.008
Oil & Grease	481.89	.002	281.37	.001
Machinery Supplies	3907.86	.015	3437.83	.015
Explosives	24720.83	.096	19741.68	.088
Lumber	93.53	.000	22.53	.000
Sundries	144.24	.000	127.94	.001
Exp. Accts. Distributed	2282.73	.010	1705.28	.008
Total Supplies	35809.96	.138	27903.45	.125
Grand Total Labor and Supplies	104636.88	.402	79579.62	.356

Note: Tonnage used in figuring unit cost in 1935 was 259,961 tons
do 1934 " 216,676 "

Unit cost in 1935 was a little higher than 1934. Wages were increased on April 1st, 1934 and the average wages for contract miners in 1934 was \$ 5.15 per day compared with \$ 5.54 in 1935. Another reason for the increase in wages to stopping contractors is the increased tons per man per day stopping in 1935.

The supply cost went up in the past year due not only to increased prices, but also due to replacing some of the old equipment that is charged to the stopping account.

CLIFFS SHAFT MINE
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8. COST OF OPERATING:

TRAMMING:

The detail costs not only for operating but also for maintenance of the electric haulage plant for 1935 and 1934 were as follows:

	<u>1935</u>		<u>1934</u>	
	Amount	Cost per Car	Amount	Cost per Car
<u>Operating:</u>				
<u>Labor:</u>				
Motormen and Brakemen	15251.57		13529.42	
Oilers	158.64		106.72	
Prop. Engine House Exp.	202.48		180.16	
Total Labor	15612.69	.144	13816.30	.155
<u>Supplies:</u>				
General	107.58		103.68	
Oil and Grease	82.02		102.04	
Electric Power	3165.81		2339.41	
Total Supplies	3355.41	.031	2545.13	.029
Total Operating	18968.10	.175	16361.43	.184
<u>Maintenance:</u>				
Generator	36.02		200.00	
Locomotives	4165.38		1055.36	
Wiring	1533.65		1030.44	
Main Line Tracks	9080.82		4183.91	
Main Line Cars	5926.31		3410.12	
Spotting Engines	16.79		21.72	
Total Maintenance	20758.97	.192	9901.55	.111
GRAND TOTAL	39727.07	.367	26262.98	.295

The foregoing figures clearly show the increased expenditures due to the heavy maintenance charges. In 1935 we just did what had been deferred since 1930, namely, trying to get our tracks, cars, and locomotives in fit condition for operating properly. We purchased or rather rebuilt two sets of batteries for the storage-battery locomotives. An Exide battery job cost us \$ 890.40 and an Edison battery was rebuilt for \$ 682.80. A lot of labor and supplies were spent on the main 5th, 8th, 10th, and 15th level trolley locomotive tracks. The latter level haulage system was completely rebuilt. Repairs were made on the 8th and 10th, certain sections of track being torn up and relaid with new ties and rails. Track bonds by the hundreds were welded onto the rail joints.

Cars were gone over and repaired and in some cases almost completely rebuilt. We not only sent cars over to the General Shops, but also kept a crew of four men busy underground making repairs.

COMPRESSORS & AIR PIPES & POWER DRILLS:

The same story applies to the air distribution system as has been written regarding tracks, cars, drills, etc. The old pipes and fittings had been repaired and salvaged until nothing was left to salvage. In 1935 we tried to bring the entire system into a state of repair that it should always be kept to avoid transmission losses and leaks.

A detail of 1935 and 1934 follows:

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8. COST OF OPERATING:

COMPRESSORS & AIR PIPES & POWER DRILLS: (Cont.)

	<u>1935</u>			<u>1934</u>		
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Compressors	4732.90	16907.74	21640.64	4053.55	13122.84	17176.39
Air Pipes	1299.10	3158.15	4457.25	792.84	1179.15	1971.99
Power Drills		7643.84	7643.84		5245.67	5245.67

A further detail of the cost of operating compressors follows:

	<u>1935</u>	<u>1934</u>
Maintenance	839.04	294.58
Labor Operating	4391.40	3698.27
Supplies Operating	19475.20	16296.56
Total Operating Expense	23866.60	19994.83
Cost per 1000 cu. ft.	.045	.050

The cost per 1000 cu. ft. is lower for 1935 largely due to the lower rate per K.W.H. It might be said right here that the rater per K.W.H. for all the electric power used in 1935 was \$.016 compared with \$.017 in 1934.

During 1935 we put in new pipe as shown, viz:

3/4" Pipe	4,497 Ft.
1" "	3,444 "
1 1/2" "	1,565 "
2" "	3,076 "
3" "	809 "
4" "	846 "
T O T A L	14,237 "

This represents more new pipe than we purchased all the four years previously put together. All of the footage enumerated was put on the main levels. In addition 455 ft. of new 6" pipe was placed in "A" shaft from the collar to the 4th level. It is obvious that it would take considerable labor to install this new pipe.

SCRAPERS & MECHANICAL LOADERS:

Total cost for maintenance under this heading was \$ 25,881.96 in 1935 compared with \$ 15,007.51 in 1934. The same explanation made previously in this report a number of times explains the increase--getting our equipment back in proper shape and buying new material to replace that worn out.

Following is the cost of scraper supplies for 1935 and 1934:

	<u>1935</u>
2650 Ft. 1/2" Wire Rope	\$ 280.41
39408 Ft. 5/8" " "	5,425.82
Electric Motors, Cables, Etc.	4,162.63
48" Scrapers & Repairs	4,814.14
42" Scrapers & Repairs	162.69
Miscellaneous Supplies	2,910.72
T O T A L	\$ 17,760.41

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8. COST OF
OPERATING:

SCRAPERS & MECHANICAL LOADERS: (Cont.)

	<u>1934</u>
4200 Ft. 1/2" Wire Rope	\$ 408.74
33375 Ft. 5/8" " "	4,573.62
Electrical Supplies	908.58
48" Scrapers & Repairs	1,211.68
Miscellaneous Supplies	<u>3,296.86</u>
T O T A L	\$ 10,399.48

In 1935 we put three new scraper outfits into commission. We also practically rebuilt the power transmitting system. We found after making a careful survey that many of our cables were too small and that the transformer stations were not in the proper locations. As a result two extra men were placed on the underground electricians' crew and the necessary equipment was purchased to bring our equipment up to date. The following new material was placed underground:

5	New Transformers
3260	Ft. No. 6 Cable
1013	Ft. No. 3 Cable
500	Ft. No. 2 Cable

The most radical changes were made in "A" shaft. On the 6th transformers were placed 1200 ft. further away from "A" shaft and 2300 volt current is now carried into the new sub-station. As a result the voltage in the contracts in the extreme east end of the 6th, 7th, and 8th levels is much better and constant than before. On the 10th level new cables were carried into the new Bancroft territory.

In "B" shaft a new transformer sub-station was placed 1000 ft. west of "B" shaft. This provides better current regulation for the lower levels in "B" shaft and also puts us into a position of bringing power into the new contracts that will eventually mine the ore on the west side of Section 9.

HOISTING:

The yearly costs for 1935 and 1934 follow:

	<u>1935</u>	<u>1934</u>
Maintenance	\$ 4,698.09	\$ 2,572.15
<u>Operating Expense:</u>		
<u>Labor:</u>		
Engineers	3,537.25	3,297.56
Other Labor	<u>527.37</u>	<u>243.34</u>
Total Labor	4,064.62	3,540.90
<u>Supplies:</u>		
Oil, Waste, and Packing	80.96	47.42
Tools, Etc.	68.51	43.25
Electric Light	88.70	96.15
Electric Power	9,549.43	8,710.42
Proportion Compressor	285.00	220.00
Heating Expense	<u>1,161.67</u>	<u>1,239.06</u>
Total Supplies	11,234.27	10,356.30
Total Operating Expense	15,298.89	13,897.20
Total Maintenance and Operating	19,996.98	16,469.35
Tons of Rock and Ore Hoisted	288,047	235,639
Average Depth Hoisted	667'	667'

CLIFFS SHAFT MINE
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8. COST OF OPERATING:

HOISTING: (Cont.)

The maintenance cost seems to be the only one out of line when you consider the tonnage hoisted, and that particular item is high because in 1935 we replaced every rope we used. Both cages, skips, and counterweights were supplied with new ropes in 1935. No new ropes were charged out in 1934.

SHAFT:

It cost us considerably more to maintain the shaft in 1935 than it had for a number of years previously and that was due to the re-building of "A" shaft from the 7th to the 8th level. All of the old timber was taken out and entirely new sets hung from the 7th level bearing pieces. During the latter part of the year, we also started to replace all of the shaft runners from the 15th level "A" shaft up to the 8th level.

TOP TRAM EQUIPMENT:

The following detail shows exactly the items that cost us more money in 1935 than they did in 1934:

	1935			1934		
	Labor	Supplies	Total	Labor	Supplies	Total
Engines & Motors	31.83		31.83	294.98	544.08	839.06
Tracks & Cars	585.47	292.48	877.95	173.99	140.84	314.83
Wire Rope	63.10	1386.05	1449.15	68.61	317.41	386.02
Sheaves, Rollers, Etc.	39.95	59.97	99.92	29.00	2.92	31.92
T O T A L	720.35	1738.50	2458.85	566.58	1005.25	1571.83

DOCKS, TRESTLES & POCKETS:

The cost for 1934 totaled \$ 1496.64. In 1935 this was increased to \$ 4051.22.

When we loaded out the larger portion of the lump pile, we found the sollar in very poor shape. We purchased 67,000 ft. of new 3" hemlock plank, took up the old plank, filled in, raised, and leveled off the central portion of the stocking grounds, and then laid down the new plank. We covered most of the area under the stocking trestle put up for this winter's production of lump ore.

Another item that required the outlay of approximately \$ 2400.00 was the repainting of the main steel trestles leading from both shafts to the crusher building. We applied two coats and in places three coats of aluminum paint. The trestle was also carefully inspected and rivets and bolts replaced wherever necessary.

TELEPHONES & SAFETY DEVICES:

This account shows an increase in 1935 due partially to the monthly rental on the Edison cap safety lamps being raised from \$ 45.00 to \$ 75.00. We have also installed dozens of new lamps underground. During the depression years very little new equipment was purchased. We are now only putting in new lamps to conform with our safety regulations. Two lights are being installed at every chute. The entire 10th level "B" shaft was wired. Lamps and switches were put on the 15th level "A" shaft side. New switch-boxes and ground wires were installed all over the mine to conform with the new safety standards adopted by the Electrical Department.

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9. EXPLORATIONS
AND FUTURE
EXPLORATIONS:

The drift we are driving on the 10th level "B" shaft towards the west side of Section 9-47-27 might properly come under this heading. The drift has been driven from the 1600 West coordinate line to the 2900 West line. The diamond-drill holes showing the ore are located on the 4100 West line and the territory beyond.

The diamond-drill was started up on December 3rd. Four holes were drilled, all of them on the 11th level "A" shaft.

Diamond-Drill Hole No. 423	29 ft. deep; 18 ft. lean ore, 11 ft. rock.
do 424	53 ft. deep; 24 ft. lean ore, 29 ft. rock.
do 425	61 ft. deep; 6 ft. ore; 23 ft. lean ore; 32 ft. rock.
do 426	79 ft. deep; 5 ft. ore; 44 ft. lean ore; 20 ft. rock.

10. TAXES:

The taxes paid by the Cliffs Shaft Mine for the last two years were as shown below:

	<u>1 9 3 5</u>		<u>1 9 3 4</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty, Placed by Tax Comm.	1,915,000	60,309.48	1,890,000	59,686.20
Mineral Under NW 9-47-27	80,000	2,519.47	79,000	2,494.82
Personal	910,000	28,658.82	940,000	29,685.20
Lot 2, Sec. 3-47-27				
60 Acres (Mineral)	250,000	7,873.30	210,000	6,631.80
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 9-47-27 (Old Barnum)	47,000	1,480.18		
Lot 174, Nelson Addition	80	2.52	80	2.53
South 35.91 Ft. of Lot 179	30	.95	30	.95
Total	<u>3,202,110</u>	<u>100,844.72</u>	<u>3,119,110</u>	<u>98,501.50</u>
Collection Fees		1,008.45		985.01
Total Cliffs Shaft		<u>101,853.17</u>		<u>99,486.51</u>
Taxes per Ton Produced		\$.3787		\$.4456
Taxes per Ton Shipped		.2556		.4189

The valuations and the taxes paid by the Cliffs Shaft Mine since 1930 follow:

<u>Year</u>	<u>Taxes</u>	<u>Valuation</u>
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

Taxes for 1935 show a very small increase due to an increase of \$ 83,000 in valuation. The tax rate for 1935 declined to \$ 3.149 from \$ 3.163 in 1934.

Taxes levied by the City of Ishpeming for the past three years follow:

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10. TAXES:

	<u>1935</u>	<u>1934</u>	<u>1933</u>
State Tax -----	\$ 63,491.53	\$ 5,436.92	\$ 5,445.48
County Tax -----	7,002.74	4,684.56	4,739.04
County Road Tax -----	3,455.34	2,518.98	12,842.75
County Debt Service Tax -----	55,000.00	56,800.00	40,000.00
Highway Fund Tax -----	11,800.00	7,300.00	6,500.00
Library Fund Tax -----	13,200.00	13,400.00	8,000.00
Fire Fund Tax -----	68,626.88	71,205.24	72,032.21
School Fund Tax -----	25,787.50	26,637.50	26,950.00
School Debt Service Tax -----	2,000.00	2,300.00	2,000.00
Sewer Fund Tax -----	4,000.00	1,300.00	1,500.00
Cemetery Fund Tax -----	36,700.00	43,700.00	49,000.00
City Tax-General Fund -----	2,300.00	2,200.00	4,200.00
City Debt Service Tax -----	293,365.99	295,756.23	294,075.24
Water Fund Tax -----	687.59	127.56	124.91
T O T A L -----	\$ 294,051.58	\$ 295,883.79	\$ 294,200.15
Rejected Tax -----			
GRAND TOTAL ---			

11. ACCIDENTS
AND
PERSONAL
INJURIES:

The accident record for the Cliffs Shaft for the past five years follows:

	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
No Lost Time Accidents -----	49	51	8	9	30
Compensable or Fatal Accidents ---	7	9	2	1	2

Two of the compensable accidents were fatal accidents. John E. Oja lost his life on April 15th when standing close to the edge of a large raise on a bench, while moving a chunk with a bar, the end of the bar snapped off. Oja lost his balance and toppled backwards into the raise, falling 50 ft. to the 6th level.

Gabriel Saari, one of the most experienced of all of the Cliffs Shaft miners, due to an error in judgment lost his life while barring loose. He was surrounded with all the possible safeguards, even having two other miners and two trammers to assist him, and yet he being the older and most experienced of the lot took the lead and was killed trying to make the back of the stope safe.

There were four of the lost time accidents that were not very serious, the fifth and last one, however, occurring on Nov. 29th, 1935 resulted in a fracture of the lower bones in the left foot of a motor brakeman. This accident resulted from carelessness and both brakeman and motorman were to blame. The latter was laid off a short period and the former will be when he reports for work.

Our record at the Cliffs Shaft Mine, if it had not been for the two fatalities, would have been much better in 1935 than in 1934 because by and large the other accidents aside from two lost time accidents were only minor in nature.

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12. NEW
CONSTRUCTION:

E & A. No. 661:

This covers the purchase of a Westinghouse electric furnace complete with automatic control apparatus. It also provided for two Ingersoll-Rand Jackbit Grinders and drill steel and the first lot of detachable bits.

This equipment as mentioned before was installed in the west half of the old machine shop and by the end of the year was added to, to make our bit grinding and rod treating procedure more scientific and efficient.

In the first place after preliminary tests underground that were supervised by the Ingersoll-Rand officials had proved the advisability of seriously considering the use of Jackbits, we decided to get rigged up properly, having in mind that the Cliffs Shaft plant would be the clearing house for all the mines using "Jack" or detachable bits.

The tests made in January were carefully watched and tabulated. The Ingersoll-Rand Co. had three of their men underground. We had one captain and one mining engineer in on all this work. The various bits and records were carefully examined and gone over in the office so that everybody kept on top the job. Even from the very start we got no negative results. Everything pointed in favor of the detachable bits. As soon as we were convinced, the necessary heat treating and grinding equipment was ordered, and I believe we have from all accounts the model shop in the Lake Superior region.

Three Jackbit grinders were installed on a long bench along the south wall of the old machine shop, where the light is good. Nearby we have a large cupboard open on both sides for the steel carrier boxes that the bits are transported in. Each contract has not only two of these carrier boxes, stamped with their contract numbers, but also one larger compartment box with holes drilled in the sides of each compartment, which are used for gauging the reground bits so that each bit is sorted out and put into one of the eight compartments. This large box is then carried by the miner up to the working face.

At the end of each shift the miner puts all of the dull bits into one of the small carrier boxes, which are collected and trucked to the regrinding shop. In the meantime the second carrier box has been taken underground with the new and reground bits. After the bits have been reground three or four times, they are retempered, and then can be used two or three more times before they are discarded.

The heat treating is done with the new Westinghouse electric furnace, which has a capacity of (200) bits per charge. We can also treat two dozen rods at a time. The furnace came equipped with a Leeds-Northrup pyrometer and an automatic switch so that we can set the switches at the end of the shift to heat the furnace to a given temperature before the next shift comes on. In other words, the next morning at eight o'clock the furnace is ready for treating steel or bits as the case may be.

The shop is also provided with four new tanks, one near the electric furnace for cooling the bits. This is rather a tricky operation because the bits must be so hardened as to provide a tough surface for the cutting edge and the wings, but the skirt must be soft enough so that the threads do not harm the threaded ends of the drill rods. That means that the water used to cool the bits must be so agitated as to rise only to the base of the threads, and still the depth of the water at the centre of the bit cannot exceed 1/2 inch. In order to secure the desired result a tank 3 ft. square is provided with a series of (12) jets. Each bit as it is removed from the furnace is placed on a screen immersed in 1/2" of water. A second screen, placed an inch above the first, is provided with holes for centering the bits over a

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12. NEW
CONSTRUCTION:

E & A. No. 661: (Cont.)

jet that causes a violent bubbling, raising the water fully an inch above the bottom screen. Usually six dozen bits are treated in one heat and one bit from each heat is then cut in two with a special, thin grinding wheel. The two sections are then immersed in dilute H.C.L. for three minutes and the acid clearly etches the limits of the hardened zone. Our retempered bits actually look better than some of those furnished by the factory. The bits are heated to 1560 degs. F., going into the furnace at that temperature, kept there for one hour, dropped onto the screen in the cooling bath and when they are blue-black in color are dropped into another tank and totally submerged in boiling water. We can treat (300) a day. I might add that when our pyrometer registers 1560 degs. the furnace actually has a temperature 27 degs. less. The furnace is calibrated once or twice a year by using a special test specimen of steel and getting the decolescent and recalescent point readings.

The shop is also equipped with a new oil tempering bath built along scientific lines. The steel box that holds approximately two barrels of quenching oil sets in a second tank that is filled with cold circulating water. There is at least eight inches of water between the walls of the two tanks. The water tank has its overflow pipe so placed that the water level is always above the oil level. We also have a bleeder pipe placed in the bottom of the oil tank so that if by chance any water gets into the oil bath, the water which naturally stays in the bottom of the tank can be drained off. If too much water actually collected below the oil, then an explosion would result when immersing a red hot rod into the quenching bath.

The shop also is equipped with a smaller tank into which a brine solution can be placed for treating the threaded rods.

On the opposite side of the shop from the cupboard for the drill carrier boxes, we have built racks for the threaded drill rods as assorted sizes must always be kept on hand.

E & A. No. 672:

This covers a new Chevrolet dump truck with an extra large box to be used principally to handle coal. This truck is kept busy most of the time at the Storehouse handling freight, oil, and gas. We also use it at the Cliffs Shaft Mine to transfer stoker coal to all the heating plants in the Ishpeming District. It is sometimes used to haul rock off the lump stocking area.

E & A. No. 673:

Under authority granted by E & A. No. 673 a new Chevrolet coupe was given to the Superintendent, while his old Ford coupe was turned over to the Chief Sampler.

E & A. No. 679:

Under this "E & A" material was ordered for a new combined skip and cage for "B" shaft. The equipment is to be built of an aluminum alloy to save weight and to make the handling of men during the shift a safer operation. The old practice in "A" shaft and the present still in "B" shaft make it necessary for the cageriders and skiptenders to ride the bail of the skip from level to level, exposing them constantly to chunks falling down the shaft. These chunks lodge on the wall plates when any spillage occurs either loading or dumping the skip and cannot be removed until the end of the shift. At the close of the year the material for the new skip and cage had not been delivered.

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12. NEW
CONSTRUCTION:

E & A. No. 681:

This covers the purchase of ten new 76 cu. ft. rocker dump cars on which we do not expect to get delivery until Feb. 15th, 1936. These cars are intended to handle ore on the 8th and 10th levels "A" shaft, most of the ore coming from the new openings in the Bancroft Vein.

Drills:

Nineteen new drifting and raising drills were purchased in 1935, four N-72 Ingersoll Rand's to be used principally in raises; four D12 Cleveland's and eleven N-75 Ingersoll-Rand machines for stoping operations. The N-72's are equipped with 1-1/8" round steel threaded for Jackbits. The other fifteen machines use 1 1/4" round lugged drill steel threaded for detachable bits.

We also purchased four RB-12 Ingersoll-Rand second-hand machines for block-holing.

Practically all the new drill steel purchased during the year was Bethlehem steel. For the first time in many years the Bethlehem Steel Co. has been manufacturing a superior grade of drill steel.

Scraper-Hoists:

We also put three new 25 H.P. scraper-hoists into operation and orders were given to have three more units built in our central shops. We can build them ourselves at a saving of about 30% over the price quoted by the manufacturer.

Cars:

Two two-ton rocker dump cars were salvaged from the Morris Mine equipment. Near the close of the year two more were brought into the General Shops to be overhauled.

14. MAINTENANCE
AND
REPAIRS:

a. Mine Buildings:

Under Section 6A in this report detailed costs on maintenance of mine buildings have already been given.

b. Rented Houses:

Detailed costs by locations for 1935 are as follows:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>No.</u> <u>Families</u>
Nebraska Location	40.44	12.76	53.20	2
Second Addition	985.74	1957.65	2943.39	20
Cliffs Shaft Location	1429.31	1620.05	3049.36	15
Hard Ore Location	3237.40	4541.07	7778.47	34
Nelson Purchase	1739.60	2158.64	3898.24	1
Outhwaite Purchase	325.88	327.96	652.84	1
Smith Purchase	540.35	869.38	1409.73	1
Hyde Purchase No. 1	69.63	302.90	372.53	1
Hyde Purchase No. 2	332.48	178.81	511.29	1
Angeline Location	405.63	312.22	717.85	17
Salisbury Location	101.10	8.81	109.91	1
T O T A L	9207.56	12290.25	21497.81	94

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14. MAINTENANCE
AND
REPAIRS:

Most of the houses need painting very badly. The same remark will be found in the last three or four annual reports. Painting cannot be deferred beyond 1936, because the woodwork is deteriorating very rapidly and delaying the painting too long means more repair work on siding, baseboards, porches, window frames, etc.

15. POWER:

The following tabulation shows the electric power costs and distribution for 1935:

	<u>K.W.H.</u>	<u>Amount</u>	<u>Cost</u> <u>per Ton</u>
Tramming -----	184,100	\$ 2,946.94	\$.011
Pumping -----	1,290,881	21,155.16	.078
Hoisting -----	612,564	9,638.13	.036
Stocking Ore -----	14,934	232.97	.001
Crushing -----	54,688	884.20	.003
Dry House -----	7,648	125.70	.001
Surface -----	17,789	290.05	.001
Mine Office -----	5,951	96.10	.000
Shops -----	6,685	115.91	.000
Compressors -----	1,188,451	19,056.81	.071
Electric Haulage -----	198,480	3,165.81	.012
Dry Heating Plant -----	8,327	134.29	.001
Drill Shop -----	2,322	34.85	.000
Telephones & Safety -----	34,720	562.55	.002
Laboratory -----	76,502	1,241.31	.005
Jackbit Shop -----	1,691	28.60	.000
Loading at Stockpile -----	5,120	82.29	.000
T O T A L -----	3,710,853	\$ 59,791.67	\$.222

Average rate per K.W.H. for 1935 \$.0161.

The average rate per K.W.H. is below the 1934 figure because the peak loads have been kept down.

18. NATIONALITY
OF
EMPLOYEES:

	<u>American</u> <u>Born</u>	<u>Foreign</u> <u>Born</u>	<u>Total</u>
English -----	52	40	92
Finnish -----	34	84	118
Swedish -----	36	24	60
Italians -----	2	8	10
French -----	17	9	26
Norwegians -----	10	8	18
Irish -----	4	1	5
Germans -----	3		3
Scotch -----	3	1	4
T O T A L -----	161	175	336

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1. GENERAL:

Ore was produced at the Lloyd Mine during all of 1935, the mine operating on a three day per week schedule. Hoisting was actually done on all of the six days in each week, two crews being employed, one crew working from Thursday of one week to Thursday of the following week and the other crew then working the same schedule for the next six working days. Because of the repair work that has to be done most of the miners in the mine actually worked on the average an extra day per week, or a total of four days per week.

A large number of young men were given work underground. For the past four or five years preference has always been given to the older and family men, but because of the advancing age of a great many of our miners, we found it necessary to recruit younger men, particularly sons of the older miners. These new men are being carefully trained and will form the nucleus of the mining gangs of the future.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

<u>Grade</u>	<u>Tons</u>
Lloyddale Ore	161,406
Lloyd Silica Ore	60,715
T O T A L	222,121

Production of Silica Ore is governed entirely by the wants of the Sales Department. We try to produce that grade of ore as fast as it can be sold. No Lloyd Ore was hoisted in 1935, but there are prospects of some of this grade being produced in 1936 on the new fifth level.

b. Shipments:

<u>Grade</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
Lloyddale	79,253	45,846	125,099	60,643
Lloyd Silica	31,950	19,010	50,960	38,380
Lloyd Silica No. 1	3,359	790	4,149	
Total	114,562	65,646	180,208	99,023
Total Last Year	60,188	38,835	99,023	
Increase in Shipments	54,374	26,811	81,185	

The table which follows shows shipments for the past five years:

Year 1931	110,313 Tons
" 1932	5,926 "
" 1933	171,917 "
" 1934	99,023 "
" 1935	180,208 "

It will be noted that the shipments for the year 1935 were the best in the five year period.

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LLOYD MINE
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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

c. Stockpile Balances:

Ore in stock as of Dec. 31st, 1935 follows:

<u>Grade</u>	<u>Tons</u>
Lloyddale	119,239
Lloyd Silica	24,750
Lloyd Silica No. 1	6,679
T O T A L	150,668

d. Division of Product by Levels:

	<u>Lloyddale</u>	<u>Lloyd</u>	<u>Lloyd</u>	<u>Total</u>
	<u>Tons</u>	<u>Silica</u>	<u>Silica #1</u>	<u>Tons</u>
3rd Level	54,085	10,058	62	64,205
4th Level	106,765	39,945	9,945	156,655
5th Level	556	705		1,261
TOTAL	161,406	50,708	10,007	222,121

e. Production by Months:

<u>Month</u>	<u>Days</u>	<u>Lloyddale</u>	<u>Lloyd</u>	<u>Total</u>	<u>Rock</u>
		<u>Tons</u>	<u>Silica</u>	<u>Ore</u>	<u>Tons</u>
January	20	11,468	2,219	13,687	201
February	20	10,058	3,271	13,329	1,608
March	26	13,080	5,002	18,082	2,355
April	24	12,193	4,371	16,564	2,961
May	26	13,565	6,676	20,241	2,826
June	24	12,875	6,618	19,493	2,010
July	26	14,646	7,139	21,785	2,754
August	27	14,868	3,970	18,838	2,907
September	24	15,855	2,901	18,756	2,703
October	27	15,448	8,374	23,822	2,328
November	23	13,765	5,005	18,770	2,043
December	24	13,543	5,211	18,754	1,593
Y E A R	291	161,364	60,757	222,121	26,289

Operating Schedule for past five years:

1931	-	1-8 hr. shift	5 days per week	Jan. 1st to April 30th
		" " "	4 " " "	Apr. 30th to June 8th
		" " "	3 " " "	June 8th to Nov. 15th
		" " "	2 " " "	Nov. 15th to Dec. 31st
1932	-	" " "	2 " " "	Jan. 1st to June 1st
		Mine Idle June 1st to Nov. 1st		
		3-8 hr. shifts	6 days a week	Nov. 1st to Dec. 31st
1933	-	" " "	6 " " "	Jan. 1st to Apr. 8th
		Mine Idle Apr. 8th to Nov. 8th		
		3-8 hr. shifts	6 days a week	Nov. 8th to Dec. 31st
1934	-	" " "	6 " " "	Jan. 1st to Apr. 3rd
		1-8 " " "	3 " " "	Apr. 3rd to Sept. 1st
		" " "	2 " " "	Sept. 1st to Dec. 31st
1935	-	" " "	2 " " "	Jan. 1st to Feb. 11th
		" " "	3 " " "	Feb. 11th to Dec. 31st

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

f. Ore Statement:

	Lloyddale Tons	Lloyd Silica Tons	Lloyd Silica No. 1 Tons	Morris Tons	Total Tons	Last Year Tons
On Hand Jan. 1st, 1935	82,932	25,002	821	91,480	200,235	267,791
Output for Year	161,364	50,750	10,007		222,121	122,806
Transfers	42	4,107	4,149			
Overruns						965
T O T A L	244,338	79,859	6,679	91,480	422,356	391,562
Shipments	125,099	55,109		57,882	238,090	191,327
Balance on Hand	119,239	24,750	6,679	33,598	184,266	200,235
Increase in Output					99,315	

g. Delays:

There was no interruption to ore production during 1935 due to accidents to equipment.

3. ANALYSIS:

a. Average Mine Analysis on 1935 Output:

Grade	Iron	Phos.	Silica
Lloyddale	58.33	.195	6.91
Lloyd Silica	51.93	.138	16.17
Lloyd Silica No. 1	51.78	.106	17.69

b. Average Analysis on Straight Cargoes:

Grade	Iron	Phos.	Silica
Lloyddale	58.50	.191	6.68
Lloyd Silica	50.93	.129	17.58
Morris	58.60	.079	8.24

c. Analysis of Ore in Stock at the Lloyd Mine on Dec. 31st, 1935:

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Lloyddale Dried	58.10	.190	7.53	.24	2.51	.80	.27	.013	4.71	
Lloyddale Natural	51.99	.170	6.74	.21	2.25	.72	.24	.012	4.21	10.51
Lloyd Sil. Reg. Dried	51.39	.141	15.94	.21	2.65	.75	.36		4.54	
Lloyd Sil. Reg. Natural	46.34	.127	14.37	.19	2.39	.68	.32		4.09	9.83

d. Analysis of Ore Reserves as of Dec. 31st, 1935:

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

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4. ESTIMATE OF
ORE RESERVES:

Assumptions: 12 cu. ft. equals one ton
10% deduction for rock
10% " " loss in mining

Ore in Sight as of Dec. 31st, 1935:

<u>LLOYD MINE EAST</u>			
	<u>Lloyd</u>	<u>Lloyddale</u>	<u>Total</u>
	<u>Ore</u>	<u>Ore</u>	<u>Ore</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Above 3rd Level		47,940	47,940
Above 4th Level		353,481	353,481
Ore Between 4th and 6th Levels	513,241	1,539,136	2,052,377
Total Ore Above 6th Level	513,241	1,940,557	2,453,798
Ore Below 6th Level	70,537	211,613	282,150
Total Ore in Lloyd Mine East	583,778	2,152,170	2,735,948

<u>LLOYD MINE</u>			
Ore Above 3rd Level	25,873		25,873
Ore Below 3rd Level	9,353		9,353
Total	35,226		35,226
 GRAND TOTAL LLOYD & LLOYD MINE EAST	 619,004	 2,152,170	 2,771,174

The 1935 estimate shows ore reserves of 2,771,174 tons compared with 2,756,818 tons in 1934, or an increase of 14,356 tons.

The following table shows a recapitulation of the ore reserves, Standard Ore only, for the past four years:

	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>
Ore in Mine Jan. 1st	2,861,086	2,897,830	2,897,830	2,756,818
Production	31,018		60,904	161,406
Balance	2,830,068	2,897,830	2,836,926	2,595,412
Ore in Mine Dec. 31st	2,897,830	2,897,830	2,756,818	2,771,174
New Ore Developed	67,762		80,108	175,762

5. LABOR
AND
WAGES:

a. General:

There was a real scarcity of first-class skilled miners. A plentiful supply of common labor was available and the practice of hiring young men and putting them underground to train them as miners was continued.

b. Comparative Statement of Wages and Product:

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
<u>PRODUCT</u>	222,121	122,806	99,315	
No. of Shifts & Hours	1-8	1-8		
 <u>AVG. NO. OF MEN WORKING:</u>				
Surface	42	33	9	
Underground	138	95	43	
Total	180	128	52	

LLOYD MINE
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5. LABOR
AND
WAGES:

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

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
<u>AVG. WAGES PER DAY:</u>				
Surface	4.19	4.18	.01	
Underground	4.98	5.00		.02
Total	4.78	4.76	.02	

<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>
1931	4.42	5.12	4.97
1932	3.75	4.46	4.28
1933	3.84	4.29	4.10
1934	4.18	5.00	4.76
1935	4.19	4.98	4.78

<u>WAGES PER MO. OF 25 DAYS:</u>				
Surface	104.75	104.50	.25	
Underground	124.50	125.00		.50
Total	119.50	119.00	.50	

<u>WAGES PER MO. OF 22 DAYS:</u>				
Surface	92.18	91.98	.20	
Underground	109.56	110.00		.44
Total	105.16	104.72	.44	

<u>WAGES PER MO. OF 17 DAYS:</u>				
Surface	71.23	71.06	.17	
Underground	84.66	85.00		.34
Total	81.26	80.92	.34	

<u>WAGES PER MO. OF 13 DAYS:</u>				
Surface	54.47	54.34	.13	
Underground	64.74	65.00		.26
Total	62.14	61.88	.26	

<u>PRODUCT PER MAN PER DAY:</u>				
Surface	26.33	28.46		2.13
Underground	9.44	11.92		2.48
Total	6.85	8.39		1.54

The decrease in the tons per man per day for 1935 is explained by three items, viz., more development work in 1935; smaller proportion of siliceous ore and smaller tonnage secured by the sub stope system of mining. Of the three items mentioned the greatest influence on the cost is felt by the decrease in the amount of Silica produced compared with the tonnage of Standard Ore that is mined. In 1934 almost exactly half the total product was Silica, the per cent of Silica dropping to less than one-third in 1935.

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
<u>LABOR COST PER TON:</u>				
Surface	.159	.147	.012	
Underground	.528	.419	.109	
Total	.687	.566	.121	

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5. LABOR
AND
WAGES:

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

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
<u>AVG. PRODUCT STOPPING & TRAM'G:</u>				
Product per Man per Day				
Stopping & Trammng	15.97	16.49		.52
Avg. Wages Cont. Miners	\$ 5.59	\$ 5.26	\$.33	
<u>AMOUNT FOR LABOR:</u>				
Surface	35,387.93	18,065.92	17,322.01	
Underground	117,315.87	51,566.54	65,749.33	
Total	152,703.80	69,632.46	83,071.34	

PROPORTION OF SURFACE TO UNDERGROUND MEN:

1931	1 to 3.41
1932	1 to 3.18
1933	1 to 2.70
1934	1 to 2.88
1935	1 to 3.29

6. SURFACE:

a. Buildings:

We had hoped this year to be able to report the finishing of the new combined shop, dry, and office building project, but to date nothing has been done except to put down a few test pits on the proposed site. Work on the new building cannot be delayed beyond next spring because the mine is inadequately equipped and the present dry built for (75) men is now housing almost twice that many. The facilities for drying underground clothes are now so crowded that frequently the men complain that their clothes are too wet to put on at the beginning of the next shift. The Lloyd and Section 6 engine houses are also being used for "catch alls" because we have no other place for storing oil, tools, supplies, etc. We cannot now observe fire regulations because of our overcrowded quarters.

b. Stocking Grounds:

There is practically no ore stocked on Sec. 1-47-28 on the Morris Mine property. A new stocking trestle running the entire length of the east stocking area was erected on the north side. Some ore can also be stocked from the south trestle, which was partially rebuilt in the fall of 1935. Next year the old Lloydale and Lloyd Silica ores stocked on the west side of the shaft should be shipped to make room for Lloyd ore, as there is a possibility of hoisting some low phosphorus ore in 1936.

c. Engine House:

The cage hoist was rebuilt by changing from double reduction to single reduction gears. The old spur gears were replaced with the Herringbone type. In 1934 the skip hoist was completely overhauled and rebuilt and now that we have finished repairs on the cage hoist, both of the hoists are now modernized. In each case the hoisting speed has also been increased.

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6. SURFACE:

d. Shaft House:

We had been planning for sometime to enclose the top half of the Lloyd shaft house, but permission to do this was secured so late in the year, that it was decided to defer this improvement until early in 1936. Enclosing the shaft house will make for better operating conditions and we hope will make the hoisting shaft upcast. Every winter for years past we have been troubled with ice in the top part of the shaft and the adding of about 100 ft. to the enclosed part of the skiproads may solve the ice problem.

Extensive repairs were also made to the crushing equipment. The crusher was provided with a new spindle; the grizzly and slide used to transfer ore from the skip dump to the top of the crusher was entirely rebuilt and a new structure was erected over the crusher, completely housing in all the equipment.

One of the top tram units was also rebuilt and at the close of the year work was started on a new top tram car.

7. UNDERGROUND:

a. Development:

New development work was largely concentrated on the new fifth level, although some little rock work was done on the east end of the fourth level, where two new rock raises were put up to permit us to mine the ore in the extreme east end of the mine between the third and fourth levels.

On the new fifth level the main rock footwall drift was driven 2200 ft. and two crosscuts started. The first one driven south near the 2500 East coordinate line by the end of the year had cut 80 ft. of ore, mostly low phosphorus Lloyd ore. The second crosscut also encountered ore, but the phosphorus, near the slate footwall, ran up to .200.

The new level plat has been whitewashed, a deep ditch runs all the way from the shaft to the ore crosscuts, and the drift is amply protected with timber where the ground is a little soft. We have taken pains to put in a good track and the completed level presents a very fine appearance.

b. Stoping:

Twelve gangs were regularly employed during the entire year mining ore. All of these gangs used the sub-level slicing system of mining with two exceptions. Two gangs, Nos. 1 and 9, and later in the year, Nos. 9 and 5, were sub-level stoping gangs. When Silica ore was desired, some of it was secured from the sub-level stopes after the high grade ore was completely mined from these stopes and some Silica was run from the mat at the ends of the slices on the regular sub-levels.

In the extreme east end of the mine all the ore mined between the 1085 ft. sub and the 990 ft. sub was secured from No. 1's and No. 9's sub stopes. By the end of the year all available standard grade ore and also siliceous ore was mined east of the 3500 East coordinate line.

In the Main Deposit below the main third level No. 5 contract started a new sub stope above the 890 ft. sub-level. This stope will be carried west only to the 3700 East coordinate line, as all of the ore west of this point is to be mined by the regular sub-level slicing system.

Two new raises were being put up to the hanging during the latter part of the year to make it possible to mine the ore along the foot between the 3400 and 3500 East coordinates.

From the 830 ft. sub to the 775 ft. sub, seven gangs, Nos. 6, 7, 8, 10, 11, 12, and 13, sliced out the central portion of the Main Deposit. The bulk of the ore these gangs mined was taken out on the 800 and 810 ft. sub-levels.

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7. UNDERGROUND:

b. Stoping: (Cont.)

During the early part of the year No. 14 also ran a little Low Phos. Silica from old No. 3 stope above the 775 ft. sub-level in the extreme southwest corner of the Main Deposit.

c. Timbering:

The cost for timbering increased in 1935 compared with 1934. Because of the subsidence south of the Section 6 shaft, first noticed in August 1934, we were put to very heavy maintenance expense on the main third level directly south of the Section 6 shaft for a distance of about 300 ft.

We also found it necessary to timber the small development drifts and raises in Nos. 1 and 9 contracts and that is one reason why we have decided to abandon the sub stoping system of mining in the Main Deposit above the main fourth level.

Furthermore as the percentage of Silica ore drops, more timber is used to mine Standard ore.

The following table gives the timber data for the years 1934 and 1935:

Statement Showing Timber Used for Year 1935:

	Lineal Feet	Avg. Price Per Foot	Amount 1935	Amount 1934
6" to 8" Timber	45,103	.034	1,553.25	1,427.55
8" to 10" "	43,607	.060	2,612.67	447.26
10" to 12" "	22,788	.080	1,831.40	817.06
12" to 14" "	2,205	.101	222.84	285.82
Total Timber 1935	113,703	.055	6,220.16	2,977.69
Total Timber 1934	56,500	.053	2,977.69	
		<u>Per 100 Ft.</u>		
5 Ft. Lagging				13.54
7 " "	242,646	.675	1,638.46	
8 " "				340.07
Total Lagging	242,646	.675	1,638.46	353.61
3 1/2" Poles	314,396	1.02	3,216.99	1,696.94
Wire Fencing, 450 Rods	7,425	4.80	356.58	
Total Poles & Fencing	321,821	1.11	3,573.57	1,696.94
Total Lagging, Poles, & Fencing for 1935	564,467	.92	5,212.03	2,050.55
Total Lagging, Poles, & Fencing for 1934	155,801	1.31	2,050.55	
Product - Tons			222,121	122,806
Feet of Timber per Ton of Ore			.512	.460
Feet of Lagging per Ton of Ore			1.092	.347
Feet of Lagging per Foot of Timber			2.134	.755
Cost per Ton for Timber			.0280	.0242
Cost per Ton for Lagging			.0074	.0029
Cost per Ton for Poles & Fencing			.0161	.0138
Cost per Ton for All Timber			.0515	.0409
Equivalent of Stull Timber to Board Measure			173,049	92,387
Feet of Board Measure per Ton of Ore			.779	.752

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7. UNDERGROUND:
c. Timbering: (Cont.)

Statement Showing Timber Used for Year 1935:

		Cost Per Ton	Amount	
Cost of Timber, Lagging, Poles & Fencing	1935	.0515	11,432.19	
	1934	.0409	5,028.24	Opt. 9 Mos.
	1932	.0729	6,047.62	Opt. 5 Mos.
	1931	.0747	26,098.93	
	1930	.0729	35,914.29	

d. Drifting and Raising:

The footage drifted and raised in 1935 greatly exceeds the total for 1934 because of the development campaign in the east end of the fourth level and the work on the new fifth level. The regular contract miners did the following drifting and raising:

Raising	1595 Ft.
Drifting	1610 Ft.

The rock and ore development gangs drove the following footage:

Development in Rock	2625 Ft.
Development in Ore	295 Ft.

e. Explosives, Drilling, and Blasting:

The following statement shows the explosives used for breaking ore and rock development:

Statement of Explosives Used in Year 1935:

	Quantity Pounds	Average Price	Amount 1935	Amount 1934
<u>BREAKING ORE:</u>				
Gelamite Powder #2	88,135	12.20	10,760.55	5,892.65
Gelatine 60%	1,950	12.50	243.75	162.89
Total Powder	90,085	12.22	11,004.30	6,055.54
Fuse - Feet	315,538	5.70M	1,798.58	883.17
Blasting Caps	52,341	11.23M	587.77	304.62
Tamping Bags	1,650	2.50M	4.13	
Electric Exploders	750	10.82C	81.17	
Fuse Lighters	4,200	6.74M	28.29	10.76
Leading Wire	1,000	7.00M	7.00	
Total Fuse, Caps, Etc.			2,506.94	1,198.55
<u>TOTAL ALL EXPLOSIVES</u>			<u>13,511.24</u>	<u>7,254.09</u>
Product - Tons			222,121	122,806
Pounds Powder per Ton of Ore			.406	.418
Cost per Ton for Powder			.050	.049
Cost per Ton for Fuse, Caps, Etc.			.011	.010
Cost per Ton for All Explosives			.061	.059

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7. UNDERGROUND:e. Explosives, Drilling and Blasting:Statement of Explosives Used in Year 1935: (Cont.)

	Quantity Pounds	Average Price	Amount 1935	Amount 1934
<u>DEVELOPMENT IN ROCK:</u>				
Gelamite Powder #2	400	11.81	47.25	23.50
Gelatin 60%	46,800	12.50	5,844.76	1,611.00
Total Powder	47,200	12.49	5,892.01	1,634.50
Fuse - Feet	97,651	5.70 M	556.60	94.00
Blasting Caps	12,796	11.23 M	143.69	31.48
Fuse Lighters	1,600	6.74 M	10.75	4.05
Electric Exploders	125	10.66 C	13.33	30.13
Total Fuse, Caps, Etc.			724.37	159.66
<u>TOTAL ALL EXPLOSIVES</u>			6,616.38	1,794.16
Rock Drifting - Feet			2,625	743
Cost per Foot for Powder			2.244	2.200
Cost per Foot for Fuse, Caps, Etc.			.276	.215
Cost per Foot for All Explosives			2.520	2.415
Grand Total Explosives Used in Mine			20,127.62	9,890.41
Used Loading by Steam Shovel			8.64	
Total as per Cost Sheet			20,136.26	9,890.41
Cost per Ton All Explosives Used			.091	.081
Average Price per Pound for Powder			.1231	.1185

The following comparative data gives a picture of the last eight years:

Year	Cost per Ton for Powder	Lbs. of Powder per Ton of Ore
1935	\$.050	.406
1934	.049	.418
1932	.064	.509
1931	.059	.461
1930	.058	.431
1929	.075	.451
1928	.085	.473
1927	.089	.500

It will be noted from the foregoing that there is little change in the cost per ton for powder for the past two years, despite the fact that the cost of powder increased approximately 5%. The cost was kept down by the lowest consumption per ton of ore for the past eight years.

f. General:

The year 1935 saw some changes in the use of Jackbits, air line respirators, water sprays, etc. Early in January after experiments at the Cliffs Shaft Mine had proven the value of using detachable bits, Jackbits were regularly used on the rock work on the fifth level.

In putting up the new rock raises from the east end of the fourth level, air line respirator equipment was used. I will not describe this equipment in detail because undoubtedly Mr. Conibear's report deals with this item.

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7. UNDERGROUND:f. General: (Cont.)

More general use of a generous supply of water in all rock operations in the form of fine water sprays, water jets, etc. was common. To make these sprays more effective, fans were also put into commission to freely circulate the air, keeping the air moving through the water curtains.

It also became the accepted practice to wash down the sides and backs of all rock drifts with a high pressure stream of water. The headings nearest the working face would be drenched before each blast, but the rest of the drift would be thoroughly cleaned only once or twice a week.

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	221,121	122,806	98,315	
Underground Costs	.919	.769	.150	
Surface Costs	.158	.189		.031
General Mine Expense	.192	.217		.025
COST OF PRODUCTION	1.269	1.175	.094	
Depreciation	.044	.070		.026
Taxes	.115	.157		.042
Loading and Shipping	.025	.024	.001	
TOTAL COST AT MINE	1.453	1.426	.027	
No. of Operating Days	291	197	94	
No. of Shifts & Hours	1-8	1-8		
Average Daily Product	763	623	140	

In the detailed statements that follow, no attempt is made to explain all of the differences between 1934 and 1935 for each account because of the change in the operating schedule. The fact that the Lloyd Mine did not start producing until April 1934 makes relative comparisons with 1935 out of place. Some of the accounts, however, will be taken up and sub-divided to show how the year's costs are made up.

DEVELOPMENT IN ROCK:

Because of the opening up of the new fifth level and because of the two new rock raises on the east end of the fourth, the footage of rock drifting for 1935 totaled 2625 feet. In 1934 there was only 274 ft. of development in rock.

Following are some comparison costs per foot:

<u>Year</u>	<u>Labor Cost</u> <u>per Foot</u>	<u>Supply Cost</u> <u>per Foot</u>	<u>Total</u>
1935	\$ 6.45	\$ 3.94	\$ 10.39
1934	7.13	4.35	11.48

Both labor and supply costs showed a lower cost per foot in 1935. The only radical change in our rock work procedure was the introduction of "Jackbits." This to some extent accounts for the decreased cost.

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8. COST OF OPERATING:

STOPPING:

Detailed cost for 1934 and 1935 follow:

	<u>1935</u>		<u>1934</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies	2884.15	.013	1826.85	.015
Iron and Steel	496.54	.002	255.30	.002
Oil and Grease	136.42	.001	72.02	.000
Machinery Supplies	1027.69	.004	275.41	.002
Explosives	12825.88	.058	6982.87	.057
Lumber and Timber	11.31	.000		
Electric Power	122.31	.001	83.66	.001
Sundries	464.70	.002	500.36	.004
Shop Supplies, Etc.			.85	
Total Supplies	17969.00	.081	9997.32	.081
Payroll Labor	53211.61	.239	29274.50	.238
Cliffs Shaft Labor	459.04	.002		
General Shops Labor	850.36	.004		
Shop Labor, Etc.	565.79	.003	1090.26	.009
Total Labor	55086.80	.248	30364.76	.247
Grand Total	73055.80	.329	40362.08	.328
Production - Tons	222121		122806	
Avg. Miners' Rate for Stopping		5.59		5.21

The unit cost for the two years on the face of it are identical, but it should be borne in mind that the percentage of Silica produced in the periods being compared has a material effect on the cost. If it is remembered that half the ore hoisted in 1934 was Silica and only 27% of that grade was produced in 1935, and that proportionally only about one-fifth of the ore mined each year came from sub-level stopes, then it must be evident that our miners were actually more efficient last year than the year before to produce ore at the same cost.

PUMPING:

A new plan was put into effect in 1935 to allocate the pumping expense between the Inland Steel and the C.C.I. Co. During 1933 and 1934 we paid, as our share, the percentage that our weir readings bore to the total pumped, the total being calculated from the pump revolutions minus a three per cent slippage factor. During the past year weirs were placed on all the levels in the Morris Mine and now all the allocating is done from the gallonage calculated from the flow over the weirs in both mines. The new plan cannot be argued against, because now both companies are being billed from similar data.

Following is some detailed data:

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8. COST OF
OPERATING:

PUMPING: (Cont.)

Pumping Expense for Year 1935:

	<u>Morris Mine</u>		<u>Lloyd Mine</u>	
	<u>Inland Steel Co.</u>		<u>C.C.I. Co.</u>	
	<u>Amount</u>	<u>Percent</u>	<u>Amount</u>	<u>Percent</u>
January	\$ 331.97	33.53	\$ 1,078.90	76.47
February	680.87	47.85	742.21	52.15
March	617.61	45.07	752.77	54.93
April	490.86	35.71	883.67	64.29
May	569.74	40.18	848.37	59.82
June	855.61	52.98	759.32	47.02
July	770.27	55.84	609.22	44.16
August	751.71	57.87	547.16	42.13
September	810.60	62.51	486.21	37.49
October	1,053.68	63.54	604.67	36.46
November	931.14	65.63	487.70	34.37
December	1,000.74	66.49	504.40	33.51
TOTAL	\$ 8,864.80	51.40	\$ 8,384.18	48.60
Year 1934	7,449.56	44.27	9,378.76	55.73
Year 1933	8,068.44	49.11	8,361.29	50.89

The above figures show clearly that the Morris Mine is paying an increasing proportion of the total pumping charges. An underground examination of this property reveals the source of the water as partially coming from the new ventilation raise and also from the subs along the south footwall between the seventh and eighth levels.

COMPRESSORS & AIR PIPES:

Due to the increasing amount of development work, the cost of maintaining the air lines shows an increase not only in total cost, but also in the unit cost per ton. This same development campaign also increased the total cost of operating the compressor plant.

Following are the figures for the two years:

	<u>1935</u>	<u>1934</u>
Operating Compressors	\$ 11,102.89	\$ 5,073.73
Air Pipes	3,150.65	1,419.16
TOTAL	\$ 14,253.54	\$ 6,492.89
Cost for 1000 cu. ft.	.041	.046

COMPRESSORS & POWER DRILLS:

This account shows a decreased cost due to not purchasing any new drilling machines. In 1934 four new African type drills suitable for rock drift work and two wet raising machines were put into service.

SCRAPERS & MECHANICAL LOADERS:

The cost for 1934 totaled \$ 896.84. This increased to \$ 5736.96 in 1935. In the latter year we charged off two 15 H.P. Sullivan double-drum scraper-hoists and also were under heavy expense keeping the Butler and Armstrong Shovel loaders in repair for mucking the rock on the fifth level.

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8. COST OF OPERATING:

ELECTRIC TRAM EQUIPMENT:

Following are comparative costs for 1935 and 1934:

	<u>1935</u>	<u>1934</u>
<u>Operating:</u>		
<u>Labor:</u>		
Motormen and Brakemen	\$ 17,209.40	\$ 4,828.90
Chutemen	1,368.53	1,987.17
Total Labor	\$ 18,577.93	\$ 6,816.07
<u>Supplies:</u>		
General	\$ 80.82	\$ 22.30
Oil and Grease	139.80	39.03
Electric Power	2,918.78	1,447.46
Total Supplies	\$ 3,139.40	\$ 1,508.79
Total Operating	\$ 21,717.33	\$ 8,324.86
<u>Maintenance:</u>		
Generator and Dynamo	\$ 244.52	\$ 122.89
Locomotives	1,557.37	1,719.88
Wiring	1,419.45	221.95
Main Line Tracks	4,061.74	483.95
Main Line Cars	1,954.65	414.81
Total Maintenance	\$ 9,237.73	\$ 2,963.48
Grand Total Operating and Maintenance	\$ 30,955.06	\$ 11,288.34

A large portion of the expense shown above for operating and maintaining the electric haulage system was incurred opening up the new fifth level. If we deduct \$ 4,247.65 of the operating costs for development in rock, then the cost per ton of ore trammed is \$.079 instead of \$.098.

HOISTING:

Following are comparative details of the hoisting expense:

	<u>1935</u>	<u>1934</u>
Maintenance	\$ 2,487.12	\$ 2,319.95
<u>Operating:</u>		
<u>Labor:</u>		
Engineers	\$ 4,534.82	\$ 2,311.58
Other Labor	386.57	34.92
Total Labor	\$ 4,921.39	\$ 2,346.50
<u>Supplies:</u>		
Oil and Waste	\$ 83.96	\$ 33.38
Tools	59.05	68.11
Electric Power	7,772.29	4,345.41
Heating Expense	480.11	86.68
Total Supplies	\$ 8,395.41	\$ 4,533.58
Total Operating Expense	\$ 13,316.80	\$ 6,880.08
Tons of Rock & Ore Hoisted	249,671	131,878
Average Depth Hoisted	855'	837'

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8. COST OF OPERATING:

HOISTING: (Cont.)

It will be noted that the ratio of tonnages hoisted for the two years is practically the ratio of the expenses for the same period. The tonnage hoisted increased 89.4%. The total cost increased 93.5%. Average depth increased from 837 to 855.

SCREENING-CRUSHING:

Costs for 1935 were five-fold over those in 1934, increasing from \$ 343.36 to \$ 1,761.75. In the spring of 1935 just before navigation opened we planned to repair the No. 6 crusher in the Lloyd shaft house. We found it necessary to provide a new spindle for the crusher head; the chute and grizzly over which the ore passes to get from the skip dump to the crusher was entirely rebuilt; the discharge chute was replaced and an entirely new structure built to house all the crusher equipment.

TOP TRAM EQUIPMENT:

This account shows an increase in the unit cost due to long deferred repairs being made in 1935. A detail of the 1935 cost follows:

Engine and Motors	\$ 600.19
Tracks and Cars	980.55
Wire Rope	405.50
Sheaves, Rollers, Etc.	179.65
T O T A L	\$ 2,165.89

We repaired both the North and South driving units. The propelling drums on one unit and a motor on the other one were replaced with new or salvaged equipment. Two top-tram saddle-back cars were rebuilt and a new car of different design is also being built. The new car will be standard with those in use at the Negaunee District mines.

10. TAXES:

The figures that follow show the taxes paid in Ishpeming Township for the past two years by the Mining Department on the Lloyd Mine.

<u>LLOYD & SECTION 6:</u>	1 9 3 5		1 9 3 4	
	Valuation	Taxes	Valuation	Taxes
$\frac{1}{8}$ of NW $\frac{1}{4}$ of Sec. 6-47-27, 41 Acres)				
$\frac{3}{8}$ of SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of " 282.93 ")	950,350	16,724.45	945,000	16,572.56
Personal - Supplies & Equipment	470,000	8,271.20	400,000	7,015.00
$\frac{1}{8}$ of NE $\frac{1}{4}$ of Sec. 6-47-26, 80 Acres	320	5.64	320	5.60
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of " " 40 "			350	6.15
SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of " " 40 "	575	10.11	575	10.09
Total	1,421,245	25,011.40	1,346,245	23,609.40
Collection Fees		250.11		236.10
T O T A L L L O Y D		25,261.51		23,845.50
PRODUCT		222,121		122,806
Taxes per Ton of Production		\$.1137		\$.1941
Shipments - Tons		180,208		99,023
Taxes per Ton Shipped		\$.1401		\$.2408

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10. TAXES:

The following table shows comparative figures for taxes on the North Lake Location:

	<u>1 9 3 5</u>		<u>1 9 3 4</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Houses on Section 6 The C.C.I. Co.	40,500	712.72	40,500	710.27
Collection Fees		7.13		7.10
Total Dwellings		719.85		717.37
 Total Ishpeming Township Rate	 1,462,082	 25,987.45 1.759	 1,386,745	 24,562.87 1.754

The tax rate for the two years shows little change, but the total taxes paid are larger because of increased valuation.

The taxes raised in Ishpeming Township for the past five years follow:

	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
State Tax		1000.85	856.64	5095.48	6248.24
County Tax	12258.51	10726.95	8945.65	11179.47	12818.94
County Road Tax	1351.93	862.29	745.51		3930.50
County Debt Service Tax	667.08	463.70	2020.32		
Township Tax	3064.38	2931.95	2535.18	9500.00	11000.00
Township Debt Service Tax	1100.00	1100.00	1100.00		
School Tax	10364.80	10348.05	8947.68	15000.00	18000.00
School Debt Service Tax	2915.50	2811.93			
Rejected Tax		20.22	104.80	3.88	4.96
T O T A L	31722.20	30265.94	25255.78	40788.83	52002.64
R A T E	17.60	17.55	16.87	27.14	30.70

The slight increase in rate is entirely due to the small increase in the County Debt Service Tax.

11. ACCIDENTS
AND
PERSONAL
INJURIES:

The Lloyd Mine accident record for the past five years follows:

	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
Fatal Accidents	0	0	0	0	1
Compensable Accidents	5	9	0	0	4

In 1934 there were (18) slight accidents compared with (41) in 1935. The accident record for 1935 was very poor compared with the three years previous, but presumably the other years were above the average.

13. NEW EQUIPMENT
AND PROPOSED
NEW EQUIPMENT:

new

Very little/equipment was purchased in 1935. The reason for lack of new purchases, was not that we did not need new drills, scraper-hoists, tools, etc., but because of the negotiations carried on during the year. Our total purchases will not foot up to over \$ 750.00. Two second-hand ventilating fans, one line respirator, and four fire extinguishers, are all that we added to our equipment inventory in 1935.

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14. MAINTENANCE
AND REPAIRS:

Following is the detailed cost of maintaining the mine location during 1935:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Repairs to Fire Hydrants	4.40	10.58	14.98
Fire Protection	20.74	53.37	74.11
Fencing Pits and Caves	136.92	11.45	148.37
Cleaning Alleys	614.34	58.26	672.60
Cleaning Outhouses	30.00		30.00
Removing Snow and Ice	17.60		17.60
Repairing Water Mains	53.24	8.63	61.87
Water		977.88	977.88
Policemen's Time	<u>1250.81</u>		<u>1250.81</u>
T O T A L	2128.05	1120.17	3248.22

The maintenance expense for the past five years follows:

Year 1935	\$ 3,248.22
" 1934	2,600.78
" 1933	625.68
" 1932	1,189.54
" 1931	3,123.58

Costs for 1935 show an increase over 1934. The bulk of the repairs cover rebuilding chimneys and porches; Sheetrock for kitchens and dining rooms; maple flooring and repairs to sewers. Repairs were made on (119) dwellings or an average of \$ 27.28 per house.

18. NATIONALITY
OF
EMPLOYEES:

Finnish -----	68
Italians -----	37
French -----	36
English -----	19
Scandinavians -----	15
German -----	1
Austrian -----	1
T O T A L -----	<u>177</u>

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1. GENERAL:

The Morris Mine, under the management of the Inland Steel Company, speeded up its production schedule from 18,000 tons a month in the early part of the year to 23,500 tons a month in December. It was hoped that a 25,000 ton product could be secured in the latter part of the year but this tonnage was not realized by 1500 tons. In January and February production was a little less than 18,000 tons. Then, beginning the first of March, orders from the Chicago office boosted the schedule to 20,000 tons a month. This tonnage prevailed until December 1st when 25,000 tons was asked for. In May and June the regular monthly assignment was exceeded because the Inland Steel Co's boats were coming to the L. S. & I. Ry. Co. dock so fast that it was necessary to speed up the pocket shipments to prevent delaying the boats.

Siliceous ore accounted for 17 $\frac{1}{2}$ % of the total product. This compares with 27 $\frac{1}{2}$ % of Morris Siliceous ore produced in the year 1934.

Shipments for the year totaled 217,906 tons compared with 156,521 tons in 1934.

The new air shaft was completed in September 1935. This greatly improves the air circulation underground. Some difficulty was experienced with the shaft freezing up in November due to a thin film of ice forming on the wire screen brattices which have been placed 100 ft. apart from the 4th level to surface. This trouble was overcome by installing an extra fan at the collar of the ventilating shaft. This fan, which was the one that our company purchased from the Archibald Mine a few years ago, was installed to exhaust or pull warm air from underground in order to thaw out the ice.

During the latter part of 1935 a change was also made in the operating personnel, Mr. R. L. Wahl having been promoted from Superintendent to General Superintendent, and Mr. Ray Satterley, formerly Superintendent of the Greenwood Mine, was made Superintendent of the Morris Mine.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

Following are the production figures for the year 1935:

<u>Grade</u>	<u>Tons</u>	<u>% of Product</u>
Morris Standard Ore	202,296	82.4
Morris Siliceous Ore	43,164	17.6
TOTAL	245,460	100.0

Production from the fee lands and Chase Leases for 1935 was divided as follows:

	<u>Morris Standard Tons</u>	<u>Morris Siliceous Tons</u>	<u>Total Tons</u>	<u>% of Total</u>
Chase Leases	158,107	29,572	187,679	76.5
C. C. I. Co.'s Fee Lands	44,189	13,592	57,781	23.5
TOTAL	202,296	43,164	245,460	100.0

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

a. Production by Grades: (Cont)

The following table shows the output for the last three years:

<u>Grade</u>	1935	1934	1933
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Morris Standard Ore	202,296	125,634	105,441
Morris Siliceous Ore	43,164	47,635	20,755
Total	245,460	173,269	126,196
Increase for 1935	72,191		

The figures that follow show the production from the Chase Leases and The C. C. I. Co. lands for the past three years:

	1935	%	1934	%	1933	%
	<u>Tons</u>		<u>Tons</u>		<u>Tons</u>	
Chase Leases	187,679	76.5	129,284	74.6	103,487	82.0
C.C.I.Co. Fee Lands	57,781	23.5	43,985	25.4	22,709	18.0
Total	245,460	100.0	173,269	100.0	126,196	100.0

It will be noted from the foregoing figures that the amount of ore hoisted from The C. C. I. Co. fee lands is proportionately a little bit less than the amount mined on our fee lands in 1934.

b. Shipments

Shipments for the year 1935 follow:

<u>Grade</u>	Pocket	Stockpile	Total
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Morris Standard Ore	130,213	51,020	181,233
Morris Siliceous Ore	23,577	13,047	36,624
Total	153,790	64,067	217,857

Shipments for the past three years follow:

<u>Grade</u>	1935	1934	1933
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Morris Standard Ore	181,233	110,956	63,255
Morris Siliceous Ore	36,624	45,565	13,300
Total	217,857	156,521	76,555
Increase for 1935	61,336		

During the year 1935 The C. C. I. Co. received from the Inland Steel Company 4,023 tons of Morris Standard Ore. We delivered to them 30,677 tons of the same grade, which means that as of December 31, 1935, there is due us from the Inland Steel Co. 26,654 tons of Morris Standard Ore. We also received during the year, for charcoal furnaces, 7,677 tons of Morris Siliceous Ore. The Lloyd Mine delivered to the Inland Steel Co. 6,190 tons of Lloyd Silica Ore, which apparently would leave us with a balance due the Inland Steel Co. of 1,487 tons. Actually, however, because of the difference in iron units, we owe the Inland Steel Co. as of December 31, 1935, 1,731 tons of Lloyd Silica Ore.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

c. Balance on Hand:

The amount of ore in stock at the Morris Mine on December 31, 1935 was as follows:

Morris Standard Ore	81,159 tons
Morris Siliceous Ore	<u>12,834 "</u>
Total	93,993 "

This compares with a total of 66,389 tons as of December 31, 1934, and 49,641 tons in stock on December 31, 1933.

e. Production by Months

<u>Month</u>	<u>Morris Standard Tons</u>	<u>Morris Siliceous Tons</u>	<u>Total Tons</u>
January	14,894	3,089	17,983
February	13,755	4,187	17,942
March	17,952	2,917	20,869
April	15,651	4,484	20,135
May	18,682	3,625	22,307
June	19,153	2,613	21,766
July	18,187	2,221	20,408
August	17,618	2,426	20,044
September	14,305	5,830	20,135
October	17,438	2,718	20,156
November	17,691	2,454	20,145
December	<u>20,202</u>	<u>3,368</u>	<u>23,570</u>
Total	205,528	39,932	245,460

3. ANALYSIS:

The following table shows the analysis of the Morris Standard Ore shipped:

<u>Month</u>	<u>Tons</u>	<u>Iron Dried</u>	<u>Moisture</u>	<u>Iron Natural</u>
April	34,382	58.50	9.69	52.83
May	48,352	58.63	9.68	52.95
June	21,596	58.52	10.28	52.50
July	18,337	58.23	10.32	52.22
August	18,618	58.28	10.04	52.43
September	14,305	58.24	10.02	52.39
October	17,651	58.73	10.12	52.79
November	6,539	58.30	10.30	52.30
December	<u>1,453</u>	60.13	10.18	54.01
Total	181,233			

Analysis of Morris Siliceous Ore Shipments:

<u>Month</u>	<u>Tons</u>	<u>Iron Dried</u>	<u>Moisture</u>	<u>Iron Natural</u>
February	193	52.04	9.53	47.08
March	184	51.61	9.79	46.56
April	6,320	52.32	9.11	47.55
May	9,841	50.66	9.44	45.88
June	2,478	50.86	9.74	45.91
July	3,813	52.10	9.51	47.15
August	4,817	53.25	9.51	48.19
September	2,213	51.55	9.88	46.46
October	4,324	51.02	9.16	46.35
November	1,705	52.74	9.15	47.92
December	735	51.56	9.25	46.79
Total	36,623			

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3. ANALYSIS:

Analysis of Ore in Stock:

At the end of the year the analysis of the ore in stock was as follows:

<u>Grade</u>	<u>Tons</u>	<u>Iron Dried</u>	<u>Phos.</u>
Morris Standard Ore	81,159	58.68	.068
Morris Siliceous Ore	12,834	50.55	.061
Total	93,993		

6. SURFACE:

Garage:

A new steel building, with one side open to the weather, was erected South of the transformer station and the surface dry. This building was put up for the purpose of accommodating forty automobiles, the idea being to stop the promiscuous parking around the mine buildings, particularly in the wintertime. Employees living in Ishpeming drive their own cars back and forth each day and during the winter months when the area South of the main machine shop is filled with snow they would have to park their cars as best they could South of the carpenter shop and along the road leading to the mine office and also in the open space between the main dry, blacksmith shop, and transformer building. As a result they interfered with the operation of the regular mine trucking equipment. When we operated the mine we did not have this difficulty because in the first place we provided transportation for approximately fifty men with our own mine truck and we also employed as many men as possible living in the mine location. About two-thirds of the men employed by the Inland Steel Company, however, live in Ishpeming, Negaunee, and Diorite, the bulk of them coming from Ishpeming.

Ventilation Shaft:

A corrugated iron building was built directly over the mouth of the ventilation shaft or raise. This building is 20 x 40 ft. in size and houses two fans, one a Jeffery 60,000 cu. ft. capacity for forcing air down into the mine, the other, a smaller fan, being used to pull warm air up the shaft to thaw out the accumulated ice.

7. UNDERGROUND:

a. General:

There were several new pieces of equipment put underground, some of which worked out successfully, and others whose use was abandoned after extensive tests were made.

In order to improve the ventilation underground a self closing door was purchased from the Automatic Door Company of Canton, Ohio. The new device consists of two doors which are hinged in a frame, the entire frame being set kitty-corner across the drift. A set of channel irons are laid between the rails in the track 40 ft. on each side of the door. As the locomotive approaches the door the flanges of the wheels run in the channels, depressing the same, and thereby operating a system of levers to throw the door open. The doors also have springs on them causing them to fly open very rapidly. After the entire train has passed through the door another set of channels on the opposite side of the door, thru a similar set of levers, closes the door.

Another new device tried underground, but in this case the test was unsuccessful, was a machine made by the Cadco people intended primarily to solve the dust problem on ~~rock~~ rock development work. The apparatus is nothing more or less than a large size vacuum cleaner. The hose from the suction apparatus was fastened around the collar of the hole, the idea being to suck the dust particles, as they were produced by drilling, into the machine and then exhausting them through another

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7. UNDERGROUND: (Cont)

a. General: (Cont)

hose into a water chamber or trap, finally releasing the trapped material, after it was thoroughly saturated with water, into the ditch alongside of the drift. The manufacturers claim that this apparatus would speed up drilling but as a matter of fact it retarded drilling. In real hard ground there were times when the miner was only able to drill one-quarter as fast with the dust catching apparatus in operation. The reason for this was that the drill steel would plug because of the fact that it was not possible to use water through the hollow drill steel to wash out the cuttings. With this Cadco apparatus it was necessary to do dry drilling. The machine failed to justify the claims of its manufacturer at either the Greenwood Mine or in the Morris Mine.

During the year 1935 the Inland Company also built weirs on all of the levels for the purpose of determining the amount of water that is coming in on the 4th, 6th, 7th and 8th levels. Ever since the Inland has leased the Morris Mine the Lloyd Mine proportion of the pumping expense has been calculated from weir readings on the 4th and 6th levels Lloyd Mine but the total amount of water pumped from both properties has been calculated by using the pump revolutions of the two Prescott pumps on the 4th level, allowing 3% for a slippage factor. To put it another way, the Lloyd Mine was paying for water based on data secured from weirs while the Morris Mine proportion was based on an entirely different set of factors. In order to make the information more reliable and to put both mines on exactly the same basis the Inland Company installed the weirs heretofore mentioned.

b. Development:

In 1933 and 1934 the Inland Steel did very little development work but in 1935 the new ventilation raise was put through from the 4th to the 6th level and they also finished the raise from the 6th to the 7th and from the 8th to the 7th. The major portion of the work in the latter two raises was, however, completed in the year 1934. It required eight months to finish the raise from the 4th level to surface. This raise was 6 ft. x 11 ft. in size and after the raise was finished all of the dividing timber was removed, providing a full size raise for ventilation. The ladder road is being maintained, however, along the foot on the South side. In order to make the ladder road safe for climbing, fence wire was put in position between the ladder road and the old rock compartment and at intervals of 100 ft. fencing was run from foot to hanging and from wall plate to wall plate, leaving only a small hole for a man to climb through. Inasmuch as more or less water runs into this shaft, a combination of the water and the cold air blown down the shaft in November coated the wire brattices with a film of ice, making the shaft useless for ventilation purposes. As mentioned before, the only way to solve this problem is to alternately pull the warm air up the shaft and then force cold air down the shaft.

The miners putting up the ventilation raise worked three 8-hour shifts during the first eight months of the year. Most of the material raised through was second class ore, a very rich jasper, and practically every pound of material taken out of the raise was hoisted as silica ore.

In order to expedite progress in the raise, a very ingenious toboggan like device was used to transport the men and material up to the top of the raise. The ladder road side of the raise was divided into two compartments, the lower, or foot side, being used for the toboggan slide, the upper portion for a ladder road. A hoist was placed on the

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7. UNDERGROUND: (Cont)
5. Development: (Cont)

4th level and a system of telephones and electric bells installed. The Inland management did not seem to have any hesitancy about having men ride in this device and no accidents occurred in putting up this raise to surface but, nevertheless, personally we believe that this device was very satisfactory for transporting materials but if we had done the project our men would have been compelled to climb the regular ladder road.

Although we have mentioned that very little development work was done by the Inland Steel Company in 1933-34 and that they started a development campaign in 1935, we are referring particularly to rock development work or drifts or raises being driven that were not in the immediate vicinity of the regular ore bodies. During both 1933 and 1934, of course, there was some ore drifting and raising done by the regular stoping contractors and there were also some drifts driven preparatory to sub level stoping in the various deposits, but in 1935 there was more than the usual amount of this work done.

Above the 7th level contract No. 1 spent most of the year driving a main transfer drift on the 110 ft. sub level in No. 21 deposit and also putting up raises and driving small dog drifts connecting these raises above the 110 ft. elevation. All of this work was done on our fee lands. Near the end of the year this contract was getting ready to actually stope the West half of the area developed by them during the year. The East half of this ore body is being mined through a new raise put up from the main 7th level crosscut.

In "B" deposit, contract No. 7 also spent the entire year putting up small raises and driving dog drifts at various elevations so that Nos. 10 and 11 contracts could continue stoping.

No. 27 also did some development work for No. 9 contract stoping at the East end of "B" deposit.

Contracts Nos. 20 and 23, which ordinarily were sub level slicing during most of the year, stopped slicing for a short time to make it possible for them to drive two crosscuts out through the hanging in order to determine the position of the main transfer drift which is planned a short distance below this particular sub level. Another reason for driving these crosscuts was to make it possible to put up raises connecting with the subs above and the subs below in order to improve the ventilation of the working places.

Contract No. 12 spent the entire year driving the main travelling transfer and timber drift at the -40 ft. elevation from the 1500 West coordinate line Southwesterly to and a little beyond the 2200 West coordinate line. They also extended this same drift Northeast for a short distance and then put up a new timber raise to the 7th level elevation. In the latter part of the year they crosscutted South parallel with the 1800 West coordinate line, crossing Chase Lease No. 9 over onto our fee lands to the South, the crosscut being extended for a distance of 160 ft., the idea being, if possible, to intercept the water coming in on the 30 ft. sub level. The drift, however, was perfectly dry, no water having been encountered.

In the extreme Southwest corner of the main deposit No. 26 contract drove a main transfer drift from the new three-compartment raise due West for 200 ft. They also put up several small raises and started to develop this territory for sub level stoping. The idea is to mine out ore that lies on our fee lands between two dikes. The stope will probably be about 200 ft. long and will run from 50 to 60 ft. in width. By the end of the year the height was undetermined.

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7. UNDERGROUND: (Cont)

b. Development: (Cont)

During the latter part of the year some work was started between the 7th and 8th levels and on the 8th level which can be classified as development work.

On the -40 ft. sub level two crosscuts were driven North from the main timber transfer drift, one crosscut being on the 1900 West coordinate line, the other being parallel to the 2000 West coordinate line. These crosscuts were driven North for about 200 ft., the idea being to determine the width of the ore at this point in order to plan an proposed 7½ level to be located halfway between the 7th and 8th main levels. The Inland management have an idea that by putting in a main transfer level to be equipped for regular motor haulage in order to handle all of the ore above the -40 ft. sub through raises that will stop at that elevation that they will save the cost of repairing the long raises that go on down through to the 8th level. It is merely a question of figuring the cost of operating another motor crew continuously on both day and night shift, together with the cost of maintaining the equipment, and then comparing that with the expense of maintaining the 200 ft. raises in order to determine the cheapest procedure. Another factor is the amount of ore that remains to be mined above the -40 ft. sub. All of the ore in the main deposit has been mined down to the 30 ft. sub and early in 1936 gangs will be working on the 10 ft. sub which is only 50 ft. above the proposed main transfer drift which has not as yet been started. I can visualize a lot of trouble with timber crushing on the proposed transfer level because by the time the transfer drift is finished mining will be in progress within 30 ft. of the back of the new drift, so we are free to confess that the proposed project does not look like the proper thing to do.

On the 8th level itself the main footwall drift in the extreme Southwest corner of the main deposit was also extended West on our fee lands parallel with the South line of Chase Lease No. 9.

c. Stoping:

Stoping operations during 1935 were carried on in four deposits, No. 21 which lies partially on our fee lands East of Chase Lease No. 9 and on the latter lease; No. 61 deposit which is entirely on Chase Lease No. 9; "B" deposit, also on Chase Lease No. 9, and the main deposit, part of which runs over onto the old Excelsior Iron Company's lands East of the Chase Lease, and a part of this deposit is also under the Excelsior Iron Co's forty South of Chase Lease No. 9, but the bulk of the main deposit, also known as No. 33 deposit, lies in the extreme Southeast corner of Chase Lease No. 9.

There were seventeen gangs stoping during the year and the work done by these gangs in detail is as follows:

No. 21 Deposit:

Contract No. 1, of which mention has already been made in this report under the heading "Development", also did a small amount of stoping in the early part of the year. They finished taking out a small pillar of ore running from the 210 ft. sub down to the 170 ft. elevation, most of the ore being mined on our fee lands adjacent to the East line of Chase Lease No. 9. A small proportion of the product, however, came from the East side of the lease. Occasionally during the year when there was a demand for Morris Siliceous Ore this contract would scrape that material out of the old workings that lie on Chase Lease No. 9.

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7. UNDERGROUND: (Cont)

e. Stoping: (Cont)

No. 61 Deposit:

Three contracts were employed during the year 1935 sub level slicing in No. 61 deposit. These three gangs mined out all of the 220 ft. sub and most of the 210 ft. sub. They also started and by the end of the year had practically finished the 200 ft. sub. All of this work was done in the East end of No. 61 deposit. Over on the West side of the same ore body but East of the limit of mining established to protect the dams built in the raises a short distance below the 4th level, the 160 ft. sub was mined out by radial slicing. Most of the 150 ft. sub between the limit of mining and the 1875 West coordinate line was also taken out and by the end of the year slicing was started on the 140 ft. elevation.

"B" Deposit:

Considerable ore was taken out of "B" deposit during the year. There were three contracts stoping, all of them in sub level stopes. No. 9 stoped Westerly from the East end of the deposit between the 250 ft. elevation and the 170 ft. sub. Over on the West side of the same deposit Contracts 10 and 11 mined ore by the sub level stoping method. These two contracts were the best producing gangs in the mine, taking out a large tonnage from the 230 ft. elevation down to the 130 ft. sub. Most of the ore produced by these gangs was Standard grade but they also produced some Siliceous material.

Main, or No. 33 Deposit:

Starting over on the East end of the main deposit on our fee lands East of Chase Lease No. 9 Contract No. 2 mined out three subs, the 160, the 150, and the 140 ft. sub. Directly West of No. 2 Contract, Contract No. 4 also mined out three subs, the 120, the 110, and the 100 ft. sub. Continuing West, No. 3 contract not only mined on the 110 and 100 ft. subs but also started radial slicing on the sill floor of the old 7th level.

In the extreme Southeast corner of Chase Lease No. 9, three gangs, Nos. 20, 22, and 23, mined out an extensive area between the 1400 to 1800 West coordinate line on the 50 ft. sub. They also mined out the 30 ft. sub and a portion of the 20 ft. sub and by the end of the year Contract No. 23 had dropped down to the 10 ft. elevation.

Continuing West, three more gangs spent practically the entire year sub level stoping. These gangs are No. 8, 21 and 25. Most of the ore mined by No. 8 contract was on Chase Lease No. 9 and a portion of the ore mined by No. 21 and 25 contracts was drawn from our fee lands South of Chase Lease No. 9.

There was also one new gang, No. 14, which was put to work near the end of the year slicing on the -40 ft. sub in the main deposit.

13. EQUIPMENT:

The Inland Steel Company purchased and put in operation twelve new 4-ton rocker dump cars during the year. These were purchased from the Lake Shore Engine Works

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19. GENERAL:Pumping:

The following table shows how the pumping costs have been divided between the Morris and Lloyd Mines and also shows the proportion charged against each company for the year 1935:

<u>Month</u>	<u>Inland Steel Co.</u>		<u>C. C. I. Company</u>	
	<u>Cost</u>	<u>%</u>	<u>Cost</u>	<u>%</u>
January	331.97	33.51	1,078.90	66.49
February	680.87	47.85	742.21	52.15
March	617.61	45.07	752.77	54.93
April	490.86	35.71	883.67	64.29
May	569.74	40.18	848.37	59.82
June	855.61	52.98	759.32	47.02
July	770.27	55.84	609.22	44.16
August	751.71	57.87	547.16	42.13
September	810.60	62.51	486.21	37.49
October	1,053.68	63.54	604.67	36.46
November	931.14	65.63	487.70	34.37
December	1,000.74	66.49	504.40	33.51
Total	8,864.80	51.40	8,384.18	48.60
Year 1934	7,449.56	44.27	9,378.76	55.73
" 1933	8,068.44	49.11	8,361.29	50.89

The above figures show very clearly that the Morris Mine is paying for an increasing proportion of the total pumping charges. This is due to the fact that the Morris Mine is getting wetter, some of the water coming in on the 4th level from the new ventilating shaft and raise, the rest of the water coming in along the South footwall on the subs between the 7th and 8th levels.

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TILDEN MINE
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1. GENERAL

Ore production at the Tilden started April 13th and was completed November 15th, the total shipments being 190,511 tons. Loading operations were intermittent, and from the West Pit only until July, when single shift operation of both the East and West Pits became steady. On September 16th, ore production was placed on a double shift basis and this was continued intermittently for the remainder of the season. The most important development of the year was the opening of the new Summit Pit which was added to the production list in October. The total shipment from this pit was 4,479 tons, which analyzed .010 in Phosphorus. The production figures from the East and West Pits were 40,575 tons and 145,457 tons respectively.

At the beginning of the year, drilling was under way along the east edge of the West Pit in order to add to the broken ore reserves of 57,579 tons. A blast of 40,000 tons was made here in June, and was later followed by a 30,000 ton blast early in September because of the accelerated loading schedule. These blasts, together with the 6,000 tons shattered previously in breaking down the overhang in the central part of the pit in January, added 76,000 tons to the above reserves, bringing the total to 133,579 tons. The difference between this figure and the 145,457 tons loaded, was a result of secondary blasting along the toe in the west half of the pit. The pit face was also lengthened to former limits by selective loading and dumping of off-grade dike and ore mixtures. Both of these operations were successful, and although they raised the cost temporarily have prepared for more efficient blasting and loading conditions in this pit in 1936.

At the East Pit 34,000 tons of broken ore were available from a blast in the latter part of 1934. It was necessary to drill and blast only 12,000 tons additional and this same blast was utilized to prepare the north face of the pit for the dumping of Summit ore later in the season. Both the East and West Pits are virtually empty of broken ore reserves at the beginning of 1936, but a drilling schedule is in force that will provide a single row of holes the full length of the face in each pit at the start of the 1936 shipping season. These two large primary blasts will eliminate much track shifting and lessen loading expense as previously explained.

Preparations to open the new Summit or low phosphorus ore pit, were begun in May. Ledge sampling having indicated the desired results, and the necessary authorization being secured, work started on the 15th of that month and continued for the remainder of the season. Clearing of the area was followed by hydraulic stripping, railway construction and drilling. The first blast was made September 27th and the

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1. GENERAL (Cont.)

ore transported on the upper level tracks to the trestle above the East Pit. From this trestle the ore is dumped to the floor of the East Pit and reloaded by #31 electric shovel for transportation to the crushing plant. The single shipment of 4,479 tons was completed October 21st and the phosphorus content was .010 as previously noted. Because of the small height of loading face, the small shovel used and the initial small tonnage, the direct cost per ton of this ore was excessive. Other factors being equal however, the only added production charge for this ore will be the East Pit reloading charge which amounted to 4.7¢ per ton in 1935.

Churn drilling, which was placed on a single shift basis shortly after the close of the shipping season, is expected to make available for blasting in the spring of 1936 approximately 125,000 tons in the West Pit; 40,000 tons in the East Pit; and 10,000 tons at Summit Pit. Unfortunately the drilling has indicated that less than one half of the blast at the last named pit will be in ore whose phosphorus content is below .010, so that it will be necessary to extend the stripping and mining limits farther east at the start of the season if exploration drilling proves the extension of low phosphorus ore in this direction. The analysis of ore in the west portion of the West Pit also indicates an iron content below the limit set for mixing the East Pit ore in producing the standard silica grade, but this was partially offset by a local area of higher grade material disclosed in the latter pit.

Stripping operations were carried on intermittently during the greater part of the loading season. In May and June the stripping limits at the West Pit were extended easterly in preparation for the first blast. This was followed by the hydraulicking of more than 5,000 cu. yd. of material from the hillside at Summit Pit during July and August. During October one week was spent in cleaning the previously stripped area at the East Pit of all traces of sand and gravel and extending the stripping limits a short distance to the south to take care of any future caving of the south pit face which has a tendency to cave and thus extend itself. At the end of the year estimates had been prepared for contract stripping during the winter, of the area east of the West Pit. Efficient washing of the material from this level surface is impossible and the contract price per cu. yd. is favorable.

Each year finds the grading of ore at the Tilden more of a problem. During 1936 sulphur, in addition to the iron and phosphorus, will need close attention during loading operations because of the necessity of including the ore of higher iron (and higher sulphur) content along the east face of the West Pit. Because of this fact, it is believed

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1. GENERAL (Cont.)

that it will be necessary to still further restrict shovel cuts to certain areas with the consequent loss of time in moving the shovels. Therefore, in order to facilitate the grading and loading of ore it is practically imperative to maintain two shovels for loading in the West Pit henceforth. With this in mind, arrangements should be made to secure comparable loading equipment for efficient operation of both the East and Summit Pits.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

	<u>Tilden</u> <u>Silica</u>	<u>Tilden</u> <u>Silica #1</u>	<u>Low</u> <u>Phosphorus</u>	<u>Total</u>
West Pit	145,457			145,457
East Pit	31,218	9,357		40,575
Summit Pit			4,479	4,479
	<u>176,675</u>			<u>190,511</u>

This production compares with 167,688 tons produced in 1934, an increase of 22,823 tons.

b. Shipments

Shipments from the Tilden for 1935 were the same as the production figures.

c. Stockpile Inventories

There is no ore in stock at the Tilden Mine. Following is an estimate of the broken ore:

West Pit	6,312 tons
East Pit	5,475 "
Summit Pit	<u>1,641 "</u>
Total Broken Ore	13,428

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

e. Product by Months

<u>Month</u>	<u>Days Operated</u>	<u>Average Daily Tonnage</u>	<u>Total Tons</u>
April	9 (1-8 hr.)	793	7,140
May	8 (1-8 hr.)	1,006	8,048
June	4 (1-8 hr.)	1,268	5,074
July	18 (1-8 hr.)	1,689	30,402
August	22 (1-8 hr.)	1,581	34,796
September	9 (1-8 hr.)	1,735	46,846
September	9 (2-8 Hr.)		
October	4 (1-8 hr.)	1,503	45,103
October	13 (2-8 hr.)		
November	3 (1-8 hr.)	873	13,102
November	6 (2-8 hr.)		
Total	133	1,432	190,511

f. Ore Statement

	<u>1935 Tons</u>	<u>1934 Tons</u>
On hand, Jan.1,1935	-	-
Output for year	190,511	167,688
Total	190,511	167,688
Shipments	190,511	167,688
Balance on hand	-	-
Increase in output	22,823	
Increase in Shipments	22,823	

1934 - 108 - 1-8 hr. shifts as tonnage was required.

1935 - 77 - 1-8 hr. shifts and 22, 2-8 hr. shifts as tonnage was required.

g. Delays

There were no serious delays, mechanical or electrical, during the season. Aside from the ordinary shovel maintenance and repairs the largest amount of time lost was in removing pieces of tramp iron from the two small crushers. The total time lost,classified under three headings, is shown as follows:

<u>Shovels</u>	<u>Crushing Plant</u>	<u>Transportation Equipmt.</u>
15 $\frac{1}{4}$ hrs.	5 hrs.	1 $\frac{1}{2}$ hrs.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

h. Delays from Lack of Current

There was a 1½ hr. delay from power failure caused by an electric storm.

3. ANALYSIS

a. Average Mine Analysis on Output

<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 on Ignition</u>
Tilden Silica incl. #1 Grade	39.40	.040	42.02	.08	.65	.35	.22	.011	.20
Tilden Low Phos.	34.35	.009	49.54	.08	.45	.28	.15	.009	.20

b. Average Analysis on Straight Cargos

	<u>Mine</u>			<u>Lake Erie</u>		
	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Moist.</u>
Tilden Silica	39.25	.037	42.29	39.37	-	1.84
Tilden Low Phos.	34.43	.010	48.75	34.48	.015	1.78

c. High Sulphur Ore

The higher sulphur ore to the east of the West Pit has not yet been thoroughly outlined. The average sulphur content of the area now explored is .028, and as mining progresses, it is believed that this can be mixed to yield a product analyzing .020 or below. This will require careful grading at times because of a few sections running as high as .192 sulphur.

4. ESTIMATE OF ORE
RESERVES

a. Developed Ore

1. West Pit (Tilden Silica)

Assumption: 14 cu. ft. equals 1 ton
10% deduction for rock.

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4. ESTIMATE OF ORE
RESERVES (Cont.)

a. Developed Ore (Cont.)

1. West Pit (Cont.)

Grade: Tilden Silica

Ore in sight Jan.1,1935, Upper Bench	502,429 tons
Ore mined in 1935, " "	145,457
Ore in sight Jan.1,1936, " "	356,972
Ore in sight Jan.1,1936, Lower Bench	<u>1,870,000</u>

Total Developed Ore Jan.1,1936, West Pit 2,226,972 tons

2. East Pit, including Summit Pit

Assumption: 14 cu. ft. equals 1 ton
10% deduction for rock
Tonnage figure is all above 1500' elevation
(Track grade from Crushing Plant)

Total ore in sight Jan.1,1935	5,445,000 tons
Ore mined during 1935	<u>45,054</u>

Total Developed Ore Jan.1,1936 5,399,946 tons

Of this total of 5,399,946 tons, approximately 2/5 is expected to grade above .015 Phos. and 3/5 below .015 Phos. These figures, based on 1930 diamond drill exploration, have so far not been proved by the small tonnage mined at the base of the hill. The tonnage explored covers so large an area that it will be years before much of it is actually developed by mining. Until such time as results prove otherwise, the available ore at the East Pit can conservatively be estimated as analyzing .026 in Phos. which, by selective mining and grading, can be made to yield a product of which approximately 33% would run .020 Phos. and 66% .030 Phos.

At the Summit Pit a small area adjacent to diamond drill hole #36 has been developed during 1935. This area is 1200' East and 120' above the floor of the East Pit. The results here are as yet inconclusive even though ore with an extremely low phosphorus content has been disclosed. Within the area stripped in 1935, small inclusions of higher phosphorus (up to .050%) material have already made grading necessary during loading operations. Until churn drill exploration definitely limits an ore body averaging lower than .016 Phos., estimates of the amount of this ore available must necessarily be deferred.

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4. ESTIMATE OF ORE RESERVES (Cont.)

a. Developed Ore (Cont.)

3.

West Pit total developed ore Jan.1,1936	2,226,972 tons
East & Summit Pits, total developed ore Jan.1,'36	<u>5,399,946</u>
Total Tilden Mine	7,626,918 tons

b. Prospective Ore.

In addition to the developed ore, there are probably large tonnages to the north and east of both the West Pit and the area developed by drilling at the East and Summit Pits. Directly north of the West Pit the ore has been limited by a large dike and a mixed mass of ore and jasper north of this dike overlain by a swamp. To the east and northeast of the West Pit, drilling and surface geology have shown the extension of the ore formation but with the inclusion of at least one small area of higher sulphur material. The tonnage which ultimately may be realized between the East and Summit Pits and to the east of the latter pit, holds forth the greatest promise.

c. Estimated Analysis of Reserves

<u>1. West Pit</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>Ign.</u>	<u>Moist</u>
Dried	42.50	.045	35.10	.120	.67	.48	.31	.014	.90	
Natural	41.44	.045	34.22	.118	.65	.47	.30	.013	.88	2.50

This analysis is based on the original diamond drill exploration of the upper and lower benches. The results secured from shipments which are now in excess of 1,000,000 tons, reduce the iron content, dry analysis, to approximately 40.50.

2. East Pit

Dried	38.20	.017	42.12	.120	.67	.48	.31	.014	.90	
Natural	37.24	.017	41.07	.118	.65	.47	.30	.013	.88	2.50

See 4-a-2 for further explanation of this analysis.

f. Estimate of production

The following is the estimate of tonnage and analysis of ore that can be produced at the Tilden Mine in 1936. The production figures are based on the 1935 season results in partially grading the East Pit ore with that from the West Pit in producing the regular silica grade.

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4. ESTIMATE OF ORE
RESERVES (Cont.)

f. Estimate of Production (Cont.)

<u>Grade</u>	<u>Tonnage</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Moist.</u>	<u>Iron Natl.</u>
Tilden Silica		39.00	.038	42.50	.015	2.00	38.20
West Pit	190,000						
East Pit	45,000						
Tilden Silica #1		37.00	.017	46.50	.011	2.00	36.25
East Pit	15,000						
Tilden Low Phos.		35.50	.010	48.50	.009	2.00	34.80
Summit Pit	10,000						

The operation of any one pit is now contingent upon the loading schedule in the other two. It is impossible to ship the low phosphorus grade except when operations are halted in the East and West Pits because of the danger of contamination in the crushing plant. Production of low phosphorus ore is dependent upon the operation of two shovels in the West Pit and none in the East while dumping into the latter pit. The Tilden Silica and #1 grades can be produced and shipped at the same time, provided the grade can be maintained by one shovel in the West Pit. Production of the low phosphorus or #1 grades cannot be increased beyond the tonnage given in the estimate unless an electric shovel comparable to present equipment is added to the two now in use at the mine.

The production and shipping of the Summit low phosphorus ore is dependent upon the accumulation of a stockpile and its reloading from the floor of the East Pit. Thus a cargo of this ore can be shipped from the mine in a very few days, but considerable time is necessary for the accumulation of each cargo, particularly with the present loading equipment at Summit Pit. For this reason, the sales department should, if possible, assign delivery of this ore to two periods only, one rather early in the shipping season and the other late.

5. LABOR
AND
WAGES

a. Comments
1. Labor

The labor conditions throughout the year were satisfactory and at no time was there a shortage of men. The Tilden Mine now has a force of experienced, faithful, and diligent workers who are "jacks of all trades" as far as jobs about the mine are concerned. Their work was

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5. LABOR
AND
WAGES (Cont.)

a. Comments
1. Labor (Cont.)

intermittent at the start of the loading season and the whole force was later used in the construction work necessary to open the new Summit Pit while the regular loading operations were slack. At the height of the season, the maximum number of employees was about 80 and of this number approximately 30 of the older hands were rotating as drill crews and repair men during the winter months.

The N.R.A. regulations were continued throughout the year.

2. New Construction

As noted above, the regular force of employees was used as much as possible in opening and equipping the Summit Pit. The track crew was added to because of the large amount of new construction. The Gwinn District crushing plant force was used when the latter plant was idle.

b. Comparative Statement of Wages & Product

<u>Product</u>	<u>1935</u>	<u>1934</u>	<u>Increase</u>	<u>Decrease</u>
No. shifts & hours	77-1-8 hr. 28-2-8 hr.	108-1-8 hr.	22,823	25
Avg. No. men working	25	21	4	
Average	4.29	4.19	.10	
Tons per man per day	45.75	50.91		5.16
Labor cost per ton (Labor Stmt)	.094	.082	.012	
Labor cost per ton (Cost Sheet)	.105	.109		.004
Total Number of Days	4163 ³ / ₄	3295 ¹ / ₄	868 ¹ / ₂	
Amt. paid for labor as per Labor Statement	17,848.33	13,807.54	4,040.79	
Amt. paid for labor as per Cost sheet	19,954.54	18,199.13	1,755.41	

6. SURFACE

Minor repairs were made when necessary to the mine buildings and accessory equipment.

The work in connection with new roads, tracks, power lines, etc. at the Summit Pit is described under the following headings:

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7. OPEN PIT
OPERATIONS

a. Stripping

Surface stripping operations were conducted at all three pits during the year. Removal of overburden from a small area east of the West Pit was followed by hydraulicking at the Summit Pit and then by additional cleaning of the previously stripped area east of the East Pit.

Preparations were started in April for the cleaning of the narrow strip which had been drilled along the east edge of the West Pit. It was necessary to repair the 6" pipe line from the pump station to this pit and several new lengths of pipe were installed and blocked into place. A new length of pipe was laid to and along the east edge and hydraulic operations started early in May. Waste disposal was to the south in the area between the mine tracks and the L.S. & I. Railway spur to the pocket. The cost for this work was higher than usual because, in addition to the regular depth of stripping, the washing removed the greater part of the pile cast up by scraping in the latter part of 1934. When the material had been washed down the hillside about 150' of loading track was taken up at the entrance of the West Pit and the bench cleaned of sand by combined shovel and washing operations. The work was completed in June when the scraper was used for a few days to pull back a thin covering of soil a distance of 40' or so from the pit edge to prevent its spilling into the pit. The cost of this work was:

Labor	\$ 691.74
Supplies	<u>1,281.88</u>
Total	\$1,973.62
Cu.Yd.	2714
Cost per cu.yd.	73¢

In addition 1,810 tons of dike rock was sorted and loaded by #29 shovel in the West Pit. This material was dumped on the stripping pile at the West end of the pit but did not uncover additional ore that will be available for mining as in the case of the surface stripping.

Late in May, preparations for the stripping of the new Summit Pit were begun by clearing trees for the dam site and the power line to the new pump station south of this pit. The construction of a dam at the lower end of the swamp was completed and the dam filled with water early in June. A pump was installed, 1400' of power line was built and 800' of 6" pipe line laid to pump the water impounded in this dam to the west where it returned by gravity to the main dam

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7. OPEN PIT
OPERATIONS (Cont.)

a. Stripping (Cont.)

south of the West Pit. From the main dam the water was pumped directly through the old 8" pipe line to the East Pit where the booster pump increased the pressure through 1200' of new line which was laid to the monitor at the higher elevation of the new pit. The washing was started early in July at the top of the hillside. Within a few days a regular flow of water to the new dam was established and the circuit was completed so that the same water was used over and over again. The stripping of the first 50' along the top of the hill and then down the hillside was extremely successful and rapid with the heavy pressure furnished by the booster pump. Frequent moves of the monitor were necessary to clean out pockets and holes behind ridges of the ledge but the steep hillside helped carry the material away as soon as it was started in motion. A small portable monitor was used as a final clean up of sand in cracks of the ledge on most of the hillside and this work was completed in August. The cost of this original stripping program at Summit was:

Total Expenditure	\$ 2,910.57
Total cu.yd.hydraulicked	5,080
Cost per cu.yd.	57¢

which uncovered a length of 200' of ore along the hillside and made available for mining approximately 200,000 tons.

Late in August the monitor was moved to the East Pit to assist in cleaning material from the site of the new trestle. This was followed in October by cleaning the previously stripped area east of the East Pit of all traces of sand and gravel. The area was also extended farther south to take care of any future caving of the south wall of the pit which has a tendency to slab and thus extend itself. The cost of this was as follows:

Total cost	\$ 333.36
Total yards	555
Cost per yard	60¢

This completed the stripping program for 1935 season and the hydraulic monitor was left in position at the east edge of Summit Pit to extend the stripping line well beyond the mining operations in the spring.

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7. OPEN PIT
OPERATIONS (Cont.)

a. Stripping (Cont.)

An E&A has been prepared for the stripping of a large area to the east of the West pit. Early approval is expected and it is planned to do this work on contract during the winter months. The ore to be uncovered is expected to analyze higher in iron and will be a help in maintaining the grade of ore produced from the West Pit.

b. Development

A large number of samples taken from the steep hillside 1200' east of the East Pit, returned an analysis approximating that obtained in diamond drill hole #36, the average being 35.20 iron and .007 phosphorus. The samples indicated that for a distance of approximately 400' along this bluff, a pit could be opened in this extremely low phosphorus ore. The necessary authorization being secured, work was started on the 15th of May. Trees were cut and removed from the proposed pit area, from the line of the proposed railway and from the dam site at the foot of the hill. Roads were then constructed to move the Armstrong drill from the East pit to the first line of churn drill holes at the bottom of the hill at the new pit, and from the East Pit to the new dam site.

To secure the correct grade of ore, the new pit was opened at an elevation of 120' above the floor of the East Pit. Construction estimates showed that a lower operating cost could be achieved by transporting the ore on a level track 1200' to the west and dumping to a stockpile on the floor of the East Pit. The small additional charge for this ore would then be similar to stockpile shipments from the underground mines during the shipping season. Additional expense, however, was necessarily incurred in building an incline grade and track to deliver the loading and transportation equipment and supplies to the new pit. The length of this incline is 1500' and the gradient averages about 9%. The construction expense was kept at a minimum and the track simply laid on the grade and later used in pulling the locomotive and cars to the upper level. The upper, or level track, from the new pit to the top of the East Pit, was graded in July. The work of aligning and ballasting was completed in September. The trestle at the end of this track which is used in dumping the ore into the East Pit was constructed in September with timber salvaged from a dismantled trestle at the Athens Mine. A portion of the first blast at the Summit Pit was used in filling and anchoring the trestle and when this had been accomplished the remaining production was stockpiled on the floor of the East Pit.

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7. OPEN PIT
OPERATIONS (Cont.)

b. Development (Cont.)

The E&A #671 (opening Tilden Low Phosphorus Pit) which had been prepared for this work may be considered closed since the pit was placed on a regular operating basis during the year

f. Drilling, Blasting & Explosives

1. Drilling

The total combined footage for the year 1935 amounted to 9,202' as compared to 3,500' in 1934. The total number of feet lost due to broken tools, caving holes and other causes was 447', leaving a net footage of 8,755'. The cost of this drilling varied from \$1.98 per foot at the West and Summit Pits to \$2.56 per foot at the East Pit, the average being \$2.03.

Two churn drills were operated at the West Pit from January to April in preparation for the blast along the east edge. The drill crews were rotated so that the work was spread. There was no drilling in May but in June the Armstrong machine was moved to the Summit Pit where it stayed for the remainder of the year drilling holes for the 1935 and 1936 seasons. Drilling was resumed at the West Pit July 23rd and was continued for the remainder of the year in preparation for 1936 after the 30,000 ton blast of September 3rd. Three holes were completed at the East Pit for the blast of August 19th and drilling was resumed here in October, also in preparation for the 1936 season.

The combined drilling cost is shown above. The detailed cost listed under the heading of each pit follows:

Cost of Operating Churn Drills in West Pit, 1935

Feet of Holes Drilled	6,851'
Feet of Holes Lost	370'
Total	7,221'

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7. OPEN PIT
OPERATIONS (Cont.)

f. Drilling, Blasting & Explosives (Cont.)

1. Drilling (Cont.)

<u>Operating</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Per Foot</u>
Drilling at Mine	\$5,897.74	2,634.37	8,532.11	1.245
Sharpening Bits	528.49	174.79	703.28	.102
Pipe & Fittings		205.49	205.49	.030
Rope		550.27	550.27	.080
New Drill Bits		1,344.23	1,344.23	.196
Electric Power		649.29	649.29	.093
Truck and Tractor	540.30	206.87	747.17	.109
Total	\$6,966.53	5,765.31	12,731.84	1.855
 <u>Maintenance</u>				
Drills	478.64	377.31	855.95	.122
Drill Sharpener	22.41	.23	22.64	.003
Total	\$ 501.05	377.54	878.59	.125
 Total Maintenance and Operating	 \$7,467.58	 6,142.85	 13,610.43	 1.980

Cost of Operating Churn Drills in East Pit, 1935

<u>Operating</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Per Foot</u>
Drilling at Mine	\$ 765.84	487.42	1,253.26	1.813
Sharpening Bits	57.10	22.55	79.65	.115
Pipe & Fittings	-	-	-	-
Rope		92.10	92.10	.133
New Drill Bits		74.24	74.24	.107
Electric Power		74.44	74.44	.107
Truck & Tractor	56.86	35.00	91.86	.133
Total	\$ 879.80	785.75	1,665.55	2.408
 <u>Maintenance</u>				
Drill Sharpener		2.00	2.00	
Drills	39.56	63.35	102.91	.152
Total	\$ 39.56	65.35	104.91	.152
 Total Maintenance and Operating	 \$ 919.36	 851.10	 1,770.46	 2.560
Feet of Holes Drilled		691'		
Feet of Holes Lost		45'		
Total		736'		