

THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT
ANNUAL REPORT OF GENERAL MANAGER
For Year Ending December 31st, 1934

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THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT
MANAGER'S ANNUAL REPORT
YEAR 1934

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Ishpeming, Michigan
March

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

Dear Sir:-

I beg to submit the report of the operations of the Mining Department for the year 1934.

The inventories, maps, statements relative to the 1934 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 September 1st, our mines operated on a three day basis. From September 1st to the end of the year, they worked only two days. Even this schedule is better than it has been since 1931. Since 1932, working time has been so small that practically every employee has gone into debt. I understand that the great majority of merchants in these mining towns are carrying a very large amount of credit on their books. They, of course, have absolutely no opportunity to get any of this money back until the operations of the mines are on a very much better working schedule.

On at least two other occasions in the past, we have endeavored to consolidate all of our machine shop work at the General Shops. For one reason or another, this has always failed. Either the cost was too high or the Superintendents complained they could not have repairs made quick enough in the central shops. Realizing that it was the logical thing to do, about September 1st we again tried centralizing the work. I am glad to report that this is working out very satisfactorily and the overall cost is lower than it was when each individual mine was doing its own work. The success of the plan is due almost entirely to the fact that everyone is co-operating to make it work.

For a good many years, we have had a General Storehouse. The object of this Storehouse was, of course, to avoid the necessity of carrying a large amount of supplies at each mine. In September we came to the conclusion it was not functioning properly. The staff was reorganized and placed under the supervision of Mr. P. R. Perring, the Clerk at the Cliffs Shaft Mine. Under his management many things have been straightened out and in the course of a year or so, you will see a very large reduction in the amount of money tied up in inventories. Not only the stock at the Storehouse but what is on hand at each of the mines is being carefully inventoried. All requisitions pass through Mr. Perring's hands before

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they come to the General Office. In this way, the amount of new supplies being ordered is kept to a minimum.

We have continued our efforts to reduce the number of accidents. The details of the Safety Department are reported by Mr. Conibear and Mr. Moulton. During the year Mr. Conibear has published bi-monthly a small pamphlet entitled "The Miners Safety Bulletin". It is, of course, impossible to tell whether this Bulletin is actually helping us in our safety campaign or not. From the reaction received from the mines, I am of the opinion that it is doing some good. We are continually thinking about this exceedingly important subject and during the year I believe we will have some improved suggestions which we will want to put into effect. Up to the present time, these have not been completely worked out. In order to be successful and to have good safety records, it is necessary to take the proper steps to keep safety foremost in the mind of each employee. This, as you know, is a difficult thing to do and it is necessary to try new plans in order that their interest may be maintained.

On April 1st there was an increase of 10% in the wages of all hourly employees.

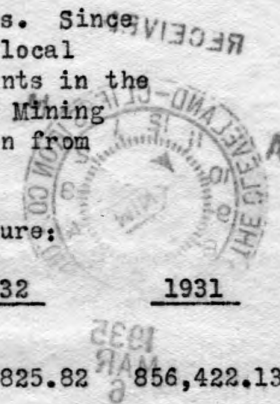
During the year, our Employees Representation Plan has continued to function satisfactorily. Apparently our men are taking quite an interest in this. In the elections which were held in January, 1935 a large percentage of our men voted. The Representatives have called attention to a few things which they thought should be corrected. These have been taken care of immediately and apparently they are well satisfied.

We have continued to operate under the Iron Ore Code and have been careful not to violate the terms of the same.

We have worked closely with the Saranac Institute and have examined all of our employees. On account of such examinations, not a single employee has been laid off. We, however, have changed the occupation of a number when it was found it was to our mutual benefit to do so. There has been no bad reaction from these examinations and I am of the opinion that with the great mass of our men, they have come to the conclusion the Company is really doing something to help them. The work underground to keep the currents as free from dust as practical, has been carried on under the supervision of Mr. Conibear. I am told by a representative of the Saranac Institute that we have progressed very rapidly. Our mines are in first class shape, and we have encountered no problem which cannot be solved at a nominal cost. During the following year, it will be necessary to install some kind of mechanical ventilation in the Cliffs Shaft Mine. I do not believe this will necessitate a heavy expenditure.

At the Cliffs Shaft Mine, we have carried on extensive experiments with what is known as a Jackbit. These have been unusually successful and it is evident that a very large sum of money can be saved by their introduction. A special report will be made on this subject as soon as we have completed our work and have all of the necessary facts.

One of the most important parts of my work is taxes. Since 1932 we have exerted the most strenuous efforts to induce local taxing bodies to reduce their budgets. Among the statements in the report you will find the skeleton of the taxes paid by the Mining Department and the Cliffs Power & Light Company in Michigan from 1931 to 1934.



The following summary, however, gives you the picture:

	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
Total Mich. Mining Dept.				
Taxes.....\$	441,780.58	475,893.24	610,825.82	856,422.13
Decrease from previous year.....	34,112.66	134,932.58	245,596.31	
Decrease from 1931.....	414,641.55			
% " " "	48.4%			
Average tax rate per \$100	2.644	2.662	2.947	3.79

Last fall we had a very serious time convincing the City of Negaunee they should not raise their budget. How long they can be kept in line is difficult to say. They are entirely unbusiness-like and several months before the end of 1934 they were out of funds. When the new taxes came in in January, they had to pay out for 1934 debts, due to the fact they did not budget their expenses by months but spend freely while they have it. They will be in the same shape towards the end of 1935 as they were in 1934.

Although the conditions in 1934, as far as the operations of our Company are concerned, were better than in 1933, they are still most unsatisfactory. This is hard on the population and also on those in charge. I sincerely hope that 1935 will show a marked improvement in working time.

I have received the finest kind of co-operation from everyone in our Company and without this I could have accomplished nothing.

Respectfully submitted,

Manager

SRE: DP

TAXES

COMPARISON OF MICHIGAN MINING DEPARTMENT AND CLIFFS POWER &
LIGHT COMPANY TAXES FOR FOUR YEARS. FOR COMPLETE
DETAIL SEE ANNUAL TAX STATEMENTS

Assessed Valuations	1934	1933	1932	1931
The C.C.I.Co.....	\$ 10,013,515	10,866,238	12,826,545	13,878,596
Negaunee Mine Co.....	3,196,400	3,554,400	4,185,700	4,635,700
Athens Iron Mining Co.....	2,077,800	2,036,500	2,266,500	2,536,500
Cliffs Power & Light Co.....	1,418,887	1,415,063	1,443,226	1,534,428
Cliffs Electric Co.....		4,500	4,500	5,000
Total Michigan Mining Dept..	\$ 16,706,662	17,876,701	20,726,471	22,590,224
Decrease from previous year..	1,170,039	2,849,770	1,863,753	
Decrease from 1931	5,883,562			
% " " "		26%		
 <u>Total Taxes Paid</u>				
The C.C.I.Co.....	\$ 267,750.15	283,160.67	378,136.12	507,608.51
The Negaunee Mine Co.....	86,527.53	99,599.60	120,527.71	183,218.38
Athens Iron Mining Co.....	56,246.84	57,065.71	65,264.22	100,251.06
Cliffs Power & Light Co.....	31,256.06	35,992.72	46,752.02	65,154.28
Cliffs Electric Co.....		74.54	145.75	189.90
Total Mich.Mining Dept.	\$ 441,780.58	475,893.24	610,825.82	856,422.13
Decrease from previous year..	34,112.66	134,932.58	245,596.31	
Decrease from 1931.....	414,641.55			
% " " "		48.4%		
 Average tax rate per \$100....	 2.644	 2.662	 2.947	 3.79

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2-6-35

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

	1931	1932	1933	1934
PRODUCT.....	291,057	82,119	55,939	223,245
<u>POWDER</u>				
Pounds - Gelamite "A".....	19,150	29,500	17,400	
Gelamite 2X	19,250	32,000	34,200	37,550
50% L.F.....	130,646	8,350		120,600
60% L.F.....	129,150	3,800		
60% Gelatine.....	12,700	6,500		49,650
Total Powder Pounds.....	310,896	80,150	51,600	207,800
Total Cost.....	\$39,783.27	\$10,047.13	\$6,330.75	\$23,426.05
Fuse- Feet.....	432,368	128,157	96,450	293,600
Caps- Number.....	79,470	24,488	16,972	70,450
Cap Crimpers.....	6			
Connecting Wire- Pounds.....	9	11	6	64
Delay Fuses.....	225	275	200	925
Fuse Lighters.....	4,450	2,500	3,000	17,000
Fuse Containers.....	2		3	
Tamping Bags.....	29,900			
Blasting Machines	1			
Total Cost-Fuse, Caps, Etc,.....	3,563.05	1,031.02	763.02	2,716.81
Total Cost all Explosives.....	\$43,346.32	\$11,078.15	\$7,093.77	\$26,142.86
Average Price per lb., -Powder.....	.1279	.125	.122	.113
Cost per ton- Powder	.1367	.1223	.1132	.1049
" " " - Fuse etc.,.....	.0122	.0126	.0136	.0122
" " " - All Explosives.....	.1489	.1349	.1268	.1171
Pounds Powder per ton of ore.....	1.0681	.9760	.9224	.9308

1934 Product increased over 1933 by 167,306 tons or 300%.

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

	1931	1932	1933	1934
PRODUCT-Tons.....	1,609,267	372,348	252,833	878,514
POWDER				
Pounds- 40%.....	50,286	8,725	1,503	1,950
50%.....	301,840	87,400	87,025	296,050
60%.....	247,870	3,690	8,350	92,075
1X and 2X Gelamite.....	234,311	73,875	11,350	50,250
Gelamite "A".....	8,900	25,240	23,150	
Total Pounds Powder.....	843,207	198,930	131,378	440,325
Total Cost Powder.....	\$106,464.82	\$24,696.02	\$15,635.14	\$49,691.73
Fuse- Feet.....	2,475,567	616,363	431,903	1,347,997
Caps-Number.....	396,091	98,058	68,119	213,859
Fuse Cutter.....	2			
Connecting Wire- Pounds.....			10	20
Tamping Bags.....	141,800	27,400	11,300	45,600
Sealing Compound-Pints.....	10	2	1	20
Powder Bags.....	61	7	18	54
Fuse and Cap Containers.....	2	2		
Fuse Lighters.....	19,000	7,450	5,850	22,600
Electric Exploders.....	500	130		3,325
Blasting Machines.....				2
Total Cost Fuses etc.,.....	\$19,742.29	\$4,756.35	\$3,360.55	\$10,925.17
Total Cost- All explosives....	\$126,207.11	\$29,452.37	\$18,995.69	\$60,616.90
Average price per Lb-Powder...	.1263	.1241	.1190	.1129
Cost per ton-Powder.....	.0662	.0663	.0618	.0566
" " " - Fuses Etc.,.....	.0122	.0128	.0133	.0124
Cost per ton all explosives...	.0784	.0791	.0751	.0690
Pounds of Powder per ton of Ore...	.5240	.5243	.5196	.5012

1934 product increased over 1933 by 625,681 tons or 247%.

The cost per ton for all explosives decreased .006 or 8%. 1934 compared with 1933.

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

	1931	1932	1933	1934
PRODUCT- Tons	1,609,267	347,579	252,833	878,514
TIMBER:				
Feet- 6-8	362,294	94,373	170,798	318,262
8-10	210,599	62,778	40,624	97,544
10-12	227,377	64,492	79,993	169,588
12-14	110,468	50,821	60,595	97,760
14-16	14,110	5,152	17,102	5,321
7-9	138,996			
9-12	29,241			
Treated Timber.....	1,760	711		2,847
Total Feet.....	1,094,845	278,327	369,122	691,322
Total Cost.....	\$83,193.29	\$21,585.99	\$30,769.30	\$42,142.29
LAGGING:				
Feet- 5'	340,638	27,625		45,800
6'	747,670	2,144		
7'	2,870,862	969,062	909,998	2,268,496
8'		13,704		40,973
Total Feet.....	3,959,170	1,012,535	909,998	2,355,269
Total Cost.....	\$28,398.21	\$6,748.16	\$6,048.14	\$16,282.15
Covering Boards-Feet.....	354,187			
" " -Cost.....	\$4,451.44			
Poles-Feet.....	2,581,462	665,435	577,707	1,637,522
" - Cost.....	\$35,612.05	\$9,135.63	\$6,950.03	\$19,644.23
Wire Fencing- Rods.....	5,716	370	110	665
" " - Cost.....	\$4,567.06	\$315.49	\$95.45	\$567.77
Total cost for all timber....	\$156,222.05	\$37,785.27	\$43,862.92	\$78,636.44
Average Cost per foot- Timber	.0760	.0776	.0833	.0610
" " " 100ft-Lagging	.717	.666	.6646	.691
" " " " -Cov.Boards	1.256			
" " " " -Poles	1.379	1.373	1.203	1.200
" " " rod -Fencing	.799	.853	.867	.853
Feet of Timber per ton of ore..	.6803	.8007	1.459	.787
" " Lagging " " " " ..	2,460	2,913	3,599	2,681
" " Poles " " " " ..	1.604	1.914	2.284	1.863
" " Cov.Boards " " " " ..	.220			
" " Fencing " " " " ..	.0586	.0176	.007	.0125
Cost per ton for Timber.....	.0516	.0621	.1217	.0480
" " " " Lagging.....	.0176	.0194	.0239	.0185
" " " " Poles.....	.0221	.0263	.0275	.0224
" " " " Covering Boards	.0029			
" " " " Wire Fencing...	.0029	.0009	.0004	.0006
TOTAL COST PER TON.....	.0971	.1087	.1735	.0895

1934-Product increased over 1933 by 625,681 tons or 247%.

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

SOFT ORE MINES

YEAR	1931		1932		1933		1934	
PRODUCT-Tons.	1,609,267		372,348		381,210		878,514	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON.
General	81,863.81	.0509	19,482.83	.0523	19,914.25	.0522	46,160.93	.0525
Iron & Steel	25,795.75	.0160	4,691.68	.0128	4,363.60	.0114	10,974.63	.0125
Machinery	62,589.77	.0389	12,457.69	.0334	8,735.40	.0229	24,439.92	.0278
Explosives	126,553.63	.0786	27,100.07	.0727	20,310.67	.0533	58,938.05	.0671
Lumber & Timber.	184,066.64	.1144	41,529.30	.1115	50,459.11	.1324	94,709.27	.1078
Fuel	20,568.90	.0128	13,376.96	.0359	9,927.61	.0260	12,211.98	.0139
Electric Power	336,176.50	.2089	123,365.53	.3313	147,269.45	.3863	235,416.12	.2680
Miscellaneous.	64,271.17	.0399	4,117.38	.0111	6,169.57	.0161	25,464.74	.0290
TOTAL	901,886.17	.5604	246,121.44	.6610	254,810.52	.6684	508,315.64	.5786

HARD ORE MINES

YEAR	1931		1932		1933		1934	
PRODUCT-Tons.	291,057		82,119		55,939		223,245	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON.
General	30,082.56	.103	4,581.34	.056	3,613.35	.065	13,095.67	.059
Iron & Steel	12,219.13	.042	1,960.90	.024	923.86	.016	8,826.18	.039
Machinery	23,716.20	.081	3,000.15	.036	3,142.11	.056	13,273.54	.059
Explosives	43,346.32	.149	11,078.15	.135	7,093.77	.127	26,142.86	.117
Lumber & Timber.	7,803.59	.027	1,555.34	.019	1,787.57	.032	3,943.05	.018
Fuel	3,463.12	.012	3,532.52	.043	1,870.49	.033	2,247.02	.010
Electric Power	57,905.58	.199	23,259.17	.283	14,971.89	.268	53,915.24	.241
Miscellaneous.	7,962.62	.027	1,044.71	.013	276.21	.005	1,727.36	.008
TOTAL	186,499.12	.640	50,012.38	.609	33,679.25	.602	123,169.92	.551

LABOR SUMMARY--ALL COMPANIES.

PRODUCT- TONS	1931		1932		1933		1934	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface.....	184,235½	861,633.10	65,217¾	250,112.23	86,757¾	329,491.79	116,526½	492,758.23
Cost Per Ton.....		.3396		.5272		.4136		.273
Underground.....	260,729½	1,329,358.41	94,885½	401,467.75	77,045¾	316,543.46	175,002	834,929.43
Cost per Ton.....		.5240		.8462		.3973		.463
Superintence & General Roll.....	50,469½	389,532.13	28,683¾	138,460.30	25,074½	104,801.78	30,447	143,502.86
Cost Per Ton.....		.1535		.2918		.1315		.080
Grand Total.....	495,434	2,580,523.64	188,786¾	790,040.28	188,877¾	750,837.03	321,975½	1,471,190.52
Cost Per Ton.....		1.0171		1.6652		.9424		.816
Average rate per day.....		5.21		4.17		3.98		4.57
Tons per man per day.....		5.12		2.51		4.22		5.60

NOTE: The above is the total of all wages and salaries for all employees of the Mining Department, including the Cliffs Power and Light Co.
 In 1934 there was an increase in wages of approximately 10%. The net increase in the Rate per day for 1934 over 1933- All labor was 14.8%.

WORKING SCHEDULE- 1934-

In 1934 the Michigan Mines worked from Jan 1st., on a 1-8 Hour shift 3 day's per week schedule. From September 1st to December 31st properties worked on a 1-8 hour shift 2 days per week schedule. During the course of the three and two days per week operations the mines actually worked six and four day's per week with on-half the crew working each day. Cliffs Shaft Mine being an exception as to working operations for they operated 3 or 2 days per week with full crew.

Spies-Virgil; Idle- Pumping during year 1934-

Minnesota Properties: Canestio Mine started operations May 14th and operated 4 day's per week- 3- 8 hour shifts. Operations finished September 27th.
 Drew Mine, started operations May 14th 1934, and operated 4 day's per week- 3- 8 hour shifts. Operations finished September 29th.
 Holman-Cliffs and Hill Trumbull properties idle during year 1934.

THE CLEVELAND CLIFFS IRON COMPANY
MINING DEPARTMENT

COMPARISON OF TOTAL DAYS WORKED AND TONS OF ORE MINED FOR THE YEARS 1934 AND 1933.

	1934 Days	1933 Days	1934 Days	1933 Days.
Stephenson.....	230 $\frac{1}{2}$	246		
Princeton.....	260 $\frac{1}{4}$	261 $\frac{3}{4}$		
Miscellaneous Payroll.....	1932 $\frac{1}{2}$	1322		
shops and Storehouse.....	5638 $\frac{1}{4}$	9329		
Sherwood.....		4196		
C.C. Iron Co. Miscellaneous & Gen.	21302 $\frac{3}{4}$	14460 $\frac{1}{4}$		
Negaunee Mine.....	1200 $\frac{3}{4}$	1569		
Athens.....	966 $\frac{3}{4}$	442 $\frac{1}{2}$		
Cliffs Power & Light Co.....	13494 $\frac{1}{2}$	9119 $\frac{1}{2}$		
Mesaba Range Properties.....	24782 $\frac{1}{2}$	15249		
General Roll- Undistributed.....	20925 $\frac{1}{2}$	17407		
Lloyd Mine-Developing 6th Level.	3188 $\frac{3}{4}$	5275 $\frac{1}{2}$		
Spies-Virgil- Mine idle.....	1942 $\frac{1}{4}$			
Francis.....	17			
Total deductions.....	95881 $\frac{1}{2}$	78877 $\frac{1}{2}$		
Grand total-All operations.....	321975 $\frac{1}{2}$	188877 $\frac{1}{2}$		
Net for operating Mines.....	226094	110000 $\frac{1}{4}$	226094	110000 $\frac{1}{4}$
Total Tons.....	1803120	796715		
Tons per man per day	7.975	7.242		
<u>OPEN PIT PRODUCTION- Tons</u>				
Tilden.....	167688	95104	4154 $\frac{3}{4}$	2684 $\frac{3}{4}$
Canestio.....	430142	302326	20934 $\frac{1}{4}$	18596 $\frac{1}{4}$
Drew.....	103531	52047	7094 $\frac{1}{2}$	5750 $\frac{3}{4}$
Total.....	701361	448477	32183 $\frac{1}{2}$	27031 $\frac{3}{4}$
Open pit tons per man per day...	21.79	16.59		
Net underground days.....			193910 $\frac{1}{2}$	82968 $\frac{1}{2}$
Net underground production.....	1101759	348238		
Underground tons per man per day	5.682	4.197		

CLIFFS SHAFT MINEANNUAL REPORTYEAR 19341. GENERAL:

The Cliffs Shaft Mine operated the entire year, but the working time was reduced to two days a week on Sept. 1st, 1934. There were some radical changes on surface and underground, namely, the installation of a picking belt in the crusher building and a trial run on detachable bits underground. Underground development work proved up some new ore, but that only took the place of floors mined out in the ore reserves, there being no great change in the ore estimate. A new combination cage and skip was placed in commission in "A" shaft.

2. PRODUCTION,
SHIPMENTS &
STOCKPILE
BALANCES:a. Production by Grades:

<u>Grade</u>	<u>Tons</u>	<u>% of Total</u>
Cliffs Shaft Lump	138,159	
Cliffs Shaft Crushed	57,099	
Total Cliffs Shaft	195,258	87.5
Bancroft Lump	18,617	
Bancroft Crushed	9,370	
Total Bancroft	27,987	12.5
GRAND TOTAL ORE	223,245	100.0

The production by grades for each year since 1930 is as follows:

<u>Year</u>	<u>Lump Ore</u> <u>Tons</u>	<u>Crushed Ore</u> <u>Tons</u>	<u>Run-of-Mine</u> <u>Ore Tons</u>	<u>Total</u> <u>Tons</u>
1930	226,059	94,910	85,956	407,925
1931	153,717	65,113	72,227	291,057
1932	57,104	24,449	566	82,119
1933	39,101	16,838		55,939
1934	156,776	66,469		223,245

b. Shipments:

<u>Grade</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>	<u>Total</u> <u>Last</u> <u>Year</u>
Cliffs Shaft Lump	74,509	68,382	142,891	135,303
Cliffs Shaft Crushed	26,978	20,629	47,607	45,162
Bancroft Lump	8,835	21,403	30,238	10,105
Bancroft Crushed	4,627	12,076	16,703	
Total	114,949	122,490	237,439	190,570
Total Last Year	1,117	189,453	190,570	
Increase in Shipments			46,869	

CLIFFS SHAFT MINE
ANNUAL REPORT
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2. PRODUCTION,
SHIPMENTS &
STOCKPILE
BALANCES:

b. Shipments: (Cont.)

Shipments by years for the past five years follow:

<u>Year</u>	<u>CLIFFS SHAFT</u>			<u>BANCROFT</u>			<u>Total</u> <u>Tons</u>
	<u>Lump</u> <u>Tons</u>	<u>Crushed</u> <u>Tons</u>	<u>Run-of-Mine</u> <u>Tons</u>	<u>Lump</u> <u>Tons</u>	<u>Crushed</u> <u>Tons</u>	<u>Run-of-Mine</u> <u>Tons</u>	
1930	126231	30460	73881	27178	4436	13075	275261
1931	17999	12099	70541	10210	285	1666	112820
1932	25505	3727	574				29806
1933	135303	45162		10105			190570
1934	142891	47607		30238	16703		237439

c. Stockpile Balances:

The balance of ore in stock on Dec. 31st, 1934 shows a small decrease compared with a year ago. Because of the shorter operating schedule, we will go into the 1935 shipping season with probably 40,000 less tons on hand than we had on May 1st, 1934.

Following is the ore in stock Dec. 31st, 1934:

<u>Grade</u>	<u>Tons</u>
Cliffs Shaft Lump	128,352
Cliffs Shaft Crushed	101,766
Total Cliffs Shaft	230,118
Bancroft Lump	19,228
Bancroft Crushed	26,045
Total Bancroft	45,273
GRAND TOTAL ALL GRADES	275,391

The amount of ore in the stockpiles on Dec. 31st each year for the last five years is shown by the following figures:

Balance in Stock, Dec. 31st, 1930	164,623 Tons
1931	342,860 "
1932	395,173 "
1933	299,585 "
1934	275,391 "

CLIFFS SHAFT MINE
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2. PRODUCTION,
SHIPMENTS &
STOCKPILE
BALANCES:

d. Division of Product by Levels:

Level	"A" Shaft	"B" Shaft	Total
	Tons	Tons	Tons
First		13,093	13,093
Second	14,218		14,218
Third	5,887	6,514	12,401
Fourth	8,204		8,204
Fifth	17,350		17,350
Sixth	23,375	2,461	25,836
Seventh	26,733	5,679	32,412
Eighth	8,307	12,747	21,054
Ninth	14,445		14,445
Tenth	27,859	2,728	30,587
Eleventh	11,395		11,395
Twelfth	62	4,516	4,578
Thirteenth		6,996	6,996
Fourteenth		10,676	10,676
Total Ore	157,835	65,410	223,245
Rock			12,394
Total Ore & Rock			235,639

e. Production by Months:

Month	Optg. Days	C.S.	C.S.	Ban.	Ban.	Rock
		Lump	Crushed	Lump	Crushed	
January	14	12,407	5,309	2,409	1,032	662
February	12	10,788	4,626	2,047	879	600
March	13	12,846	5,497	2,056	876	1,056
April	13	12,624	5,395	1,801	773	1,072
May	13	13,339	5,581	1,944	877	1,142
June	13	12,492	5,252	1,775	986	1,084
July	13	13,128	5,717	1,984	874	1,118
August	14	14,519	5,597	2,055	964	1,146
September	8	8,574	3,475	1,093	635	924
October	10	9,999	3,859	1,128	666	1,304
November	8	7,613	3,247	852	372	1,052
December	9	8,269	3,544	1,034	436	1,234
Total	140	136,598	57,099	20,178	9,370	12,394

f. Ore Statement:

	C.S.	C.S.	Ban.	Ban.	Total	Total Last Year
	Lump	Crushed	Lump	Crushed		
On Hand Jan. 1st, 1934	133,084	92,274	30,849	33,378	289,585	395,173
Output for Year	136,598	57,099	20,178	9,370	223,245	84,982
Transfers	1,561		1,561			
Total	271,243	149,373	49,466	42,748	512,830	480,155
Shipments	142,891	47,607	30,238	16,703	237,439	190,570
Balance on Hand	128,352	101,766	19,228	26,045	275,391	289,585
Increase in Output					138,263	

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1934

2. PRODUCTION,
SHIPMENTS &
STOCKPILE
BALANCES:

g. Delays:

<u>Date</u>	<u>Hours</u>	<u>Cause</u>	<u>Tons Lost</u>
Jan. 26	8	Switch and transformer in crusher building and top-tram motor burned out.	1280
Aug. 29	$\frac{1}{8}$	No current.	100
Total	8$\frac{1}{8}$		1380

3. ANALYSIS:

a. Average Analysis of 1934 Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Cliffs Shaft Lump	58.75	.101	7.47
Cliffs Shaft Crushed	56.28	.105	10.25
Bancroft Lump	59.97	.102	6.30
Bancroft Crushed	57.24	.104	9.13

b. Average Analysis on Straight Cargoes:

	<u>MINE</u>			<u>LAKE ERIE</u>	
	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Iron</u>	<u>Moist.</u>
Cliffs Shaft Lump	59.25	.101	7.26	59.94	.39

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

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Lump Cargoes	59.15	.105	7.10	.49	2.31	1.41	1.08	.017	2.15

Complete Analysis for 1934 Season:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Lump Ore	58.90	.105	7.40	.49	2.38	1.47	1.08	.015	2.10
Crushed Ore	56.90	.106	9.60	.49	2.76	1.42	1.13	.025	2.30

c. Analysis of Ore in Stock Dec. 31st, 1934:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
C.S. Lump	Dried	59.00	.104	7.51	.46	2.55	1.20	.91	.019	2.10
	Natural	58.70	.103	7.47	.46	2.54	1.19	.90	.019	2.09
C.S. Crushed	Dried	56.15	.107	10.28	.50	2.61	1.46	1.19	.023	2.36
	Natural	55.06	.105	10.08	.49	2.56	1.43	1.17	.023	2.31
Ban. Lump	Dried	60.79	.101	6.05	.31	2.50	1.30	.98	.017	1.65
	Natural	60.51	.100	6.02	.31	2.49	1.29	.98	.017	1.64
Ban. Crushed	Dried	57.04	.110	8.63	.31	3.06	1.40	1.11	.021	2.00
	Natural	55.86	.108	8.45	.30	3.00	1.37	1.09	.021	1.96

d. Analysis of Ore Reserves:

Run-of-Mine Ore:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Dried	58.30	.108	6.71	.400	2.45	1.50	1.20	.018	2.25	
Natural	57.02	.106	6.56	.390	2.40	1.47	1.17	.018	2.20	2.20

CLIFFS SHAFT MINE
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4. ESTIMATE OF ORE RESERVES:

Assumptions:- 8, 9 and 10 cu. ft. per ton.
10% Deduction for Rock
10% " " Loss in Mining
No Bessemer Ore

a. Ore in Sight as of Dec. 31st, 1934:

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

	<u>"A" SHAFT: AVAILABLE ORE:</u>		Prospective Breasts Tons	Total Tons
	<u>Developed</u>			
	Floors Tons	Pillars Tons		
1st Level		7,700		7,700
2nd "	13,600			13,600
3rd "	8,500			8,500
4th "	2,800			2,800
5th "	10,200	23,300		33,500
6th "	82,300	84,300	20,000	186,600
7th "	185,000	19,400	2,000	206,400
8th "	134,500	16,600	4,000	155,100
9th "	154,400	7,300	4,000	165,700
10th "	66,300	141,500		207,800
11th "	47,700	167,600	4,000	219,300
12th "	44,700	67,000		111,700
15th "	37,000			37,000
T O T A L	787,000	534,700	34,000	1,355,700

"B" SHAFT: AVAILABLE ORE:

1st Level	8,600	2,700		11,300
2nd "	3,000			3,000
3rd "	21,800	9,600	2,000	33,400
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 "	56,900	7,800	4,000	68,700
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 "	14,200	5,500	2,000	21,700
14th "	27,900	2,000		29,900
15th "	30,800	14,600		45,400
T O T A L	249,800	54,100	12,000	315,900

<u>RECAPITULATION:</u>	Available "A" Shaft Tons	Available "B" Shaft Tons	Total Available Tons
Cliffs Shaft Ore	1,355,700	315,900	1,671,600
Less 10% for Rock & 10% for Loss in Mining	257,600	60,000	317,600
Tons Available	1,098,100	255,900	1,354,000
Less December Production			11,813
Net Tons Available			1,342,187

CLIFFS SHAFT MINE
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4. ESTIMATE OF
ORE RESERVES:

a. Ore in Sight as of Dec. 31st, 1934:
Bancroft Grade:

	<u>AVAILABLE ORE:</u>			<u>Total</u> <u>Tons</u>
	<u>Developed</u>		<u>Prospective</u>	
	<u>Floors</u> <u>Tons</u>	<u>Pillars</u> <u>Tons</u>	<u>Breasts</u> <u>Tons</u>	
1st Level		1,800		1,800
2nd "	10,500		2,000	12,500
3rd "	6,400	2,100		8,500
4th "	10,600	2,900	4,000	17,500
5th "	2,400	800	2,000	5,200
6th "	14,700	13,600		28,300
7th "	10,900		2,000	12,900
8th "	2,400	8,000	4,000	14,400
9th "	10,100			10,100
10th "		97,400		97,400
11th "	46,000			46,000
T O T A L	114,000	126,600	14,000	254,600

RECAPITULATION:

Bancroft Ore Available	254,600 Tons
Less 10% for Rock & 10% for Loss in Mining	48,400 "
Tons Available	206,200 "
Less December Production	1,470 "
Net Tons Available	204,730 "

SUMMARY:

Cliffs Shaft Ore Available	1,342,187 Tons
Bancroft Ore Available	204,730 "
GRAND TOTAL	1,546,917 "

The last ore estimate was made as of Dec. 31st, 1931 and those figures are submitted for comparison with 1934.

	<u>1931</u> <u>Tons</u>	<u>1934</u> <u>Tons</u>
Cliffs Shaft Ore Available	1,342,822	1,342,187
Bancroft Ore Available	198,228	204,730
Total Ore Available	1,541,050	1,546,917
Increase in Last Three Years		5,867

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

	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932-34</u>
Ore in Mine Jan. 1st	1,358,000	1,388,316	1,506,700	1,541,050
Production	414,419	412,786	303,638	361,303
Balance	943,581	975,530	1,203,062	1,179,747
Ore in Mine Dec. 31st	1,388,316	1,506,700	1,541,050	1,546,917
New Ore Developed	444,735	531,170	337,988	367,170
Excess over Production	30,316	118,384	34,350	5,867

CLIFFS SHAFT MINE
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4. ESTIMATE OF
ORE RESERVES:
(Continued)

The following table clearly shows how the ore reserves have been maintained in the Cliffs Shaft Mine:

AVAILABLE ORE IN MINE END OF EACH YEAR:

1934	1,546,917 Tons
1931	1,541,050 "
1930	1,506,700 "
1929	1,538,316 "
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 "

5. LABOR
AND
WAGES:

a. General:

The employees working by the day averaged three days a week up until September, after which the working time was reduced to two days a week. As the mine averaged at least two extra days hoisting per month, some of the men received two additional shifts per month. As we try to do our block-holing on the off days when the miners are not working, certain other men also received a few extra shifts per month.

b. Comparative Statement of Wages and Product:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	223,245	55,939	167,306	
No. of Shifts & Hours	1-8	1-8		
No. of Days Operated	140	42	98	
 <u>AVG. NO. OF MEN EMPLOYED:</u>				
Surface	57	50	7	
Underground	231	200	31	
Total	288	250	38	
 <u>AVG. WAGES PER DAY:</u>				
Surface	3.81	3.28	.53	
Underground	4.70	3.94	.76	
Total	4.48	3.71	.77	
 <u>WAGES PER MONTH OF 25 DAYS:</u>				
Surface	95.25	82.00	13.25	
Underground	117.50	98.50	19.00	
Total	112.00	92.75	19.25	
 <u>WAGES PER MONTH OF 22 DAYS:</u>				
Surface	83.82	72.16	11.66	
Underground	103.40	86.68	16.72	
Total	98.56	81.62	16.94	

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1934

5. LABOR
AND
WAGES:
(Cont.)

b. Comparative Statement of Wages and Product:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
<u>WAGES PER MONTH OF 17 DAYS:</u>				
Surface	64.77	55.76	9.01	
Underground	79.90	66.98	12.92	
Total	76.16	63.07	13.09	
<u>WAGES PER MONTH OF 13 DAYS:</u>				
Surface	49.53	42.64	6.89	
Underground	61.10	51.22	9.88	
Total	58.24	48.23	10.01	
<u>WAGES PER MONTH OF 9 DAYS:</u>				
Surface	34.29	29.52	4.77	
Underground	42.30	35.46	6.84	
Total	40.32	33.39	6.93	
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	19.60	8.65	10.95	
Underground	6.46	4.57	1.89	
Total	4.86	2.99	1.87	

The tons per man per day for the past few years follow:

<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>
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
1927	22.00	6.19	4.85
1926	19.37	5.91	4.53
1925	18.32	5.91	4.47

The above table shows that in spite of a reduced operating schedule in 1934 our tons per man record is the best for the past ten years. It will be noted that the improvement is underground, as the tons per man per day underground are by far the highest on the above table.

<u>LABOR COST PER TON:</u>	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	.194	.379		.185
Underground	.728	.861		.133
Total	.922	1.240		.318

Following are labor costs per ton for some years back:

<u>Year</u>	<u>Surface</u> <u>Labor</u>	<u>Underground</u> <u>Labor</u>	<u>Total</u> <u>Labor</u>
1934	\$.194	\$.728	\$.922
1933	.379	.861	1.240
1932	.303	.908	1.211
1931	.232	.888	1.120
1930	.222	.890	1.112
1929	.213	.843	1.056
1928	.214	.861	1.075

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5. LABOR
AND
WAGES:
(Cont.)

b. Comparative Statement of Wages and Product:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
AVG. PRODUCT STOPING & TRAM'G	16.81	14.16	2.65	
AVG. PRODUCT STOPING & TRAM'G INCLUDING HAULAGE MEN	13.41	11.18	2.23	
AVG. WAGES CONTRACT MINERS	\$ 5.15	\$ 4.07	\$ 1.08	
DO TRAMMERS	5.72	4.56	1.16	
DO LABOR	5.25	4.13	1.12	
 <u>TOTAL NUMBER OF DAYS:</u>				
Surface	11,389 $\frac{1}{2}$	6,463 $\frac{1}{2}$	4,925 $\frac{1}{2}$	
Underground	34,520 $\frac{1}{2}$	12,231	22,289 $\frac{1}{2}$	
Total	45,910	18,694 $\frac{1}{2}$	27,215 $\frac{1}{2}$	
 <u>AMOUNT FOR LABOR:</u>				
Surface	43,402.16	21,210.84	22,191.32	
Underground	162,410.14	48,208.46	114,201.68	
Total	205,812.30	69,419.30	136,393.00	

PROPORTION OF SURFACE TO UNDERGROUND MEN:

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
1928	1 to 3.67

6. SURFACE:

a. Buildings and Repairs:

More money was expended for repairs on mine buildings in 1934 than in 1933 due to lack of repair work done since 1930.

For comparison I submit costs for the past four years:

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

Repairs were heavy on the office building, coal dock and miscellaneous items. At the office we repaired the roof, which had leaked for years. A new water line was also put in to the mine office, replacing the old line that ran all the way over from the drill sharpening shop. The water pressure was so poor prior to the change that we could not run a lawn sprinkler in the summer months. We had also had trouble for years with the sewer and that was dug up and the poor sections replaced. The interior of the office was also kalsomined and new lights installed.

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6. SURFACE:

a. Buildings and Repairs: (Cont.)

The coal dock needed extensive repairs. Most of the west half of the north track was condemned by the L.S. & I. Co.'s inspector and before the Railway Company would consent to spot cars on the dock, we had to replace caps, corbels, some legs and even stringers.

The costs under the heading "Miscellaneous" refer to extensive repairs to the oil house. All of the joists, floor and floor covering had to be replaced.

At the laboratory we installed a "Moloch" stoker to take care of the boiler that heats the laboratory, "A" shaft house and the drill sharpening shop.

In the crusher building we finished the installation of the picking belt, chutes, rock trestle, new top-tram plant for rock car, etc. We also installed a pipe radiator underneath the belt to prevent the ore from freezing onto the plates.

Near the end of the year we took out the old lathe in the northwest corner of the machine shop and installed the grinder for grinding the detachable bits known as "Jack Bits."

A new smoke stack was purchased and erected for the central heating plant in the basement of the shop building. The old stack was poor and also poorly located directly underneath the steel trestle between "A" shaft and the crusher building. The new stack was moved north of the old location to prevent the hot gases from the stack impinging on the steel trestle.

At the dry a new, concrete coal bin was built, which was so constructed as to permit dumping coal direct with the truck into the bin and large enough to hold coal for a week's supply.

A slight change was made at the steel garage, the first stall being rebuilt so as to permit us to house the new Chevrolet platform-body truck in the steel garage instead of the wooden garage that was moved to the Cliffs Shaft Mine from back of Mr. Derby's house.

7. UNDERGROUND:

a. Development Work:

"A" Shaft:

There were twelve contracts on development work in the "A" shaft territory during the entire year. Most of these gangs were in the Bancroft or North Veins, although one contract on the 10th level and one on the 11th level worked in the Main Vein and one gang employed on the 12th level explored in the Southeast Vein.

BANCROFT VEIN: TENTH LEVEL:

Two contracts, Nos. 10 and 70, worked on the west side of the vein, No. 10 in the extreme northwest corner following the hanging to the west until the rock started cutting across the breast. Raising was then started until a point 50 feet above the level in ore was reached. A second raise a short distance farther south was also put up partly in rock and partly in ore. At the 9th level elevation a drift in rock was headed northwest towards the first raise, the idea being to have one raise for a traveling road, while the second raise would be used to dump ore into.

No. 70 started in ore near the 2000 East coordinate line on the north side of the drift and after raising to the north in ore for a distance of 30 feet, a branch was then started to the south, and at the end of the year the south branch was up 60 feet in high grade ore. The north half of the raise was also breasted in ore.

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7. UNDERGROUND:
(Continued)

a. Development Work:
"A" Shaft:

BANCROFT VEIN: FIFTEENTH LEVEL:

On the 15th level contract No. 58 is putting up two raises to get under the Bancroft Lens on the 10th level. The most northerly raise is up 70 ft. and the other one 55 ft. Both are in the foot, but in December the north raise did cut some ore and on Dec. 31st was in lean ore and jasper.

NORTH VEIN: EIGHTH LEVEL:

On the 8th level in the North Vein, four gangs, Nos. 4, 23, 25 and 44, did development work. On the west side of the vein No. 4 opened up a new stope close to the main East-West fault halfway between the 1600 and 1800 East coordinate lines. There is a strong, well developed slip on the west side, which we believe means that considerable ore exists on that side.

In the northeast corner of the level, two gangs, Nos. 23 and 25, were developing, the former in rock and the latter in ore. Contract No. 23 drifted northeast in hard siderite near the intersection of the 200 South and 3000 East coordinates. This gang is looking for the downward extension of two large stopes that exist on the 6th level a short distance northeast of their breast on the 8th level.

Contract No. 25 after drifting in ore to the west of the north-south crosscut in the extreme northwest corner of the level stopped because the breast became quite lean. The contract was then moved a short distance south and a new crosscut started to the northeast, and after going through 80 feet of rock, a very fine, high grade orebody was encountered. During the last half of the year contract No. 25 continued to develop new ore and in December a second gang was started raising in this same ore. From the looks of this territory by the appearance of the large and healthy slips, I would assume that a large quantity of ore will eventually be found here.

No. 44 contract started at the intersection of the 500 South and 3200 East coordinate lines and drifted northeast for 150 ft. and then started a raise, which is planned to come up under the two stopes developed by No. 8 on the 6th level. Both the drift and raise up to the end of the year were in footwall material.

NORTH VEIN: NINTH LEVEL:

On the 9th level contract No. 60 started a new stope in the northeast corner of the level to develop the ore discovered in Diamond-Drill Hole No. 418. A raise in ore was also put up to the 8th level.

MAIN VEIN: TENTH & ELEVENTH LEVELS:

Two gangs added to the ore reserves in the east end of the "A" shaft territory, one on the 10th level and one on the 11th level. No. 35 on the 10th was started near the 600 South coordinate line on the extreme east end of the main motor haulage drift and after a cut or two found ore and then drifted in ore for 125 ft. The idea was to get under the ore discovered by No. 44 on the 9th level. We have no idea as to the width or length of the orebody discovered by No. 35 on the 10th, but indications are that this ore will go up to the 9th level and possibly down to the 11th, where No. 68 is looking for the same lens.

At the latter elevation No. 68 is now crosscutting north and has found some ore, which they followed up a short distance by raising. We are probably, however, not far enough north to have cut the ore we are looking for. On the 10th level after No. 35 hit the hanging, we swung

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7. UNDERGROUND:
(Continued)

a. Development Work:
"A" Shaft:

MAIN VEIN: TENTH & ELEVENTH LEVELS:

to the south and drifted through the rock to try and cut the ore discovered by Diamond-Drill Hole No. 419 on the ninth level.

SOUTHEAST VEIN: TWELFTH LEVEL:

On the 12th level No. 5 contract put up three raises and drove one crosscut. The first raise went all the way through to the 11th level before cutting any ore. The second hit ore about 10 ft. above the 12th level. A crosscut driven to the south to get under the ore discovered in the second raise failed to find any and at the end of the year a third raise started from the east side of the crosscut was breasted in mixed material. The development work done by No. 5 was very slow because all their blasted material had to be hauled to the nearest raise by means of a scraper. There are no tracks or motors or cars on the 12th level, all the dirt previously having been scraped.

We had hoped to find enough ore on the 12th level, which together with the ore still remaining on the 9th, 10th and 11th levels would warrant driving a new crosscut on the 15th level so that by means of a raise from the 15th, we could drop all the ore from the 9th, 10th, 11th and 12th levels direct into motor cars on the 15th.

MAIN VEIN: FIFTEENTH LEVEL:

In the latter part of the year No. 71 contract was started driving the main drift east in the foot to make it possible to get a new raise up under the east end of the 11th and 12th level stopes. On the 11th level we have large stopes 300 ft. east of the nearest easterly raise and we must get new raises up to enable us to transfer this ore over to "B" shaft on the 15th level to balance the hoisting. This past year about 30% of the ore mined came from "B" shaft territory. The only way to keep the skips in "A" and "B" shaft coming up alternately is to transfer enough ore from the "A" shaft stopes so that 50% of our product is hoisted by both skips.

"B" Shaft:

We have uncovered some very interesting geology in 1934 and have hopes of finding some very substantial new orebodies to prolong the life of the mine. Six contracts were busy the entire year on development work and all of them found ore.

NORTH VEIN:

In the North Vein on the 3rd level No. 72 contract is opening up a very fine stope of large dimensions. This contract has been in ore continuously for nearly 600 ft., but only the last 250 ft. has much width. The westerly 100 ft. is well over 50 ft. wide. There is a bare possibility that the ore No. 72 has found will join with the Main Vein, which is about 80 ft. away from the breast of No. 72's stope.

On the 8th level No. 36 has also discovered a very fine lens of ore about 30 ft. wide. This ore is now being stoped both east and west and because it is similar to ore found on the 6th and ore in diamond-drill holes on the 7th level is located properly on the dip between the 6th level ore and the new ore on the 8th, we have an idea that there must be at least 100 ft. of ore over the 8th level. No. 36 is developing this ore in the northwest corner of the level.

In the northeast corner No. 57 after drifting a short distance east

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7. UNDERGROUND:
(Continued)

a. Development Work:
"B" Shaft:

NORTH VEIN: (Cont.)

in the footwall dropped back 175 ft. to the west and started a raise, which has developed apparently two lenses of ore. We now believe that both No. 40's and No. 49's ore on the 5th level will go down through to the 8th level. At the end of the year No. 57 was cutting out in ore at the 7th level elevation.

FAULT VEIN:

No. 33 raising from the 6th to the 4th level has also added to the reserves. By the end of the year they had opened up a good sized stope on the 4th level, all of it in high grade steel ore. It would appear from the ore the raise went through that this ore extends from the 4th to the 6th and will possibly also run above the 4th level.

SECTION NINE EXPLORATION:

Contract No. 47, drifting west on the 10th level "B" shaft, is now in 800 ft. beyond their starting point. For a while the drift was in the footwall rock, but during the last half of the year we have cut across numerous stringers of ore, none of them to date wide enough for stoping operations, but nevertheless indicating that we are in a mineralized formation. The last ore vein cut through appeared to be about eight feet thick.

MAIN VEIN:

On the 13th level contract No. 14 after being moved from their stope on the 10th level, dropped down to the 12th, where it was planned to crosscut south at about the 1250 West coordinate to get the 10th level ore on the downward dip. We had hoped to get the ore after drifting 100 or 125 ft. in rock, but after one cut hit ore and by the end of the year had crosscutted south through 25 ft. of ore and were still breasted in ore on Dec. 31st. It is possible that the ore we have found is No. 14's ore on the 10th level, but we have probably cut another vein that lies in between.

b. Stoping:

There are two general classifications for miners stoping, one really adding to the ore reserves by breast stoping close to but outside the known ore limits, and the other class taking down backs or mining floors. Tabulations made of the two kinds of stoping operations reveals the fact that a miner in a breast stope breaks just about as much ore per day as the man mining floors. Data collected over a two year period shows our former ideas to be erroneous, namely, it was commonly supposed that the miners taking floors produced the largest tonnage per day.

Following is a detailed description of the stoping gangs:

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7. UNDERGROUND:
(Continued)

b. Stoping:

STOPPING-DEVELOPING CONTRACTS:

FIRST LEVEL "A" SHAFT: BANCROFT VEIN:

No. 34 on the west side of the Bancroft Vein raised up on the foot to the mining limit and then crosscut both to the east and west. They also discovered more ore in the foot of their stope than we heretofore expected to find.

SECOND LEVEL "A" SHAFT: BANCROFT VEIN:

The other half of No. 34 contract, mining between the 1000 and the 1200 East coordinate lines 250 ft. north of the south line of the Bancroft Lease, also put up a raising stope on the footwall and then stripped down both sides, but at the end of the year had exhausted all possibilities of ore where they were working, so they were moved farther east to start a new raising stope.

FOURTH LEVEL "A" SHAFT: BANCROFT VEIN:

No. 29 contract on a sub between the 3rd and 4th levels advanced two breasts, the ore on the east side being narrowed up to leave a brace under the hanging to prevent a heavy fall of rock. No. 29 works near the 1200 East coordinate line.

STOPPING-FLOORS OR BACKS:

FIRST LEVEL "A" SHAFT: BANCROFT VEIN:

No. 9 took out floors near the south boundary of the Bancroft Lease.

SECOND LEVEL "A" SHAFT: BANCROFT VEIN:

No. 30, working between the 2nd and 3rd levels, not only mined floors 600 feet northeast of "A" shaft, but also took down some back close to the 2nd level.

FOURTH LEVEL "A" SHAFT: BANCROFT VEIN:

800 ft. northeast of "A" shaft No. 22 drove a stope crosscut on the dividing line and also mined considerable bottom in their most northerly stope.

SIXTH LEVEL "A" SHAFT: BANCROFT VEIN:

In the extreme southeast corner of the 6th level, three gangs, Nos. 51, 61 and 66, took out floors and backs. No. 66 also cut north through a thin seam of rock and found a little ore behind what we supposed to be the footwall, but the new seam was narrow. Near the close of the year No. 66 also dropped down to the 6th level to open up a new stope to the east of their raise.

SEVENTH LEVEL "A" SHAFT: BANCROFT VEIN:

In the extreme northwest end of the Bancroft Vein No. 62 took out a piece of floor 110 ft. long from the 7th to the 8th levels.

EIGHTH LEVEL "A" SHAFT: BANCROFT VEIN:

In the central part of the Bancroft Vein No. 15 took out a short piece of floor to the east of the North-South crosscut and then the hanging dropped so low and the ore had to be scraped so far to the east, that it was decided to abandon this place temporarily until a new raise could be put up from the 10th level. By the end of the year this new raise was up 60 ft. above the 10th level.

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7. UNDERGROUND:
(Continued)

b. Stoping:

STOPPING-DEVELOPING CONTRACTS:

FIFTH LEVEL "A" SHAFT: NORTH VEIN:

No. 32 has found what is apparently some new ore in the extreme east end of the 5th level. We have already stoped back behind the old footwall for 20 ft. along a length of 35 ft. and still have ore. That opens up large possibilities because perhaps all of the foot along a 200 ft. contact may have ore behind it.

SIXTH LEVEL "A" SHAFT: NORTH VEIN:

There are four gangs on the 6th that have increased the ore reserves by advancing their breasts out into virgin ground. Starting near the 1800 East coordinate line, No. 16 drove their breast stope 50 ft. farther east. On the extreme east end, No. 28 on a sub above the 6th, developed a new stope that had a breast 60 ft. long. At the close of the year, however, the hanging dropped down and the miner was moved back to the main level to drift ahead and cut the ore on the downward dip. 2400 ft. directly east of "A" shaft, No. 8, working in three different breasts, found some new ore. The new lens to date is 50 ft. wide and lies back of the foot of old No. 8 deposit.

In the extreme southeast corner of the 6th level No. 12 continues to advance their stope to the northeast and they also crosscutted towards the old Incline Shaft.

SEVENTH LEVEL "A" SHAFT: NORTH VEIN:

Two gangs, Nos. 15 and 67, were in developing or advancing stopes. No. 15 on the north limb near the 3000 East coordinate line drove their raising stope southeast, while No. 67 on the south side holed their west breast from the sub below the 7th to the 7th level floor. The ore here is only about 15 ft. wide.

STOPPING-FLOORS OR BACKS:

SECOND LEVEL "A" SHAFT: NORTH VEIN:

In the northwest corner of the North Vein No. 30 contract mined floors from the 2nd to the 3rd and also below the 3rd level. The back of this stope is not very secure and considerable time was spent during the year barring the back.

FIFTH LEVEL "A" SHAFT: NORTH VEIN:

About halfway between "A" and "B" shafts along the north side of the North Vein, two gangs, Nos. 42 and 49, mined floors during the entire year.

SIXTH LEVEL "A" SHAFT: NORTH VEIN:

Three contracts in the central portion of the North Vein depleted our ore reserves by taking out floors. Nos. 20 and 59 worked fairly close together 1200 ft. northeast of "A" shaft, while over nearer the east end of the vein No. 52 took out a large shallow floor.

SEVENTH LEVEL "A" SHAFT: NORTH VEIN:

No. 54, 1100 ft. northeast of "A" shaft, took down some back as well as driving their breast a little further south.

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7. UNDERGROUND:
(Continued)

b. Stoping:

STOPPING-DEVELOPING CONTRACTS:

SECOND LEVEL "A" SHAFT: MAIN VEIN:

Although contract No. 27 is shown on the annual report as mining floors between the 2nd and 3rd levels along the south contact between "A" and "B" shafts, still we are classifying them as a developing-stoping gang because they have found so much new ore in the floor of their old stope and in the old 1st level floors south of their working place. This contract has much more ore in sight now than they had a year ago.

NINTH LEVEL "A" SHAFT: MAIN VEIN:

No. 55 on a sub above the ninth level, 1000 ft. southeast of "A" shaft, advanced their breast 50 ft. further south.

TENTH LEVEL "A" SHAFT: MAIN VEIN:

All six gangs stoping can be classified as developing-stoping contracts. Beginning on the west side about 1300 ft. east of the shaft, No. 39 drove their breast stope 75 ft. farther east. No. 21, the gang east of No. 39, drove two breasts, the westerly one only a few feet, but on the east side the breast was pushed ahead 65 ft. No. 11, still farther east, continued to put up raising stopes and crosscuts on the footwall between the 10th and 11th levels. Nos. 26 and 50 on the sub above the 10th drove crosscuts in ore to the south and north. The most easterly breast on the sub-level was also advanced about 20 ft.

ELEVENTH LEVEL "A" SHAFT: MAIN VEIN:

In the north central part of the 11th level No. 7 also drove their breast north, extending the limits of the ore area.

STOPPING-FLOORS-BACKS:

TENTH LEVEL "A" SHAFT: MAIN VEIN:

No. 53 on a sub above the 10th level, 850 ft. southeast of "A" shaft, took out floors.

ELEVENTH LEVEL "A" SHAFT: MAIN VEIN:

No. 7 on the 11th level along the north side of the Main Vein took out a large floor area between the 2200 and 2400 East coordinate lines.

SOUTH LENS:

There was only one gang, No. 3, mining in the South Lens, and they mined floors between the 10th and 11th levels.

SIXTH LEVEL "A" SHAFT: SOUTHEAST VEIN:

Two gangs, Nos. 2 and 6, mined floors and backs between the 5th and 6th levels. No. 2 in the south central part of the vein really took out most of their ore above the sill floor of the 5th level. No. 6 mined out the bulk of their tonnage at the 6th level elevation.

SEVENTH LEVEL "A" SHAFT: SOUTHEAST VEIN:

In the east end of the 7th level No. 45 mined known reserves between the 6th and 7th levels. Most of the ore came out of the back.

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7. UNDERGROUND:
(Continued)

b. Stoping:

STOPPING-FLOORS-BACKS:

EIGHTH LEVEL "A" SHAFT: SOUTHEAST VEIN:

In the west end of the Southeast Vein No. 41 on a sub above the 8th level not only extended the known limits of the orebody to the west, but they also took out most of the available floor.

NINTH LEVEL "A" SHAFT: SOUTHEAST VEIN:

No. 65 on the ninth level was one of those gangs that not only took out proven reserves, but also extended the limits of the known ore area. The ore contact was pushed farther north and they also took out most of the available ore in the back.

STOPPING-DEVELOPING CONTRACTS:

SUBS ABOVE FIRST LEVEL: MAIN VEIN: "B" SHAFT:

Contract No. 17, working 600 ft. southeast of "A" shaft, raised from the 1165 ft. sub to find the new ore they developed on the 1218 ft. sub, and after finding this ore started stoping on the 1165 ft. sub-level. There is now a good possibility that this ore extends back down to the main first level.

SEVENTH LEVEL "B" SHAFT: MAIN VEIN:

No. 19 on the west end of the Main Vein put up a third raising stope on the footwall 1200 ft. southwest of "B" shaft. This raise followed ore all the way up to the 4th level, making quite a lot of new tonnage available for mining.

EIGHTH LEVEL "B" SHAFT: MAIN VEIN:

Two gangs, Nos. 38 and 69, working close together about 900 ft. due west of "B" shaft, developed some new ore outlines in their stopes. No. 69 carried a large raising stope all the way from the 8th to the 7th level. Contract No. 38 enlarged the west end of their stope at the 8th level elevation.

SIXTH LEVEL "B" SHAFT: NORTH VEIN:

On the 6th level and about midway between the two shafts, No. 40 on a sub at the 6th level elevation, continued to breast stope west in high grade ore. The hanging is now crowding the stope over to the north.

SEVENTH LEVEL "B" SHAFT: NORTH VEIN:

On the 7th level, No. 13, directly north of "B" shaft, extended their south breast 100 ft. farther west. The north breast was also extended east about 40 ft.

STOPPING-FLOORS-BACKS:

SUBS ABOVE FIRST LEVEL "B" SHAFT: MAIN VEIN:

Contract No. 18, 500 ft. southwest of "B" shaft, continues to mine floors in their old stope. This gang might really be considered a developing gang because we are finding the ore in the floor of the old stope to go much deeper and lower down than estimated.

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7. UNDERGROUND:
(Continued)

b. Stoping:

STOPPING-FLOORS-BACKS:

THIRTEENTH LEVEL "B" SHAFT: MAIN VEIN:

There were three contracts, Nos. 43, 46 and 48, mining in developed ore areas between the 12th and 14th levels during the entire year. Considerable barring also had to be done to make the mining places safe.

FIRST LEVEL "B" SHAFT: SOUTHEAST VEIN:

There is one gang, namely, No. 1, working in the Southeast Vein in the extreme southeast corner of the level. This contract took some ore off the foot, but spent most of the year taking out two benches in the floor of the first level.

TENTH LEVEL "B" SHAFT: FAULT VEIN:

On the 10th level 1300 ft. southwest of "B" shaft, No. 14 took out as much floor as could be scraped up into motor cars, and as the floor area was approximately 70 ft. by 80 ft., all high grade ore, we decided to drop down to the 12th level and crosscut south and get under this floor.

TWELFTH LEVEL "B" SHAFT: FAULT VEIN:

No. 56 on the 12th level 1400 ft. due west of the shaft spent the entire year taking floors between the foot and hanging below the 12th level.

No. 31 over on the east end of the level scammed what ore they could find on their old sub-level.

RESUME:

A summary of the gangs stoping and developing shows that the following can be classified as developing gangs, which added ore to our reserves.

DEVELOPING DRIFTS & RAISES:

"A" Shaft	- Bancroft Vein	- Nos. 10, 58 and 70
do	- North Vein	- Nos. 23, 25, 44 and 60
do	- Main Vein	- Nos. 35, 68 and 71
do	- Southeast Vein	- No. 5
	T O T A L	- 11 GANGS

"B" Shaft	- North Vein	- Nos. 36 and 57
do	- Fault Vein	- No. 33
do	- Sec. 9 Exploration	- No. 47
do	- Main Vein	- No. 14
	T O T A L	- 5 GANGS

STOPPING-DEVELOPING OR RAISING STOPES:

"A" Shaft	- Bancroft Vein	- Nos. 29 and 34
do	- North Vein	- Nos. 4, 8, 15, 16, 28, 32 and 67
do	- Main Vein	- Nos. 7, 11, 21, 26, 27, 39, 50 and 55
	T O T A L	- 17 GANGS

"B" Shaft	- Main Vein	- Nos. 17, 19, 38 and 69
do	- North Vein	- Nos. 13, 40 and 72
	T O T A L	- 7 GANGS

GRAND TOTAL - 40 GANGS

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YEAR 1934

7. UNDERGROUND:
(Continued)

b. Stoping:

RESUME: (Cont.)

The gangs that drew on developed ore reserves were:

"A" Shaft - Bancroft Vein - Nos. 9, 15, 22, 30, 51, 61, 62 and 66
do - North Vein - Nos. 20, 30, 42, 49, 52, 54 and 59
do - Main Vein - Nos. 7 and 53
do - South Lens - No. 3
do - Southeast Vein - Nos. 2, 6, 41, 45 and 65
T O T A L - 23 GANGS

"B" Shaft - North Vein - No. 36
do - Main Vein - Nos. 18, 43, 46 and 48
do - Southeast Vein - No. 1
do - Fault Vein - Nos. 14, 31 and 56
T O T A L - 9 GANGS

GRAND TOTAL - 32 GANGS

TOTAL FOR MINE 72 GANGS

Of the 72 gangs, 56% or over half were developing gangs, and that, of course, is the reason why the ore reserves have been kept up.

c. Drifting and Raising:

The amount of drifting and raising done in 1934 totaled 3,170 ft., which is about the normal amount when you consider the working schedule. For sake of comparison, the last nine years are shown below. In 1934 ore drifting totaled 398 ft; ore raising 711 ft; rock drifting 1489 ft. and rock raising 572 ft., making a grand total of 3,170 ft.

<u>Year</u>	<u>Rock Drifts & Raises</u>	<u>Ore Drifts & Raises</u>	<u>Total</u>
1934	2061 Ft.	1109 Ft.	3170 Ft.
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 "

We averaged 22.6 ft. of development drifts and raises per shift in 1934 compared with 23.5 ft. per shift in 1933. With the exception of 1930 the average amount of development footage driven per shift was 23.5 for the past ten years.

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7. UNDERGROUND:
(Continued)

d. Explosives, Drilling and Blasting:

Explosives Statement for Year 1934:

Stopping and Development in Ore:

<u>Kind</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1934</u>	<u>Amount 1933</u>
50% LF Ex. Gelatine	1,050	11.00	115.50	
Gelamite "A"				1,225.68
Gelamite "2X"	33,350	12.00	4,002.00	3,960.00
50% Powder, LF.	109,850	10.75	11,807.01	
60% Powder Gelatine	30,750	12.00	3,689.40	
Total Powder	175,000	11.21	19,613.91	5,185.68
Prop. Cost - Battery			26.25	
No. 6 Blasting Caps	60,150	10.84M	652.16	148.85
Eagle Brand Fuse	239,800	5.64M	1,350.18	424.27
Connecting Wire	52	.365lb.	19.04	1.94
Connecting Wire	1,375	10.00M	13.75	
Electric Blasting Caps	725	8.67C	62.83	20.67
Fuse Containers				4.74
Fuse Lighters - 7" Wire	8,050	7.17M	57.70	16.89
Fuse Igniters	5,250	3.80M	20.00	
Match Sticks	250	2.50C	6.25	
Leading Wire-Duplex	175	2.00C	3.50	2.53
Total Blasting Supplies			2,211.66	619.89
TOTAL ALL EXPLOSIVES			21,825.57	5,805.57

PRODUCT	223,245	55,939
Pounds Powder per Ton of Ore	.7838	.7561
Cost per Ton for Powder	.0879	.0927
Cost per Ton for Fuse, Etc.	.0099	.0110
Cost per Ton for All Explosives	.0978	.1037

Development in Rock:

Gelamite "A"				926.82
Gelamite "2X"	4,200	12.00	504.00	218.25
50% LF Powder	9,700	10.75	1,043.04	
60% LF Powder	18,900	12.00	2,265.10	
Total Powder	32,800	11.62	3,812.14	1,145.07
Prop. Blasting Battery			15.00	
No. 6 Blasting Caps	10,300	11.05M	113.86	34.98
Eagle Brand Fuse	53,800	5.70M	306.66	95.42
Connecting Wire, lbs.	12	.373	4.48	
Connecting Wire, Ft.	1,020	10.00M	10.20	
Electric Blasting Caps	200	9.93C	19.86	6.99
Fuse Containers				2.37
Fuse Lighters-7" Hot Wire	2,000	6.59M	13.18	3.37
" " -Paper & Powder	1,700	3.92M	6.66	
Match Sticks	50	2.50C	1.25	
Leading Wire	750	1.866C	14.00	
Total Blasting Supplies			505.15	143.13
TOTAL ALL EXPLOSIVES			4,317.29	1,288.20

FOOTAGE	2,061	615
Cost per Ft., All Explosives in Rock	2.09	2.09
Total Cost of Explosives as per Cost Sheet	26,142.86	7,093.77
Average Cost per Pound for Powder	.112	.122

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7. UNDERGROUND:
(Continued)

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

In order to summarize the cost per ton for powder and cost per ton for all explosives for the past few years the following table is submitted.

<u>Year</u>	<u>Lbs. Powder per Ton of Ore</u>	<u>Cost per Ton for Powder</u>	<u>Cost per Ton for All Explosives</u>	<u>Avg. Cost of Powder</u>
1934	.7838	\$.0879	\$.0978	\$.112
1933	.7561	.0927	.1037	.122
1932	.7212	.0914	.1008	.125
1931	.8512	.1080	.1180	.127
1930	.8738	.1128	.1227	.130
1929	.7760	.1008	.1098	.131

The quantity of powder used in rock drifting and raising is shown by the following figures:

<u>Year</u>	<u>Footage</u>	<u>Lbs. of Powder</u>	<u>Lbs. per Foot</u>
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	6,496	103,500	15.9

In 1934 mostly 60% L.F. Powder was used for blasting on rock development work. In 1930 60% L.F. Powder was also used. In 1931 we used some Gelamite or bulk powder. In 1932 practically nothing but Gelamite "A" was used and the same holds true for 1933. The average results shown above would indicate that Gelamite "A" might be the cheapest powder to use, but when you consider the cost per lb. it makes very little difference whether Gelamite or L.F. Powder is used.

10. TAXES:

The taxes the Cliffs Shaft Mine paid for the last two years in the City of Ishpeming follow:

	<u>1934</u>		<u>1933</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty, Placed by Tax Comm.	1,890,000	59,686.20	1,885,000	58,511.32
Mineral Under NW $\frac{1}{4}$ 9-47-27	79,000	2,494.82	75,000	2,328.05
Personal	940,000	29,685.20	1,000,000	31,040.50
Lot 2, Sec. 3-47-27, 60 Acres (Mineral)	210,000	6,631.80	200,000	6,208.09
Lot 174, Nelson Addition	80	2.53	80	2.48
South 35.91 ft. of Lot 179	30	.95	30	.93
Total	3,119,110	98,501.50	3,160,110	98,091.37
Collection Fees		985.01		980.91
Total Cliffs Shaft		99,486.51		99,072.28
Taxes per Ton Produced		\$.4456		\$ 1.7710
Taxes per Ton Shipped		.4189		.5200

CLIFFS SHAFT MINE
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YEAR 1934

10. TAXES:
(Cont.)

The valuations and the taxes paid by the mine since 1930 follow:

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

The taxes show very little change for the last two years, but in 1933 and 1934 they were only two-thirds of what the taxes amounted to in 1931.

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

	<u>1934</u>	<u>1933</u>	<u>1932</u>
State Tax -----	\$ 5,436.92	\$ 5,445.48	\$ 38,301.72
County Tax -----	58,273.03	56,865.76	84,033.94
County Road Tax -----	4,684.56	4,739.04	
County Debt Service Tax -----	2,518.98	12,842.75	
Highway Fund Tax -----	56,800.00	40,000.00	56,000.00
Library Fund Tax -----	7,300.00	6,500.00	9,000.00
Fire Fund Tax -----	13,400.00	8,000.00	10,500.00
School Fund Tax -----	71,205.24	72,032.21	104,000.00
School Debt Service Tax -----	26,637.50	26,950.00	
One Mill Tax -----			11,293.74
Sewer Fund Tax -----	2,300.00	2,000.00	1,500.00
Cemetery Fund Tax -----	1,300.00	1,500.00	2,500.00
City Tax -----	43,700.00	49,000.00	58,000.00
City Debt Service Tax -----		4,200.00	
Water Fund Tax -----	2,200.00	4,000.00	3,000.00
T O T A L -----	295,756.23	294,075.24	378,129.40
Rejected Tax -----	127.56	124.91	60.29
G R A N D T O T A L -----	\$ 295,883.79	\$ 294,200.15	\$ 378,189.69

11. ACCIDENTS
AND
PERSONAL
INJURY:

The following tabulation shows our accident record at the Cliffs Shaft Mine for the past five years:

	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>	<u>1930</u>
No lost time accidents -----	51	8	9	30	61
Compensable accidents -----	9	2	1	2	3

Our record for 1934 is not one to be proud of and for a time it seemed that everything we tried to do went contrary to rule.

The first compensable accident happened on Feb. 12th when Jonas Tuttila stumbled and let a 35 lb. weight fall on his hand. The second on April 9th occurred to Anner Anderson while barring a chute when a chunk dropped onto the end of the bar, knocking the bar back towards his face. The third happened to Nestor Mattilo on April 16th by an accident to the drill bucket.

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YEAR 1934

11. ACCIDENTS
AND
PERSONAL
INJURY:
(Cont.)

The fourth developed into a fatal accident. Matt Toppila, working in contract No. 62 on the 7th level "A" shaft in the Bancroft Vein, was standing on the bottom third round of a 12 ft. ladder. He was trying to bar down a loose chunk from the side of the pillar. He leaned forward to the left of the ladder and while in the act of pushing the bar ahead, it slipped, causing him to lose his balance. He fell 5 ft. on top a pile of broken ore. He lay there a short time before his partner, the scraper operator, heard him calling. He could not get up and his partner, Alfred Hendrickson, assisted him to the shaft. Toppila went home and two days later reported back at the mine ready for work. He was sent to the hospital, where he died of pneumonia three days later.

On June 26th Simon Luoma was moving some old wire rope aside when a sliver of rope went through his gloves and infected his hand. He became very sick and almost died and did not get back to work until Sept. 24th.

On the same day, June 26th, Matt Pesola hurt his neck when a clamp on his drill post, which he was carrying on his shoulder, slipped forward.

Another accident report dated Aug. 13th covers a peculiar occurrence to Oscar Kurin. He was drilling a peg hole for an electric cable when he claimed a piece of dirt flew into his right eye. He was wearing a pair of new goggles.

The last lost time accident occurring on Nov. 13th involved two men, Caleb Torma and Oscar Huhtala. These men were barring loose when a large slab came off the side of the drift and partially buried them. Fortunately neither one was seriously hurt.

12. NEW
CONSTRUCTION:

E & A. 634:

This covers the new picking belt installed in the crusher building at the Cliffs Shaft Mine. A description of this proposed installation was in last year's report, so I will not repeat what has been said before. The work of installing this belt was not completed until March 1934 and after making a few minor adjustments we have had no difficulty in operating the new equipment.

The installation of this belt speeded up stockpile loading last summer when we loaded that part of the pile that was stocked after the belt was in operation. The year before loading was delayed considerably while two men picked rock out of the railway cars as they were being loaded at the stockpile. We have also had no delays in the crusher building due to large chunks getting caught in the crusher.

The cars bringing the ore from both shafts now dump in a bin on the west side of the crusher building. Formerly they dumped in the center of the building. In order to avoid spotting the "B" shaft car twice each trip at "B" shaft because of the fact that when the "A" shaft car dumped in the crusher building the "B" shaft car went beyond the chute in the shaft house, a second drum was installed in the top-tram plant so that now each car has its own drum.

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YEAR 1934

12. NEW
CONSTRUCTION:
(Continued)

E & A. 643:

E & A. 643 covers the new, combined cage and skip put into service in "A" shaft. The cage and skip is made out of an alloy of aluminum. What we had in mind in making this change was the element of safety. For twenty years groups of as many as six men at a time have ridden on top the skip protected by a bonnet, but in case of a sudden jar some or all of these men would have been thrown into the shaft. Furthermore, the changing from cage to skip and from skip to cage meant bringing up six men from underground each day twenty minutes before the end of the shift and holding them over on surface at the beginning of each shift until after all the men were down in order to help the surface crew complete the cycle. The new combination cage and skip together weighs less than the old skip and the lessened weight ought to help to improve our load factor.

Before the new cage was put into commission we rebuilt the 2nd level rock dump. The old dump had needed repairs for the past three years, but because of industrial conditions we put repairs off from time to time. The dump as rebuilt can now be handled by one man very easily. The old dump required three men to bring it into the proper position.

E & A. 644:

E & A. 644 covers the purchase of two Chevrolet trucks, one a $1\frac{1}{2}$ -ton, 157 in. wheel base, stake body truck, and the other a $1\frac{1}{2}$ -ton, 131 in. wheel base, dump body truck. Both of these trucks have given satisfactory service throughout the year, but we now find so much work accumulating due to all of the machine and blacksmith shop work being done at the General Shops that we find it imperative to purchase another truck a little larger in size that will be capable of handling the largest skips that we have in service. We will possibly also have to purchase another dump truck early in the spring. It might be interesting to know that in hauling coal to the Hospital, for instance, that we can haul as much coal with the dump truck in a shift as we formerly did with two stake body trucks. The installation of automatic stokers at the Cliffs Shaft Laboratory and Shops, General Office and the General Storehouse would make it advisable to purchase another dump body truck with a box specially designed for handling coal. This box is quite a bit larger than the standard box and has a special door at the rear end for dumping coal.

E & A'S NOS. 654 & 655:

These E & A's cover two automatic stoker units, one for the laboratory and one for the shop heating plant. The idea in purchasing these stokers was to save labor and also to be able to burn a cheaper kind of coal than the "Pocahontas" that we were compelled to buy for the laboratory building because of its close proximity to the dwellings on the other side of the street.

CLIFFS SHAFT MINE
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13. NEW
EQUIPMENT:

We purchased (14) new, dustless African type drifting drills, of which (12) were Ing-Rand N-75's, (1) Cleveland and (1) Gardner-Denver. These drills were made mandatory by the dust prevention campaign.

We also fell heir to (12) RB-12 Jackhammers from the Armour Mine, which were converted into block-holing machines.

All of the miners and bosses were equipped with Edison Mine Safety Lamps, which we are paying for on a rental basis on our present operations of \$ 45.00 a month. At the end of five years the lamps belong to us. In the meantime the Mine Safety Appliances Company, who are Agents for these lamps, take care of all repairs to lamps and charging equipment.

14. MAINTENANCE
AND
REPAIRS:

a. Mine Buildings:

A detail of the maintenance cost on the mine buildings follows:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Office -----	\$ 363.54	\$ 196.70	\$ 560.24
Warehouse -----	23.28	6.62	29.90
Shops -----	1.80		1.80
Shaft House -----	44.48	83.03	127.51
Engine House -----	84.72	29.99	114.71
Dry House -----	125.70	98.46	224.16
Coal Dock & Trestle -----	694.98	197.52	892.50
Miscellaneous -----	284.46	144.24	428.70
T O T A L -----	\$ 1622.96	\$ 756.56	\$ 2379.52

For sake of comparison the figures for the past five years follow:

1934	\$ 2,379.52
1933	1,291.65
1932	312.94
1931	1,500.27
1930	3,785.72

Explanations have already been given in this report under "Repairs" as to the office and coal dock, which account for over half the total for 1934. The dry house coal storage bin represents most of the expense under this item.

b. Rented Houses:

The following tabulation shows the maintenance cost for the dwellings owned by the Company in the City of Ishpeming:

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14. MAINTENANCE
AND
REPAIRS:
(Cont.)

b. Rented Houses:

	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
Nebraska Location -----	69.29	93.21	8.75	284.85
Second Addition -----	2982.62	553.07	182.58	637.66
Cliffs Shaft Location -----	1589.80	426.42	202.76	862.86
Hard Ore Location -----	7062.65	1146.88		
Nelson Purchase -----	399.65	83.64	15.96	119.61
Outhwaite Purchase -----	326.78	147.94	131.05	443.42
Smith Purchase -----	667.69	81.40	74.89	166.14
Hyde Purchase No. 1 -----	141.20	22.57	13.43	6.12
Hyde Purchase No. 2 -----	25.27	2.89		
Angeline Location -----	548.77	227.54	504.81	911.27
Salisbury Location -----	72.92	66.24	60.87	582.67
T O T A L -----	13886.64	2851.80	1195.10	4014.60

For sake of comparison we are also showing the previous three years and it will be noticed that the costs for 1934 are considerably in excess of the total for the prior three years. That is not strange when you consider the small amount of money spent on all of the dwellings that we own in the City. The Company still owns (99) houses in the City. It will be noted that the major portion of the costs were in the Second Addition and Hard Ore Location. In the Second Addition most of the repairs were confined to the roofs and the same is true at the Hard Ore Location, but in addition to the repairs to the roofs quite a lot of repairing was done on the Manager's residence, which had been badly in need of repairs for the last two or three years. As I have mentioned previously in the last three reports our houses are exceedingly shabby. Last year I remarked that the General Manager's house was actually shabby and this year the same remark applies to the house that Mr. Meyers lives in. If something is not done to this house in 1935, the repair bill is going to be very high when we do start.

The following statement shows the detailed cost for 1934:

	<u>LABOR</u>	<u>SUPPLIES</u>	<u>TOTAL</u>	<u>NO.</u> <u>FAMILIES</u>
Nebraska Location -----	29.66	39.63	69.29	2
Second Addition -----	1680.44	1302.18	2982.62	20
Cliffs Shaft Location -----	753.72	836.08	1589.80	16
Hard Ore Location -----	1551.97	5510.68	7062.65	33
Nelson Purchase -----	165.32	234.33	399.65	1
Outhwaite Purchase -----	137.80	188.98	326.78	1
Smith Purchase -----	290.24	377.45	667.69	1
Hyde Purchase No. 1 -----	89.99	51.21	141.20	1
Hyde Purchase No. 2 -----	25.00	.27	25.27	1
Angeline Location -----	335.82	212.95	548.77	21
Salisbury Location -----	62.51	10.41	72.92	2
T O T A L -----	5122.47	8764.17	13886.64	99

CLIFFS SHAFT MINE
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YEAR 1934

15. POWER:

Following is a statement showing the electric power costs for 1934:

	<u>K.W.H.</u>	<u>AMOUNT</u>	<u>PER TON</u>
Tramming -----	182,400	3,147.57	.014
Pumping -----	1,230,912	21,207.76	.097
Hoisting -----	514,882	8,806.57	.039
Stocking Ore -----	20,979	362.87	.002
Screening & Crushing -----	40,166	677.09	.003
Dry House -----	6,634	115.49	.000
Surface Expense -----	15,038	263.28	.001
Mine Office -----	3,640	63.31	.000
Shops -----	15,802	263.50	.001
Compressor -----	894,214	15,944.85	.071
Electric Haulage -----	136,350	2,339.41	.010
Heating Plant -----	7,213	119.97	.001
Loading by Hand -----	1,230	23.65	.000
Telephones & Safety -----	33,500	579.92	.002
T O T A L -----	3,102,960	53,915.24	.241
Cost per 1000 Gals. Pumped	.066		
" " " Cu. Ft. Air	.044		
Cost per Ton of Ore Stocked	.003		
" " " " " & Rock Hoisted	.003		
" " " " " " " Trammed	.013		

The above statement does not show the rates paid, but our electric power rate will average higher this past year than it ever has before. Prior to April 23rd, 1934 our rate was a flat $1\frac{1}{2}\%$ per K.W.H. plus a 3% Sales Tax. In May our rate jumped to \$.0164; June \$.0164; July \$.0164; August \$.017; September \$.017; October \$.0202; November \$.0186 and December \$.017. Even though our electric power is not actually a cash purchase, we are making every effort to keep down our peak loads to build up a high load factor. For that reason no spare pump is started up while we are hoisting ore. No two compressors are started within the same fifteen minute load cycle. Each of the "A" shaft and "B" shaft skips are not started at the same instant, the "B" shaft hoist being held back until "A" shaft is up to speed.

16. NATIONALITY
OF
EMPLOYEES:

	<u>American</u>	<u>Foreign</u>	<u>Total</u>
	<u>Born</u>	<u>Born</u>	
English -----	47	30	77
Finnish -----	30	82	112
Swedish -----	31	26	57
Italians -----	1	10	11
French -----	16	7	23
Norwegians -----	10	6	16
Irish -----	4	3	7
Germans -----	3		3
Scotch -----	3	1	4
Danish -----	1		1
Polish -----	1		1
T O T A L -----	147	165	312

CLIFFS SHAFT MINE
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19. GENERAL:SARANAC EXPENSE:

The cost sheet shows an expenditure of \$ 3,869.14 under this heading, but actually the total cost of not only the physical examinations for the men, but the introduction of dustless type drill machines, the conversion of all stoping and block-holing drills from dry to wet, and the changing of our water lines to high pressure clean water foots up to \$ 11,086.39, divided as follows:

Saranac Expense from Central Office -----	\$	3,393.80
Changes in Water Lines, Sprays, Etc. -----		1,361.42
New Drifting and Raising Drills -----		4,755.67
Converting Stoppers & Jackhammers from Dry to Wet Type -----		1,575.50
T O T A L -----	\$	11,086.39

Prior to this past year all of the drill machines in the mine used water from the pump water column, but as that created a dust hazard due to sludge in the water, we changed over all the piping in the mine to give each contract a clean water supply. Lines were run up to the sumps in each shaft above the first level, where the ledge water entering the shafts was trapped into these sumps. Pipes were also run down to the main 4th level sump and to the dam on the 8th level, where the water from old No. 3 Mine enters. We also tapped Diamond-Drill Hole No. 1 on the 10th level. Then by putting some new 1" and 1½" lines in service, we were able to pipe this clean water to all the contracts.

Every drill operating in the Cliffs Shaft Mine is now of the wet type. We also rigged up a combination air and water spray for each rock drifting gang. All the rock miners are furnished with a new type respirator with renewable pads. Every gang sprays the muck pile thoroughly before scraping. All the holes as they are being drilled are kept very wet.

All block-holing is done on the off shift and as a result of all the efforts being made the dust count in the air was satisfactory and permissible prior to the introduction of the "Jack Bits." The latter brings up a new problem that can and will be solved in 1935.

DETACHABLE BITS:

In December we started making some experiments with detachable bits. At the present writing there does not seem to be any question but what it will be advisable to consider the installation of all the equipment necessary to change our operations over so that each miner will be able to use "Jack Bits." From what we know now the use of "Jack Bits" greatly increases the number of holes that the contractors can drill in a shift due partially to the fact that the "Jack Bits" are able to drill more inches per minute than the regular mine steel and also due to the fact that there is a tremendous saving in time of transporting bits.

LLOYD MINE

ANNUAL REPORT

YEAR 1934

1. GENERAL:

Production was resumed at the Lloyd Mine on April 3rd, 1934 after a lapse of twenty-one months. As might be expected after a shutdown of nearly two years, a large amount of repair work was necessary in the drifts and raises, and even at the end of the year we were still suffering by reason of the shutdown. I mean by that, that breakdowns were still frequent due to the rotting of the old floor covering, causing runs from the backs of the slices that required close timbering and fore-poling.

It will not be possible in this report to make the usual comparisons with previous years because of two reasons. First, no ore was hoisted in 1933. Secondly, the last time ore was mined prior to 1934, production was coming from both the Morris and Lloyd Mines, and it is not fair to compare the Lloyd record for 1934 with the results secured from the combined Morris-Lloyd Mines in 1932.

Due to the ground movement over the Section 6 Mine workings, the underground workings are now subjected to pressure, resulting in more retimbering and the miners have more water to contend with. The water being pumped by the Inland Steel Co. for us has increased about one-third. As a result more track cleaning is necessary and we have more difficulty handling the wet ore on surface during the winter stocking season.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

<u>Grade</u>	<u>Tons</u>
Lloyd Ore	322
Lloyddale Ore	60,582
Lloyd Silica Ore	<u>61,902</u>
T O T A L	122,806

b. Shipments:

Shipments for the year totaled 191,327 tons, of which 60,188 tons came from the pocket and 131,139 tons were loaded out of the stockpiles. A detail of this follows:

<u>Grade</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
Lloyd				35,797
Lloyddale	31,491	29,152	60,643	134,192
Lloyd Silica	28,697	7,382	36,079	1,928
Morris		92,304	92,504	129,957
Morrisville		<u>2,301</u>	<u>2,301</u>	104,954
Total	<u>60,188</u>	<u>131,139</u>	<u>191,327</u>	406,828
Total Last Year		<u>406,828</u>	<u>406,828</u>	
Decrease in Shipments		275,689	215,501	

Shipments include 965 tons of Morrisville stockpile overrun.

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YEAR 1934

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments:

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

Year 1930	299,791 Tons Shipped
" 1931	172,615 " "
" 1932	26,021 " "
" 1933	406,828 " "
" 1934	191,327 " "

c. Stockpile Balances:

Ore in stock on December 31st, 1934 was as follows:

Lloydale Ore	82,932 Tons
Lloyd Silica Ore	25,823 "
Morris Ore	91,480 "
T O T A L	200,235 "

Stockpile balances showing ore on hand at the end of each year for the past five years were as follows:

Dec. 31st, 1930	370,541 Tons
Dec. 31st, 1931	547,084 "
Dec. 31st, 1932	603,939 "
Dec. 31st, 1933	220,059 "
Dec. 31st, 1934	200,235 "

d. Division of Product by Levels:

	<u>3RD LEVEL</u>				<u>4TH LEVEL</u>			
	<u>#1</u> <u>Silica</u>	<u>Lloyd</u> <u>Silica</u>	<u>Lloyd-</u> <u>dale</u>	<u>Lloyd</u>	<u>#1</u> <u>Silica</u>	<u>Lloyd</u> <u>Silica</u>	<u>Lloyd-</u> <u>dale</u>	<u>Lloyd</u>
April		3,032	46			945	3,232	
May		5,564	26			5,435	5,202	
June		4,242	659	129		7,823	5,264	193
July		2,326	3,119			7,500	5,134	
August		771	5,261			7,778	5,775	
September			8			5,686	4,262	
October		57	2,140			4,810	5,037	
November		30	3,120			3,628	3,487	
December	18		4,229		803	1,454	4,581	
Total	18	16,022	18,608	129	803	45,059	41,974	193

SUMMARY:

	<u>#1</u> <u>Silica</u> <u>Tons</u>	<u>Lloyd</u> <u>Silica</u> <u>Tons</u>	<u>Lloydale</u> <u>Tons</u>	<u>Lloyd</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
Third Level	18	16,022	18,608	129	34,777
Fourth Level	803	45,059	41,974	193	88,029
Total	821	61,081	60,582	322	122,806

LLOYD MINE
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YEAR 1934

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

e. Production by Months:

Month	Days	Lloyd	Lloyddale	Lloyd Silica	Total Ore	Rock
April	24		3,278	3,977	7,255	84
May	26		5,228	10,999	16,227	36
June	26	322	5,923	12,065	18,310	75
July	25		8,253	9,826	18,079	18
August	27		11,036	8,549	19,585	123
September	17		4,270	5,686	9,956	1,167
October	19		7,177	4,867	12,044	2,937
November	17		6,607	3,658	10,265	2,835
December	16		8,810	2,275	11,085	1,737
Y E A R	197	322	60,582	61,902	122,806	9,012

Operating Schedule for past five years:

1930	-	1-8 hr. shift	6 days a week	Jan. 1st to July 16th
		" " "	5 " " "	July 16th to Dec. 31st
1931	-	" " "	5 " " "	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

f. Ore Statement:

	Lloyd	Lloyd-dale	Lloyd Silica	Morrisville	Total
On Hand Jan. 1st, 1934		82,671		183,784	267,791
Output for Year	322	60,582	61,902		122,806
Transfers	322	322	2,301	2,301	
Stockpile Overruns				965	965
Total		143,575	64,203	183,784	391,562
Shipments		60,643	38,380	92,304	191,327
Balance on Hand		82,932	25,823	91,480	200,235

g. Delays:

No delays were reported during the year.

3. ANALYSIS:

a. Average Mine Analysis on 1934 Output:

Grade	Iron	Phos.	Silica
Lloyddale	58.32	.191	7.74
Lloyd Silica	50.80	.131	18.89

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3. ANALYSIS:
(Continued)

b. Analysis of Ore in Stock Dec. 31st, 1934:

<u>Grade</u>		<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Morris	Dried	58.85	.071	9.07	0.49	2.47	1.06	0.29	.014	2.83	
	Natural	52.92	.064	8.16	0.44	2.21	0.98	0.26	.015	2.56	10.08
Lloydale	Dried	57.97	.177	7.97	0.24	2.51	1.73	0.27	.013	4.71	
	Natural	51.30	.157	7.05	0.21	2.22	1.53	0.24	.012	4.17	11.50
Lloyd Sil. Reg.	Dried	51.15	.137	18.78	0.22	2.65	1.10	0.36	.012	4.54	
	Natural	45.52	.122	16.71	0.20	2.36	0.98	0.32	.011	4.04	11.00

c. Analysis of Ore Reserves as of Dec. 31st, 1934:

<u>Grade</u>		<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Lloyd	Dried	58.98	.127	6.68	0.25	2.29	1.18	0.38	.012	4.81	
	Natural	52.45	.111	5.93	0.22	2.04	1.05	0.34	.011	4.08	11.25
Lloydale	Dried	58.25	.187	7.08	0.25	2.65	1.26	0.44	.011	5.02	
	Natural	51.56	.166	6.28	0.22	2.35	1.12	0.39	.010	4.46	11.25

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, 1934:

	<u>LLOYD MINE EAST</u>		
	<u>Lloyd</u>	<u>Lloydale</u>	<u>Total</u>
	<u>Ore</u>	<u>Ore</u>	<u>Ore</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Above 4th Level		386,477	386,477
Ore Between 4th and 6th Levels	513,241	1,539,724	2,052,965
Total Ore Above 6th Level	513,241	1,926,201	2,439,442
Ore Below 6th Level	70,537	211,613	282,150
Total Ore in Lloyd Mine East	583,778	2,137,814	2,721,592

	<u>LLOYD MINE</u>	
	<u>Ore</u>	<u>Ore</u>
	<u>Tons</u>	<u>Tons</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 & EAST LLOYD	619,004	2,756,818

The above estimate shows approximately 141,000 tons less in sight than the last estimate, which was made as of Dec. 31st, 1932. In other words, in spite of the fact that we mined approximately 61,000 tons of Standard Ore during the year 1934, the ore reserves have been reduced approximately another 80,000 tons because of the fact that we had to eliminate some pillars above the 3rd level, which we believe to be unavailable for mining.

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4. ESTIMATE OF
ORE RESERVES:
(Continued)

The following table shows a recapitulation of the ore reserves for the last four years:

	<u>1931</u>	<u>1932</u>	<u>1933</u>	<u>1934</u>
Ore in Mine Jan. 1st	1,073,551	2,861,086	2,897,830	2,897,830
Production	203,366	31,018		60,904
Balance	870,185	2,830,068	2,897,830	2,836,926
Ore in Mine Dec. 31st	<u>2,861,086</u>	<u>2,897,830</u>	<u>2,897,830</u>	<u>2,756,818</u>
New Ore Developed	1,990,901	67,762		80,108

5. LABOR
AND
WAGES:

a. General:

In an effort to stretch employment as far as possible a number of young men were hired during 1934 and as fast as they became acquainted with the general underground practice, we placed them in the regular mining contracts as helpers for one of the older miners.

b. Comparative Statement of Wages and Product:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	122,806	0	122,806	
No. of Shifts & Hours	1-8	3-8		

AVG. NO. OF MEN WORKING:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	53	20	13	
Underground	95	54	41	
Total	<u>128</u>	<u>74</u>	<u>54</u>	

AVG. WAGES PER DAY:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	4.18	3.84	.34	
Underground	5.00	4.29	.71	
Total	<u>4.76</u>	<u>4.10</u>	<u>.66</u>	

Year	<u>Surface</u>	<u>Underground</u>	<u>Total</u>
1930	4.35	5.27	5.06
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

WAGES PER MO. OF 25 DAYS:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	104.50	96.00	8.50	
Underground	125.00	107.25	17.75	
Total	<u>119.00</u>	<u>102.50</u>	<u>16.50</u>	

WAGES PER MO. OF 22 DAYS:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	91.96	84.48	7.48	
Underground	110.00	94.38	15.62	
Total	<u>104.72</u>	<u>90.20</u>	<u>14.52</u>	

WAGES PER MO. OF 17 DAYS:

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
Surface	71.06	65.28	5.78	
Underground	85.00	72.93	12.07	
Total	<u>80.92</u>	<u>69.70</u>	<u>11.22</u>	

LLOYD MINE
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YEAR 1934

5. LABOR
AND
WAGES:
(Cont.)

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

	<u>1934</u>	<u>1933</u>	<u>Increase</u>	<u>Decrease</u>
<u>WAGES PER MO. OF 15 DAYS:</u>				
Surface	54.34	49.92	4.42	
Underground	65.00	55.77	9.23	
Total	61.88	53.30	8.58	
<u>WAGES PER MO. OF 9 DAYS:</u>				
Surface	37.62	34.56	3.06	
Underground	45.00	38.61	6.39	
Total	42.84	36.90	5.94	
<u>PRODUCT PER MAN PER DAY:</u>				
		<u>1932</u>		
Surface	28.46	25.77	2.69	
Underground	11.92	8.46	3.46	
Total	8.39	6.37	2.02	
<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>	
1934	28.46	11.92	8.39	
1932	25.77	8.46	6.37	
1931	30.19	8.72	6.76	
1930	27.65	8.52	6.54	
1929	25.53	8.22	6.54	
1928	23.09	7.59	6.22	
1927	20.93	6.61	5.71	
1926	21.42	6.97	5.26	
1925	20.45	6.85	5.13	

It will be noted that results for 1934 are by far the best ever attained, but the thought must be kept in mind that the 1934 data is for the Lloyd Mine and the years 1932, 1931, etc. are for the combined Morris and Lloyd Mines.

	<u>1934</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
<u>LABOR COST PER TON:</u>				
Surface	.147	.152		.005
Underground	.419	.552		.133
Total	.566	.704		.138

AVG. PRODUCT STOPPING & TRAM'G:

Product for Stopping and Trimming	16.49 Tons	17.50 Tons		1.01
Avg. Wages Cont. Miners	\$ 5.26	\$ 5.14	\$.12	

TOTAL NUMBER OF DAYS:

		<u>1933</u>	
Surface	4,319	2,196 $\frac{1}{2}$	2,122 $\frac{3}{4}$
Underground	10,312	3,079 $\frac{1}{2}$	7,232 $\frac{3}{4}$
Total	14,631	5,275 $\frac{1}{2}$	9,355 $\frac{1}{4}$

AMOUNT FOR LABOR:

Surface	18,065.92	8,428.42	9,637.50
Underground	51,566.54	13,210.23	38,356.31
Total	69,632.46	21,638.65	47,993.81

LLOYD MINE
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YEAR 1934

5. LABOR
AND
WAGES:
(Cont.)

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

Proportion of Surface to Underground Men:

1930	-	1 to 3.41
1931	-	1 to 3.82
1932	-	1 to 3.18
1933	-	1 to 2.70
1934	-	1 to 2.88

6. SURFACE:

a. Buildings:

The Section 6 dry-house was repaired and made usable for the underground crew. The decision to move all of our crew back to the Section 6 dry was prompted by two reasons. First, our men lost considerable working time because they had to walk back and forth nearly a mile four times each day to get from the Morris dry to their working places in the Lloyd Mine East. Secondly, we could operate our dry cheaper than the Inland Steel Company was charging us each month. Our judgment was confirmed by actual figures. The last three months prior to moving, our dry house expense averaged \$ 290.00 per month. The last five months of 1934 the Section 6 dry cost us \$ 874.39 or about \$ 175.00 per month.

In order to rehabilitate the dry it was necessary to purchase a new stack for the heating boiler; a new concrete floor was laid in the main portion of the dry; the old pipe radiators were taken out and "Ventura" fan-driven heaters salvaged from the Armour Mine equipment were installed. We put in new showers and installed toilets in a small addition built onto the north side of the building. Lockers also salvaged from other mines were installed. We borrowed a pump from the Cliffs Power & Light Co. because the dry is almost as high in elevation as the water level in the main supply tank. On Monday, June 25th, the crew was moved from the Morris Mine to the Section 6 dry.

b. Stocking Grounds:

Stockpile trestles were erected both east and west of the Lloyd shaft. The north trestle on the east side is for Silica ore, only five bents having been put up; on the west side of the shaft low phosphorus Silica is stocked from the extreme west end of the trestle, while Lloyd-dale is dumped close to the shaft house. The south stocking trestle east of the shaft is reserved for Lloyd-dale ore.

c. Engine House:

When operations, that is the production ^{of} ore, were resumed on April 3rd, we noticed that the skip drum had several bad cracks in the face of the drum itself and furthermore some of the arms of the spider that support the drum were cracked. The Mechanical Department decided at first to take out the drum and main shaft and move the Barnes-Hecker skip drum over to the Lloyd Mine, but subsequently it was decided that the drum could be saved by putting in steel supporting shoes. This repair work, which could only be done on overtime, was finished in July.

Prior to resuming operations it was also decided to rebuild the skip hoist by substituting a Herringbone gear for the old Spur tooth gear and by installing only a single reduction gear it was possible to increase the rope speed up to 1200 ft. per min. The teeth of the old

LLOYD MINE
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6. SURFACE:
(Cont.)

c. Engine House: (Cont.)

gear were cut off by making the drum itself an improvised lathe. A Sullivan air-hoist was fastened to the sole plate of the hoist itself and then by passing an eight-inch belt around the skip drum as well as around the small drum on the air-hoist, the large skip drum was revolved and the teeth cut off by fastening the cutting tool to the bed-plate of the hoist.

The old heating boiler was brought over from the Barnes-Hecker Mine and installed as an air receiver during February.

The rotary converter installed the latter part of 1933 proved too small to handle the load and in order to keep the voltage for the underground slusher hoists and haulage motors up to 250, a second converter was installed that had about 15% more capacity. A new transmission line was also run by the Cliffs Power & Light Co. from the Morris sub-station to the Lloyd switchboard in order to prevent too much drop in line voltage.

During the early part of the year and also again in mid-summer there was a shortage of water for the domestic drinking supply lines, and as we use the water from the location supply tank for cooling the compressor, it was decided to install a cooling pond outside the engine house, which would enable us to circulate the same water over and over again. This job was finished late in the summer.

d. Shaft Houses:

The steel channels supporting the skip runners were replaced during the year. Every runner from the ground up to the dump was taken out and renewed. This work naturally all had to be done on Sundays and holidays.

The Section 6 shaft house was also jacked up and blocked so as to make it vertical. There has always been a tendency for this shaft house to lean to the west.

e. Roads:

The cross road running from the main road to the Section 6 plant was brushed out and graded and gravel dumped on the low spots. The road was also widened out at various points to permit cars to pass each other.

f. Rock Dump:

The track leading south from the Lloyd shaft house landing floor was repaired and rock is now dumped into the old cave southwest of the shaft.

g. Timber Yards:

The timber yards were cleaned up and the supply of new timber coming in is kept very low because all timber, except lagging, can be delivered at any time during the entire year.

7. UNDERGROUND:

a. Development:

For the first three months of the year all efforts were concentrated on getting the Lloyd shaft stripped and timbered to the new 6th level. The shaft, which was completed to a point 40 feet below the fifth level at the end of 1933, was bottomed early in March. The balance of that month was spent taking out the rock pillar left in the centre of the plat on the sixth. A pocket was also built under both skiproads to catch the spillage from the skips.

After the shaft was again in commission and hoisting of ore resumed, a crew of miners started cutting the new fifth level plat. The new African type dustless drilling machines were used and a tail track 100 ft. long was driven north of the shaft and all of the plat cut south of the shaft. We are providing room for three tracks, one for timber trucks

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7. UNDERGROUND:
(Continued)

a. Development: (Cont.)

and two for the ore trains. By the end of the year we had started to make the turn preparatory to drifting southeast through the footwall towards the orebody.

In the extreme east end of the Lloyd Mine East the orebody pitches very flat to the west, the footwall or rather the crotch between the slate footwall and dike moving west 600 feet between the 3rd and 4th levels, which are 200 ft. apart. There have been no drifts driven in rock east of the crotch on the 4th and it is obvious that to mine out the floor of ore 600 ft. further east on the 3rd that some sort of a rock drift and several rock raises would be necessary. We had planned to do this development work early in 1935, but the ground movement that started in August made it mandatory to start this development work this year, because in the event that we found it impossible to maintain the main 3rd level footwall drift, it would be necessary to mine out the ore remaining above the 3rd through new raises coming up from the 4th level.

Early in the summer of 1934 we put up a new raise from the east end of the main 4th level footwall drift and cut out a new sub at the 820 ft. elevation. When the sub-level drift reached a point 220 ft. east of the top of the new raise, a second raise was started towards the 3rd level. This latter raise will eventually hole in the third crosscut east of the Section 6 shaft on the third level, which will make it possible to take all the ore now being mined by Nos. 1 and 9 direct to the 4th level.

On the main 4th level No. 16 contract extended the new footwall rock drift to a point 50 feet east of the 3600 East coordinate line. Two cut outs were also made for two new raises, one on the 3600 East coordinate line and the other 100 ft. further west.

b. Stoping:

Eleven gangs were employed mining ore from April to the end of the year. Four of these contracts worked above the 3rd level from April to September, but during the last four months of the year we had only two gangs above the 3rd. The balance of the contractors worked in the Main Deposit between the 3rd and 4th levels.

When operations were resumed in April, the Sales Department had us scheduled for 80,000 to 85,000 tons of Silica to be mixed with other ores as a cheap ore for the Otis Steel Company. There was some hesitation on our part as to whether or not we could produce that much Silica of a satisfactory grade during the 1934 shipping season. With that heavy a Silica schedule we started out with the idea of producing at least 400 tons a day, which we assumed would take five gangs. One contract was placed in the centre of the old Lloyd Mine workings a short distance above the 3rd level, in the hopes that we could draw some low phosphorus Silica from the old mat. After working here a short time we gave up because the hanging material was too coarse and lean.

Four other contracts were placed between the 3rd and 4th levels along the slate footwall. Two of these, Nos. 5 and 7, were spotted southeast and southwest of the Section 6 shaft, while two more, Nos. 13 and 14, were placed in the extreme west end of the orebody, one in the northwest corner and the other in the southwest corner of the Main Deposit. Along towards the latter part of the summer it appeared that the Sales Department would not need so much Silica, so No. 5 was stopped and the drawing of Silica confined to three gangs. When the ground movement started above the 3rd level, No. 7 contract was stopped and then for the balance of the year Silica was produced by only two contracts, Nos. 13 and 14, and at times in December only one gang produced the low grade

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7. UNDERGROUND:
(Continued)

b. Stoping: (Cont.)

ore. In December we also attempted to stock some low phosphorus Silica separately, but we are having a hard time trying to keep the phosphorus below .100.

In the Main Deposit above the 3rd level in the extreme east end, two contracts, Nos. 1 and 9, sub-level stoped most of the available ore down to the 1060 ft. sub-level. Contract No. 3 between April and September also stoped along the slate footwall between the 990 ft. sub-level and the fourth main sub. They removed quite a block of ore during the summer months.

In the area between the 3rd and 4th levels in the central portion of the Main Deposit, six gangs, Nos. 6, 7, 8, 10, 11 and 12, sliced out ore, most of it coming from the 800, 810 and 820 ft. sub-levels. On the latter sub-level most of the ore pillar between the 3200 and 3400 East coordinate lines was sliced out. A start was also made on the pillar directly south of old No. 19's sub-level stopes. All of the 810 ft. sub between the 3100 and 3300 East coordinate lines was sliced out and a good start made on the 800 ft. sub underneath the mined out area on the 810 ft. elevation.

It might be interesting to compare the tons per man stoping for the past year with previous years, keeping in mind, of course, that the figures for 1932 and prior years are for the Morris-Lloyd Mine.

<u>Year</u>	<u>Tons per Miner</u>
1920	9.27
1921	10.20
1922	13.82
1923	15.54
1924	15.67
1925	17.10
1926	17.33
1927	17.46
1928	20.26
1929	23.29
1930	23.75
1931	23.94
1932	22.17
May 1934	24.06
June "	25.96
July "	25.14
Aug. "	26.10
Sept. "	24.23
Oct. "	20.83
Nov. "	19.58
Dec. "	22.26
Avg. for 1934	22.86

It will be noted that we had several very good months and the drop first showing up in September coincides with the heavy ground movement, which crushed some of our working places. Things began to improve in December and our results are better again. The loss of the overrun during the stocking season makes our figures at least 10% less than they would be if we were shipping all the product hoisted.

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7. UNDERGROUND:
(Continued)

c. Timbering:

The timbering cost for 1934 was the lowest per unit for a great many years due largely to two reasons. One that we used only new stull timber that was newly cut and the second because all the Silica was mined without the use of timber. We also stoped a small proportion of the Lloydale ore produced.

This low cost was possible despite the unusual timbering expense due to ground movement. We had to timber up all the main third level footwall drift near the Section 6 shaft. The top subs close to the hanging all had to be retimbered and several raises repaired.

A perusal of the statement that follows shows the comparative cost for the past ten years.

Statement Showing Timber Used for Year 1934:

	Lineal Feet	Avg. Price Per Foot	Amount 1934	Amount 1932
6" to 8" Timber	35,859	.398	1,427.55	580.48
8" to 10" "	7,341	.061	447.26	984.53
10" to 12" "	10,213	.080	817.06	770.07
12" to 14" "	3,087	.093	285.82	556.32
Total Timber 1934	56,500	.053	2,977.69	2,891.40
Total Timber 1932	41,678	.069	2,891.40	
		Per 100 Ft.		
5 Ft. Lagging	1,700	.797	13.54	211.00
7 " "				1,125.46
8 " "	40,973	.830	340.07	114.43
Total Lagging	42,673	.828	353.61	1,450.89
3-1/2" Poles	113,128	1.50	1,696.94	1,611.79
Wire Fencing - 110 Rods				93.54
Total Poles & Fencing			1,696.94	1,705.33
Total Lagging, Poles & Fencing for 1934	155,801	1.31	2,050.55	3,156.22
Total Lagging, Poles & Fencing for 1932	317,006	.99		3,156.22
Product - Tons			122,806	82,876
Feet of Timber per Ton of Ore			.460	.503
Feet of Lagging per Ton of Ore			.347	2.506
Feet of Lagging per Foot of Timber			.755	4.985
Cost per Ton for Timber			.0242	.0349
" " " " Lagging			.0029	.0175
" " " " Poles & Fencing			.0138	.0205
" " " " All Timber			.0409	.0729
Equivalent of Stull Timber to Board Measure			92,387	78,936
Feet of Board Measure per Ton of Ore			.752	.952

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YEAR 1934

7. UNDERGROUND:
(Continued)

c. Timbering:

Statement Showing Timber Used for Year 1934:

<u>Cost of Timber, Lagging, Poles & Fencing</u>	<u>Cost Per Ton</u>	<u>Amount</u>
Year 1934	.0409	5,028.24 Opt. 9 Mos.
" 1932	.0729	6,047.62 " 5 "
" 1931	.0747	28,098.93
" 1930	.0729	33,914.29
" 1929	.0687	29,885.05
" 1928	.0777	27,690.94
" 1927	.0857	27,993.33
" 1926	.0752	21,787.65
" 1925	.0666	17,701.50

d. Drifting and Raising:

The footage drifted and raised in 1934 was comparatively small. Only two new raises were put up in ore, one by No. 4 from the 4th to the 820 ft. sub-level, a vertical distance of 80 ft; a second raise by No. 15 in ore went up from the 820 to the 900 ft. sub. The only rock or ore drifting was on the main 4th level, where 274 ft. of rock drift was driven at a cost of \$ 11.48 per foot.

All of the development work during 1934 on the new fifth level was really cutting plat and not primarily rock drifting.

e. Explosives:

We discovered back in 1931 that when we first tried Gelamite or bulk powders that money could be saved on powder when breaking ore, but that Gelamite actually cost more per foot for a rock drift than Gelatine. For that reason you will find 60% Gelatine used on our Rock Development statement for 1934. The first part of the explosives statement which follows shows a cost of \$.049 per ton for powder for breaking ore only and for sake of comparison we show other years for the entire Morris-Lloyd Mine.

<u>Year</u>	<u>Cost per Ton for Powder</u>	<u>Lbs. Powder per Ton of Ore</u>
1934	.049	.418
1932	.064	.509
1931	.059	.461
1930	.058	.431
1929	.075	.451
1928	.085	.473
1927	.089	.500

In the second part of the statement you will find the cost for powder per foot for the rock drifts less in 1934 than in 1932. In 1932 Gelamite LX was used in all rock drifts and raises.

LLOYD MINE
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YEAR 1934

7. UNDERGROUND:e. Explosives:

Statement of Explosives Used for Breaking Ore, Rock Development and Developing Lloyd 6th Level for Year 1934:

<u>BREAKING ORE:</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1934</u>	<u>Amount 1932</u>
Gelamite Powder No. 2	50,050#	11.77	5,892.65	
Gelatin 60%	1,350#	12.06	162.89	
Total Powder	51,400#	11.78	6,055.54	5,286.65
Fuse - Ft.	154,928	5.70M	883.17	818.06
Blasting Caps	27,319	11.15M	304.62	301.67
Fuse Lighters	1,600	6.72M	10.76	9.45
Total Fuse, Caps, Etc.			1,198.55	1,129.18
Total All Explosives			7,254.09	6,415.83
Product - Tons			122,806	82,876
Pounds Powder Per ton of Ore			.418	.509
Cost per Ton for Powder			.049	.064
Cost per Ton for Fuse, Caps, Etc.			.010	.014
Cost per Ton for All Explosives			.059	.078
<u>DEVELOPMENT IN ROCK:</u>				
Gelamite Powder No. 2	200#	11.75	23.50	3,058.88
Gelatin 60%	13,425#	12.00	1,611.00	
Total Powder	13,625#	12.00	1,634.50	3,058.88
Fuse - Ft.	16,490	5.70M	94.00	290.96
Blasting Caps	2,810	11.15M	31.48	73.87
Fuse Lighters	600	6.72M	4.05	8.10
Electric Fuses	300	10.00	30.15	
Total Fuse, Caps, Etc.			159.66	372.93
Total All Explosives			1,794.16	3,431.81
Feet - Rock Drifting			743	1,273
Cost per Foot for Powder			2.200	2.403
Cost per Foot for Fuse, Caps, Etc.			.215	.293
Cost per Foot for All Explosives			2.415	2.696
<u>SINKING SHAFT:</u>				
Gelatin 60%	4,650#	12.25	569.63	
Total Powder	4,650#	12.25	569.63	
Fuse - Ft.	300		1.80	
Blasting Caps, Electric	2,025	12.57	254.48	
Leading Wire	3,250	.05	16.25	
Total Fuse, Caps, Etc.			272.53	
Total All Explosives			842.16	
Grand Total Explosives Used in Mine			9,890.41	9,913.42
Cost per Ton All Explosives Used			.081	.120
Average Price per Pound for Powder			.1185	.1250

LLOYD MINE
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YEAR 1934

7. UNDERGROUND:
(Continued)

f. General Underground:

Ground movement involving all the levels above the main 3rd level gave us some cause for worry last August. We had mined a considerable tonnage, approximately 1,150,000 tons, the last ten years without any noticeable settlement on surface. The Lloyd Mine East orebodies dip very steeply so that quite a large tonnage of ore can be mined without undercutting any great horizontal extent of hanging. It has been obvious for sometime that the capping was not settling over our mining contracts and we were not concerned because there was no water backed up nor any possible chance for a run of quicksand because the old open pit to the east of the Section 6 shaft drained all the area above the ledge. The main orebody is U-shaped pitching very flat to the west and as we gradually mined down along the south dike and the north slate footwall, we gradually took the props out from underneath the projecting finger of hanging. This hanging started to break away below the 3rd level and as we have a series of dikes cutting through the footwall northeast and southwest between the orebody and the shaft, huge blocks of footwall started to slide off the dike or fault contacts. The movement was progressively less as you approached the shaft. For two months this movement kept up, but practically ceased in November without involving the Section 6 shaft. There were a series of cracks in the footwall 50 or 60 feet south of the shaft on the 1st, 2nd, 3rd and 4th main subs, but no noticeable movement.

Inasmuch as we had contracts Nos. 1, 2, 3 and 9 working above the main 3rd level, and because their only way of egress from their working places was through drifts that showed pressure due to ground movement, we decided while the hanging was settling to take these miners out of their working places, which, of course, hurt our production in September and October and partially in November. Underground conditions did not become normal again until December.

Now that the settlement has ceased, it would appear that all the openings over the workings have been filled and that the Section 6 shaft is safe for sometime. Eventually ground movement will recommence as we continue mining and prior to that time we should have a new dry built east of the Lloyd shaft because in two years time all the miners for the sake of convenience and to save time ought to be transferred to a new dry closer to their working places.

As said before the ground movement was not only inevitable but desirable because no mine operating with the caving system is being operated properly unless the hanging or back is settling gradually, closing all voids over the working places.

LLOYD MINE
ANNUAL REPORT
YEAR 1934

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1934</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	122,806	82,876	39,930	
Underground Costs	.769	.994		.225
Surface Costs	.189	.174	.015	
General Mine Expenses	.217	.308		.091
COST OF PRODUCTION	1.175	1.476		.301
Depreciation	.070	.120		.050
Taxes	.137	.539		.202
Loading & Shipping	.024	.010	.014	
TOTAL COST AT MINE	1.426	1.959		.533
No. of Days Operating	197	44	153	
No. of Shifts & Hours	1-8	1-8		
Average Daily Product	623	1,884		1,261

Note: 1934 costs are for Lloyd Mine only.
1932 costs are for Morris-Lloyd Mine.

It might be interesting to note that the average wages paid in 1932 were about 5% lower than the average for 1934.

It seems rather futile to compare in detail some of the 1934 costs with those for 1932 because conditions for the Lloyd Mine alone are so different from those for the combined Morris-Lloyd Mine and for that reason I am only picking out certain items for comparison.

DEVELOPMENT IN ROCK:

	<u>Labor Cost</u> <u>per Foot</u>	<u>Supplies</u> <u>per Foot</u>	<u>Total</u>
Year 1934	\$ 7.13	\$ 4.35	\$ 11.48
" 1932	4.32	3.49	7.81
" 1931	5.04	3.66	8.70
" 1930	6.31	4.11	10.42

Cost for 1934 higher than 1932 or 1931 because the 4th level rock drift had to be timbered, which is not true of the usual run of rock drifts. The formation in this new drift stood on end and followed closely along the south foot, giving us a lot of loose slabby ground in the back.

STOPPING:

Detailed costs for the years 1934 and 1932 follow:

	<u>1934</u>		<u>1932</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies	1,286.85	.015	562.72	.007
Iron & Steel	255.30	.002	86.78	.001
Oil & Grease	72.02	.000	49.36	.001
Machinery Supplies	275.41	.002	797.27	.009
Explosives	6,982.87	.057	4,593.88	.055
Electric Power	83.66	.001	318.58	.004
Sundries	501.21	.004		
Shop Expense			308.24	.004
Total Supplies	9,997.32	.081	6,716.83	.081

LLOYD MINE
ANNUAL REPORT
YEAR 1934

8. COST OF
OPERATING:
(Continued)

STOPPING: (Cont.)

	1934		1932	
	Amount	Per Ton	Amount	Per Ton
Pay Roll Labor	29,274.50	.238	18,775.17	.227
Shop Expense & Trucking	1,090.26	.009	839.13	.009
Total Labor	30,364.76	.247	19,614.30	.236
Grand Total	40,362.08	.328	26,531.13	.317

PUMPING:

Mine water is now and has been for two years pumped for us by the Inland Steel Co. Weirs placed in the ditches on the 4th and 6th levels are read each day, and at the end of the month the quantity of water calculated, and we pay whatever proportion this water is of the total pumped. There is no doubt but that the arrangement is the cheapest that can be devised for both companies. The following table shows what we have paid the Inland Co. the last two years and also shows how we are now paying a larger proportion of the total expense following the ground movement. No better evidence can be shown of the fact that the hanging is cracked and that water now finds its way underground from a larger area than before. The statement was made previously in this report that the damage from a run of quicksand or water was nil because the old open pit drained the surface, which is still true, but the elevation of the ledge rock in the pit is higher than the ledge farther west as we approach the swamp south of the Morris Mine and there is undoubtedly some water of a shallow depth to the west of the old pit that could not flow over the rim. We are now draining off that water.

The following table shows the pumping expense for the last two years:

Statement of Pumping Expense: Year 1933:
Inland Steel Co. G.C.I. Co.

	Inland Steel Co.		G.C.I. Co.		Current Drinking Water Supply	1933 Total
	Amount	Percent	Amount	Percent		
January	397.46	34.00	744.35	66.00	154.15	898.50
February	679.48	60.00	452.98	40.00	190.82	643.80
March	723.96	55.00	592.34	45.00	92.28	684.62
April	723.96	48.00	789.83	52.00	143.01	932.84
May	812.62	45.00	980.25	55.00	198.81	1,179.06
June	550.54	37.25	927.39	62.75	164.67	1,092.06
July	667.58	46.70	761.88	53.30	178.13	940.01
August	709.68	50.69	690.39	49.31	172.12	862.51
September	609.86	46.89	690.63	53.11	166.59	857.22
October	689.73	53.37	602.61	46.63	155.06	757.67
November	764.04	56.12	597.34	43.88	154.50	751.84
December	739.53	58.19	531.30	41.81	150.51	681.81
Total	8,068.44	49.11				
As per Cost Sheet			8,361.29	50.89	1,920.65	10,281.94

LLOYD MINE
ANNUAL REPORT
YEAR 1934

8. COST OF OPERATING:
(Continued)

Statement of Pumping Expense: Year 1934:

	<u>Inland Steel Co.</u>				<u>C.C.I. Co.</u>	
	<u>Amount</u>	<u>Percent</u>	<u>Amount</u>	<u>Percent</u>	<u>Current Drinking Water Supply</u>	<u>1934 Total</u>
January	702.65	54.11	595.98	45.89	151.84	747.82
February	703.66	57.43	521.52	42.57	142.57	664.09
March	685.14	53.28	600.89	46.72	142.57	743.46
April	647.68	43.02	857.76	56.98	144.67	1,002.43
May	571.09	31.70	1,230.69	68.30	169.53	1,400.22
June	566.38	40.10	846.06	59.90	130.04	976.10
July	661.31	45.80	782.56	54.20	129.00	911.56
August	718.43	46.47	827.58	53.53	122.70	950.28
September	627.95	47.01	679.95	51.99	121.02	800.97
October	616.72	47.52	680.97	52.48	105.87	784.84
November	532.20	39.45	816.98	60.55	87.26	904.24
December	416.35	30.75	937.82	69.25	89.85	1,027.67
Total	7,449.56	44.27				

As per Cost Sheet 9,378.76 55.73 1,534.92 10,913.68

It will be noted that for 1934 the C.C.I. Co. paid 55.73% of the total pumping expense compared with 50.89% in 1933 and that our proportion for the fall and early winter months is increasing rather than decreasing.

ELECTRIC TRAM EQUIPMENT:

No attempt will be made to compare the present electric haulage set-up with what it was two years ago and the following table shows the detailed cost for 1934 only.

Operating:

<u>Labor:</u>		
Motormen and Brakemen		\$ 4,828.90
Chutemen		1,987.17
Total Labor		\$ 6,816.07
<u>Supplies:</u>		
General		\$ 22.30
Oil and Grease		39.03
Electric Power		1,447.46
Total Supplies		\$ 1,508.79
Total Operating		\$ 8,324.86

Maintenance:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Generator and Dynamo	\$ 38.15	\$ 84.74	\$ 122.89
Locomotives	293.60	1,426.28	1,719.88
Wiring	92.41	129.54	221.95
Main Line Tracks	139.48	344.47	483.95
Main Line Cars	189.06	225.75	414.81
Total Maintenance	\$ 852.70	\$ 2,210.78	\$ 2,963.48

Grand Total Operating & Maintenance \$ 11,288.34

LLOYD MINE
ANNUAL REPORT
YEAR 1934

8. COST OF
OPERATING:
(Continued)

ELECTRIC TRAM EQUIPMENT: (Cont.)

It will be noted that we seem to have a high supply cost under locomotives, but that is due to purchasing a second-hand locomotive from the Mesabi Range equipment stored in Ishpeming for \$ 900.00.

HOISTING:

Because of the fact that in 1934 we only operated the Lloyd and Section 6 Shaft engine houses, whereas in the last year in which we produced ore, viz., 1932, three engine houses were in commission, but only for five months, no cost comparison will be made.

Expenses for 1934 follow:

Maintenance	\$ 2,319.95
Operating Engineers	2,311.58
" Heating Labor	34.92
Total Labor	2,346.50
Oil and Waste	33.38
Tools	68.11
Electric Power	4,345.41
Heating Expense	86.68
Total Supplies	4,533.58
Total Labor & Supplies	6,880.08
Total Maintenance & Operating	9,200.03
Tons of Rock and Ore Hoisted	131,878
Average Depth Hoisted	837 Ft.

COMPRESSORS AND AIR PIPES:

Cost of operating compressors for 1934 follows:

Maintenance	\$ 344.58
Operating Labor	500.32
" Supplies & Tools	24.92
" Water	180.00
" Electric Power	4,279.35
" Oil & Waste	31.43
" Heating Expense	57.71
Total Supplies	4,573.41
Total Labor & Supplies	5,073.73
Total Maintenance & Operating	5,418.31
Cost per 1000 cu. ft.	.046
Cu. ft. of Air Compressed	116,847,000

The labor and supply cost on air pipes was \$ 1,419.16 for the year. We spent \$ 2,527.06 on power drills, most of which was for the new African Dustless Type drills used in the rock drifts. Two new Ingersoll-Rand N-75's and two new Cleveland D9's were added to the Lloyd Mine equipment during 1934.

LLOYD MINE
ANNUAL REPORT
YEAR 1934

8. COST OF OPERATING:
(Continued)

DRY HOUSE:

For the first half of the year all the underground men changed at the Morris Mine dry, but during the other months our own dry at Section 6 was in commission. As mentioned previously in this report we can operate our dry much cheaper than the rental we paid the Inland Steel Company.

SHAFT:

For some unaccountable reason the gauge of the Lloyd shaft cageroad was an inch less than standard from surface down to the 4th level and during the latter part of 1934 we moved all the runners back to standard gauge. In order to do this, however, it was necessary to move the casing planks on both sides of the cageroad in between the dividers. The two-inch casing planks formerly were spiked onto the outside of the dividers and by moving them in between, the width of the compartment was increased by four inches. This proved to be quite a job, as only four sets could be finished in a shift, and we had 1200 feet of shaft to be remodeled.

MINE BUILDINGS:

Very few repairs were undertaken during the year, only those absolutely necessary being made. An amount of \$ 588.97 was spent on the Lloyd shaft house, most of which was changing and rebuilding the skiproad and runners from surface up to the dump.

Some expense was also incurred at the engine house due to putting in new machinery. The woodwork was painted, roof repaired, double windows put on the basement windows and toilets and cess-pool provided.

At the Section 6 dry our cost sheet shows quite a heavy expenditure, \$ 2,072.93, rehabilitating the building, but quite a lot of this money is merely a bookkeeping transfer. Every piece of equipment installed, lockers, heaters, pumps, boiler, showers, etc. was old second-hand material lying idle at the General Storehouse.

10. TAXES:

The following table shows the taxes paid in Ishpeming Township for the past two years:

	Lloyd & Sec. 6:	1934		1933	
		Valuation	Taxes	Valuation	Taxes
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 6-47-27	41.00A)				
S $\frac{1}{2}$ of SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of 6 "	282.93A)	945,000	16,572.56	515,000	8,685.57
Personal-Supplies & Equipment		400,000	7,015.00	600,000	10,120.01
S $\frac{1}{2}$ of NE $\frac{1}{4}$ of Sec. 6-47-26	80.00A	320	5.60	320	5.40
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of " "	40.00A	350	6.15	350	5.91
SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of " "	40.00A	575	10.09	575	9.71
Total		1,346,245	23,609.40	1,116,245	18,826.60
Collection Fees			236.10		188.27
Total Lloyd			23,845.50		19,014.87

LLOYD MINE
ANNUAL REPORT
YEAR 1934

10. TAXES:
(Cont.)

	<u>1934</u>	<u>1933</u>
Product	122,806	0
Taxes per Ton of Production	.1941	
Shipments - Tons	191,327	406,828
Taxes per Ton Shipped	.1246	.0467

Taxes for 1934 are a little higher due to increased valuation and because the rate is a little higher due to imposing School Debt Service Tax covering transportation of high school pupils and insurance premiums.

The following table shows the taxes levied on the North Lake dwellings:

	<u>1 9 3 4</u>		<u>1 9 3 3</u>	
	Valuation	Taxes	Valuation	Taxes
Houses on Sec. 6, G.C.I. Co.	40,500	710.27	40,500	689.93
" " " 6, Inland Steel Co.			4,500	76.67
Collection Fees		7.10		7.67
Total Dwellings	40,500	717.37	45,000	774.27
Total Ishpeming Township Rate	1,386,745	24562.87	1,161,245	19789.14
		1.754		1.687

The taxes raised in Ishpeming Township for the past four years are shown in the following table:

	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>
State Tax	1,000.85	856.64	5,095.48	6,248.24
County Tax	10,726.95	8,945.65	11,179.47	12,818.94
County Road Tax	862.29	745.51		3,930.50
Township Contingent Tax	2,931.95	2,535.18	3,000.00	3,000.00
Highway Improvement Tax			1,000.00	1,000.00
Road Repair Tax			5,500.00	7,000.00
School Tax	10,348.05	8,947.68	13,497.36	16,301.23
One Mill Tax			1,502.64	1,693.77
Rejected Tax	20.22	104.80	3.88	4.96
County Debt Service Tax	463.70	2,020.32		
Township Debt Service Tax	1,100.00	1,100.00		
School Debt Service Tax	2,811.93			
TOTAL	30,265.94	25,255.78	40,778.83	52,002.64
RATE	17.55	16.87	27.14	30.70

11. ACCIDENTS
AND
PERSONAL
INJURIES:

The accident record for the past four years follows:

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

We had eighteen slight accidents, but in none of these instances did the men lose any time.

LLOYD MINE
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13. EQUIPMENT:

Considerable equipment was added to the Lloyd Mine inventory, but very little actual cash was involved in the purchase. We acquired (4) 15 H.P. Sullivan electric scraper-hoists; (1) oil switch and (2) transformers; (1) 500 H.P. induction motor; (1) underground locomotive; (14) RB-12 drilling machines; (1) White truck and (1) chemical fire cart, all of which were second-hand coming from the Wade, Armour, Republic and Negaunee Mines.

Furthermore the Section 6 dry was furnished with lockers, pumps, showers, heaters, etc., all second-hand from other properties.

The only new equipment purchased were (4) African Dustless Type drifting machines and (1) new 50-Hole blasting machine.

14. MAINTENANCE
AND
REPAIRS:

Following is a detailed statement showing maintenance costs for the North Lake Location:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Repairs to Fire Hydrants	\$ 6.28	\$ 5.56	\$ 11.84
Repairs to Water Mains	174.15	401.31	575.46
Removing Snow and Ice	61.35	3.28	64.63
Fire Protection	20.89	200.05	220.94
Cleaning Alleys	604.35	7.58	611.93
Cleaning Out-Houses	120.00		120.00
Fencing	65.49	24.30	89.79
Water	13.74	1216.71	1230.45
T O T A L	\$ 1066.25	\$ 1858.79	\$ 2925.04

To the above is added a proportion of the policeman's time amounting to \$ 1046.08, which makes the grand total of the maintenance expense foot up to \$ 3971.12.

The repair bill on the houses is larger this last year than it was for the past three years due to lack of repairs during those years. It is obvious that you cannot let houses go year after year without doing some repairs. In 1934 a total of \$ 2600.78 was spent repairing chimneys, porches, siding, interior decorating, etc.

The following table shows comparative costs for the past few years:

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

Back in the years prior to 1931 from \$ 5000 to \$ 9000 a year was spent on repairs to houses. To show what condition our houses are really in, I can refer to the seven that the Inland Steel Company bought from us and which they fixed up this last year. From information that I received from the Inland officials \$ 500.00 per house was expended in 1934 to put them in first-class shape. We spent \$ 2600.78 on (121) dwellings or an average of about \$ 21.60 per house.

Our repairs in 1934 were almost entirely confined to chimneys, porches, steps and some repairs to plastering. Of course, all the tenants received paint and kalsomine.

LLOYD MINE
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18. NATIONALITY
OF
EMPLOYEES

Finnish.....	62
French.....	29
English.....	14
Italians.....	29
Scandinavians.....	10
Austrian.....	1
German.....	<u>1</u>
Total.....	146

MORRIS MINE

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1. GENERAL:

The Inland Steel Company continues to operate the Morris Mine. For the first four months of the year they operated on a schedule of what is equivalent to three days per week, but beginning with the first of May production was stepped up to the equivalent of four days a week. In October there was a little curtailment, but in December the Chicago Office informed the Ishpeming officials that production could be increased again.

One of the most noticeable things about the year's production is the high percentage of siliceous ore. It will be remembered that when the Inland Steel Co. first considered taking a lease on the Morris Mine they seemed to be concerned about the possibility of their steel works at Indiana Harbor consuming Silica, if as much as 10% of the total product from the Morris Mine would be off grade ore. It is apparent from the way they were asked to produce Silica, particularly during the shipping season, that their fears were unwarranted because during the entire year they produced nearly three times the minimum that they thought they could handle when they first took over the property.

Shipments from the property were very heavy, there being very little ore in stock at the end of the shipping season.

A project looking towards the improvement of the air circulation underground was started, which involves a great deal of rock raising. I have an idea that when this program is finished it will also help conditions in the Lloyd Mine, because at the present time at the Lloyd Mine we have great difficulty during the winter months keeping our shaft upcast, and it would seem reasonable to suppose that if all the downcast air in the Morris Mine goes down this new raise that there will be a tendency to make the air current in the connecting drifts between the Morris and Lloyd Mines head towards the Lloyd shaft instead of from the Lloyd shaft.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

The following is the production for the year 1934:

<u>Grade</u>	<u>Tons</u>	<u>% of Product</u>
Morris Standard Ore	125,634	72.5
Morris Siliceous Ore	47,635	27.5
T O T A L	173,269	100.0

The production from the fee lands and Chase Leases for 1934 is divided as follows:

	<u>Morris Standard Tons</u>	<u>Morris Siliceous Tons</u>	<u>Total Tons</u>	<u>% of Total</u>
Chase Leases	95,558	33,726	129,284	74.6
C.C.I. Co.'s Fee Lands	30,076	13,909	43,985	25.4
T O T A L	125,634	47,635	173,269	100.0

MORRIS MINE
ANNUAL REPORT
YEAR 1934

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

a. Production by Grades: (Cont.)

The following table compares this year's output with that of 1933:

<u>Grade</u>	<u>1934</u> <u>Tons</u>	<u>1933</u> <u>Tons</u>
Morris Standard Ore	125,634	105,441
Morris Siliceous Ore	47,635	20,755
T O T A L	173,269	126,196
Increase for 1934	47,073	

The figures that follow show the production from the Chase Leases and C.C.I. Co.'s fee lands for 1933 and 1934:

	<u>1934</u> <u>Tons</u>	<u>1933</u> <u>Tons</u>
Chase Leases	129,284	103,487
C.C.I. Co.'s Fee Lands	43,985	22,709
T O T A L	173,269	126,196

It will be noted from the above figures that the production of ore from the fee lands has almost doubled compared with 1933.

b. Shipments:

Shipments for the year 1934 follow:

<u>Grade</u>	<u>1934 Tons</u>
Morris Standard Ore	110,956
Morris Siliceous Ore	45,565
T O T A L	156,521

Shipments for the last two years follow:

<u>Grade</u>	<u>1934</u> <u>Tons</u>	<u>1933</u> <u>Tons</u>
Morris Standard Ore	110,956	63,255
Morris Siliceous Ore	45,565	13,300
T O T A L	156,521	76,555

It will be noted from the foregoing figures that the shipments for 1934 although twice as large as they were in 1933, still did not total as much as the mine production.

c. Balance on Hand:

The amount of ore in stock at the Morris Mine on Dec. 31st, 1934 was as follows:

Morris Standard Ore	56,864 Tons
Morris Siliceous Ore	9,525 "
T O T A L	66,389 "

This compares with a total of 49,641 tons in stock on Dec. 31st, 1933.

MORRIS MINE
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YEAR 1934

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

e. Production by Months:

<u>Month</u>	<u>Morris</u>	<u>Morris</u>	<u>Total</u>
	<u>Standard</u>	<u>Siliceous</u>	
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
January	8,697	3,926	12,623
February	9,048	3,562	12,610
March	10,440	1,564	12,004
April	10,440	1,545	11,985
May	9,553	4,448	14,001
June	8,806	6,760	15,566
July	7,709	7,725	15,434
August	6,835	9,975	16,810
September	14,591	1,742	16,333
October	14,123	1,314	15,437
November	13,252	2,180	15,432
December	12,140	2,894	15,034
T O T A L	125,634	47,635	173,269

3. ANALYSIS:

Analysis of Morris Standard Ore Shipped:

<u>Month</u>	<u>Tons</u>	<u>Iron</u>	<u>Moisture</u>	<u>Iron</u>
		<u>Dried</u>		<u>Natural</u>
May	528	58.32	10.54	52.17
June	2,157	56.61	9.71	51.11
July	6,640	58.14	9.60	52.56
August	25,919	58.39	9.86	52.63
September	38,253	58.49	9.80	52.76
October	37,459	58.72	9.71	53.01
T O T A L	110,956	58.55	9.98	52.71

Analysis of Morris Siliceous Ore Shipments:

<u>Month</u>	<u>Tons</u>	<u>Iron</u>	<u>Moisture</u>	<u>Iron</u>
		<u>Dried</u>		<u>Natural</u>
January	490	53.30	9.87	48.04
February	442	51.30	9.13	46.61
May	7,572	52.08	10.08	46.83
June	12,032	50.86	9.68	45.93
July	11,580	51.66	9.55	46.72
August	12,583	50.95	9.01	46.36
September	866	51.12	9.28	46.38
T O T A L	45,565	51.31	9.52	46.43

Analysis of Ore in Stock:

<u>Grade</u>	<u>Tons</u>	<u>Iron Dried</u>	<u>Phos.</u>
Morris Standard Ore	56,864	59.07	.064
Morris Siliceous Ore	9,525	51.25	.057

MORRIS MINE
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YEAR 1934

6. SURFACE:

Mine Office:

The old change-room in the southwest corner of the mine office was remodeled to make room for a laboratory. Upstairs on the second floor on the south side of the building a room was partitioned off and the apparatus used in connection with the dust count survey underground was installed in this room. A new steam and water line was also run into the building early in the spring.

Drainage Ditch:

The work on the drainage ditch was practically completed last year, but the finishing up of the concrete tunnel between the mine buildings and the rock pile was deferred until the warm weather came on in the spring of 1934.

In the month of April because of the large amount of snow in the woods melting very suddenly, this tunnel was found inadequate to take care of the water that was attempting to flow through it and the bridge on the L.S. & I. Ry. west of the Morris shaft narrowly escaped being washed out. It required very quick and strenuous work on the part of a large section crew to dump enough rock in the creek at this point to save the bridge.

Fire Pump:

During the month of May the suction of the fire pump, which had been out of commission for about five months, was hooked up so that we could use it in the case of an emergency. A new six-inch suction line was run along the north side of the machine shop and then south between the shops and the steel warehouse to the drainage ditch. A small shaft was sunk on the north side of the drainage ditch to provide a sump, into which the suction of the fire pump runs. Another pipe about eight inches in diameter runs out of the side of the sump into the bottom of the drainage ditch and a small dam was built in the ditch to raise the level of the water high enough to make it possible to fill the sump with the eight-inch line. All of the sewage from the dry, shop buildings and office now runs into a new sewer line, which empties into the drainage ditch quite a distance east of this sump, the idea being to prevent pollution of the water in the ditch that runs into the sump because the fire pump pumps into the same mains that furnishes the location with drinking water. In order to prevent any pollution from the discharge of the underground mine pumps, a twelve-inch spiral riveted pipe runs all the way from the Morris shaft down through the concrete launder and empties its water to the east of the sump mentioned above.

Ventilation Project:

A small temporary wooden shaft-house was built over the site of the proposed ventilation shaft on the ledge outcrop north of the drainage ditch a short distance southeast of the mine office. A shaft 6 ft. by 11 ft. in size was sunk 51 feet.

Mine Location:

In the mine location the Inland Steel Company spent considerable money on the seven houses, which were turned over to them by our Company. Stone foundations have been put under all the houses, which were raised, repaired and painted. I would estimate conservatively that the Inland Steel Co. spent at least \$ 1000.00 on each individual dwelling.

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YEAR 1934

6. SURFACE:
(Cont.)

Engine House:

The small Ingersoll-Rand air compressor was moved from the Morris Mine over to the Greenwood property during the year.

7. UNDERGROUND:

b. Development:

In 1933 the Inland Steel Co. did not do one single foot of rock drifting nor raising. Along about the middle of 1934 they decided to ventilate their underground workings by the means of a new air shaft raise and with that thought in mind a 6 ft. by 11 ft. raise was started on the 7th level and put up to the 6th. This raise is up in rock in the footwall and holes on the 6th level close to the bottom of a raise that our Company put up from the 6th to the 4th. Our raise, however, was only intended for a second outlet from the lower levels in the Morris Mine and was about only five feet in diameter. The Inland Co. stripped this raise from the 4th to the 6th and then started another raise on the 4th level, which is intended to hole in the bottom of the shaft mentioned previously in this report. At the end of the year this raise was up approximately 100 ft. above the 4th level.

c. Stoping:

Stoping operations were carried on in four deposits; No. 21 Deposit, which lies partially on our fee lands and Chase Lease No. 9; 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 lies east of Chase Lease No. 9 on the old Excelsior Iron Co.'s lands and the southwest end of which also runs across the boundary from the Chase Leases onto our lands to the south.

During the greater part of the year nineteen separate contracts were mining ore. Four of the gangs were in sub-level stopes and the balance of them were either sub-level slicing, using timber, or were driving the small dog drifts and raises preparatory to sub-level stoping. About 60% of the production of the mine comes from stopes, the other 40% coming from the regular sub-level slicing mining contracts. On the regular working days, that is, the days on which the entire crew is out, production runs from 200 to 210 cars each day, of which 120 cars comes from the sub-level stopes, it being the aim of the Inland management to keep four of these stopes constantly in operation. That means that actually four of the mining gangs are producing 60% of the ore. The general practice throughout the year has been to work the miners the first four days of the week, but to hoist on the fifth day, which is usually Friday unless there happens to be a holiday. On that day the raises are cleaned out and production averages 150 to 160 cars.

During the year considerable ore of siliceous grade was run from the sub-level stopes, practically all of it coming from No. 21 Deposit or "B" Deposit. Most of the Silica produced from No. 21 Deposit was taken from the C.C.I. Co.'s fee lands. This siliceous material broke fairly small, ran freely and a large tonnage could be hoisted each day without much expense.

Following is a detailed account of the work done by each contract:

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7. UNDERGROUND:
(Continued)

c. Stoping: (Cont.)

250 FT. SUB-LEVEL:

On Chase Lease No. 9 at the 250 ft. elevation No. 9 contract, which had been trying to find the connection between the Main Deposit and "B" Deposit, finally found the top of the ore about midway between these two deposits at the intersection of the 1600 West and 3600 South coordinate lines. They stoped out a very small area of ore directly under the hanging above this sub. For a while it looked as if the ore that No. 9 had followed would go all the way up to the 6th level where an old diamond-drill hole shows a considerable width of ore directly underneath the 6th, which up to the present writing has never been mined out either by our Company and the Inland Company because we have never been able to get under it from any of the existing workings.

230 FT. SUB-LEVEL:

At the 230 ft. elevation on Chase Lease No. 9 a drift was put in by No. 9 connecting their development raises at the intersection of the 1600 West and 3600 South coordinate lines. The stope mentioned on the sub above was also carried down to this elevation.

220 FT. SUB-LEVEL:

On the 220 ft. sub on Chase Lease No. 9 in No. 61 Deposit, contract No. 5 took out what little ore remained in the east end of No. 61 Deposit and then dropped down to the sub below.

210 FT. SUB-LEVEL:

Five contracts were employed at various times during the year on the 210 ft. sub-level. Mining operations were carried on both on the Excelsior Iron Co.'s lands and on Chase Lease No. 9 in No. 21 Deposit, No. 61 Deposit and "B" Deposit. There was also a very extensive development shown up between the Main Deposit and "B" Deposit.

In the extreme northeast corner of the sub No. 1 contract put up some raises and drove crosscuts in March outlining the ore area on the old Excelsior Iron Co.'s lands.

Over on the northwest side of the sub contracts Nos. 5 and 6 continue to sub-level slice and by the end of the year had taken out the major portion of the east end of No. 61 Deposit at the 210 ft. elevation.

In the southwest corner of the sub-level No. 11 contract continued their sub-level stope, which was started last year, mining out a bench nearly 50 ft. long and about 140 ft. wide, and a development drift about 150 ft. long was also driven southeasterly from the stope over towards the workings being opened up by No. 9. The latter contract outlined an ore area about 125 ft. long and 60 ft. wide midway between "B" Deposit and the Main Deposit.

190 FT. SUB-LEVEL:

Three contracts, Nos. 9, 11 and 27, were employed at this elevation, all of them on Chase Lease No. 9, two of them in "B" Deposit and the other trying to find the connection between "B" Deposit and the Main Deposit. On the extreme west side of the sub No. 11 stoped out quite an extensive area, while No. 27, which spent most of the year driving dog drifts and raises for No. 11 contract preparatory to stoping, developed an area about 140 ft. long and approximately 75 ft. wide to the east of No. 11's stope. No. 9 contract at the 190 ft. elevation merely drove a drift about 45 ft. long connecting their two exploring raises.

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YEAR 1934

7. UNDERGROUND:
(Continued)

c. Stoping: (Cont.)

170 FT. SUB-LEVEL:

Three contracts mined ore at this elevation, one of them, No. 1, being employed on the old Excelsior Iron Co.'s lands east of Chase Lease No. 9 in No. 21 Deposit, while Nos. 11 and 27 were over on the west side of the sub in "B" Deposit.

In No. 21 Deposit in the northeast corner of the sub No. 1 contract continued to drive northeast for another 140 ft. besides putting in two crosscuts about 75 ft. long. The total length of the ore developed by No. 1 is now almost 350 ft. east and west and 250 ft. of this is on our own fee lands. There is not any doubt but what there is going to be considerable new tonnage on our own lands in this particular area.

On Chase Lease No. 9 in "B" Deposit on the west side of the sub No. 11 contract stoped out a block of ground about 60 ft. long and 50 ft. wide on the north side of the horse of rock that splits "B" Deposit. On the south side a new stope was opened up, which by the end of the year was only about 15 ft. east and west and about 35 ft. north and south.

160 FT. SUB-LEVEL:

No. 2 contract, working in the top of the Main Deposit on our fee lands east of Chase Lease No. 9, finished sub-level slicing the small pillar left between the limit of mining established for No. 3 and the 1200 West coordinate line.

150 FT. SUB-LEVEL:

Over in the northwest corner of the 150 ft. sub considerable work was done in No. 61 Deposit. A new drift was run east and west parallel with the main footwall drift for about 225 ft. and then three sets of crosscuts were run north and south, the idea being apparently to make it possible to mine out the large block of ore that our Company left behind in order to protect the dams that were built following the Barnes-Hecker disaster in the raises running from the 4th to the 6th level. When it came to a question of mining out this block of ore the engineer representing the fee owners contacted our officials and we strongly advised against mining out this block of ore for three reasons.

First, there is plenty of other ore in the mine easily accessible that can be taken out; secondly, the main footwall drift will probably remain intact for a great number of years so that this block of ore could be mined out easily at some future time; thirdly, we did not believe it advisable to undermine the raises that have concrete plugs in them. The Inland Steel Co. took heed of our advice and as a result only radial sliced from the east side of the limit of mining established to protect the pillar above.

In the southwest corner of the sub-level we find No. 10 contract sub-level stoping along the south side of the horse of rock that splits "B" Deposit.

In the extreme top northeast corner of the Main Deposit on the old Excelsior Iron Co.'s lands contract No. 2 mined out all of the available ore between the limit of mining established between Nos. 2 and 3 and the crotch between the main foot and the dike on the south, and they also drove a drift northwesterly between their deposit and the main scraping transfer drift used by No. 1 contract. After going through a small seam of jasper at the south end of this crosscut, ore was encountered and the crosscut stayed in ore practically all the way over to No. 21 Deposit, showing that at this elevation there is a connection between the Main Deposit and No. 21 Deposit.

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YEAR 1934

7. UNDERGROUND:
(Continued)

c. Stoping: (Cont.)

130 FT. SUB-LEVEL:

At this elevation on Chase Lease No. 9 there was quite a lot of mining done on both sides of the horse of rock in "B" Deposit. No. 11's sub-level stope on the north side of "B" Deposit was stoped out along a line about 125 ft. east and west. The ore along the south side of the deposit was stoped out for a distance of about 180 ft. During the summer months when a large proportion of the Silica ore was hoisted, a great deal of it came from "B" Deposit, and in fact most of it was actually secured from the breaking down of this horse of rock between No. 10's stope and No. 11's stope.

In the southeast corner of "B" Deposit it will be noted that there is a full size drift running all the way from "B" Deposit over to the Main Deposit and at the 130 ft. elevation these two ore lenses join. This new drift was driven east for a distance of 200 ft. by No. 9 contract.

Up in the northeast corner of the sub another connecting drift will be noted joining the Main Deposit with No. 21 Deposit. This drift put in by No. 3 proved the joining up or connection between the orebodies on the north side of the sub. To put it another way, at this elevation there seems to be a continuous orebody along the main foot running for a distance of nearly 1200 ft. east and west. The developments proven by the Inland Company merely confirm what has been written repeatedly in the Morris Mine reports for the last eight or ten years, and that is, that we always believed that the various individual deposits, which we have been opening up in the Morris Mine above the 7th level, would eventually join at some lower elevation and form one large deposit that will reach from the slate footwall on the north over to the footwall dike on the south. We have also mentioned in previous reports that as the Morris Mine became deeper that on each succeeding level the ore area was twice as large as on the level above. History is going to again repeat itself because when the 8th level is finally fully developed its ore area is going to be considerably larger than the ore developed on the 7th.

110 FT. SUB-LEVEL:

Practically all the mining at this elevation is confined to the Main Deposit and up in the northeast corner of that deposit all of the ore between the slate and the dike between the old workings on Chase Lease No. 9 on the west side and the limit of mining established for Nos. 2 and 3 on the east side was taken out. In other words, a pillar of ore approximately 100 ft. square was radial sliced.

Up in the extreme northeast corner of the sub near the end of the year No. 1 contract also started a new scraping transfer drift, which is being driven North 55 degs. East in order to get under the ore discovered on the subs above on our fee lands.

100 FT. SUB-LEVEL:

In the Main Deposit on Chase Lease No. 9, No. 3 contract has mined out about half of the ore area at this elevation along the main dike.

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YEAR 1934

7. UNDERGROUND:
(Continued)

c. Stoping: (Cont.)

7TH LEVEL:

During 1934 a large tonnage of ore was mined in the extreme southwest corner of the 7th level, most of it coming from the C.C.I. Co.'s fee lands south of Chase Lease No. 9. Three separate stopes opened up by No. 25 contract took out a large tonnage. All of this ore came from the Main Deposit.

70 FT. SUB-LEVEL:

All of the mining at this elevation was along the south side of the Main Deposit and all of the ore mining was done by the sub-level stoping method, some of it coming from the fee lands to the south of Chase Lease No. 9, but a large tonnage also coming from Chase Lease No. 9. Most of this ore was taken out by two contracts, viz., Nos. 8 and 21. No. 21, as mentioned above, started three separate stopes, all of them being along the boundary or the dividing line between Chase Lease No. 9 and our fee lands. Two of these stopes were over on the east end in the crotch between the main dike and the vertical dike that runs east and west parallel with the boundary line, while the other stope, which is approximately 50 ft. east and west and 60 ft. north and south, was opened up at the intersection of the boundary line and the 2000 West coordinate line. Over in the extreme southwest end of the Main Deposit, No. 8 stoped back all the ore beginning at the hanging on the west side and continued east for 75 ft.

50 FT. SUB-LEVEL:

On this sub, which is the third one below the 7th level, all of the mining was confined to the Main Deposit. Some radial slicing was done in a roll in the hanging near the 1700 West coordinate line and an exploring drift was also run out to the northeast under this roll in the hanging for a distance of 125 feet, most of the drift being in ore. This really was the beginning of the hunt carried through by No. 9 during the year, which was mentioned on a number of sub-levels earlier in this report. No. 9 after driving this crosscut, started to raise and then continued raising and drifting until finally they stopped under the hanging 200 ft. above this sub.

Over in the southwest corner of the sub in a lens that lies south of the Main Deposit on our fee lands, two contracts, Nos. 21 and 26, drove some dog drifts and raises preparatory to stoping out the ore which lies between two dikes, the ore having a width of about 30 ft. and a length of about 200 ft; all of this drifting and raising was done between the 2000 and 2200 West coordinate lines.

30 FT. SUB-LEVEL:

Four gangs were employed at various times during the year mining on the 30 ft. sub; three of these gangs were on Chase Lease no. 9 in the Main Deposit, while the fourth contract was employed on our fee lands south of Chase Lease No. 9 in a new lens discovered between two dikes in the extreme southwest corner of the level.

In the south central portion of the Main Deposit contracts Nos. 20, 22 and 23 radial sliced in an area 250 ft. east and west and 75 ft. north and south and by the end of the year two-thirds of the ore area had been mined out by radial slicing.

In the extreme southwest corner of the level No. 26 contract drove a main transfer crosscut underneath the dog drifts and raises described

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YEAR 1934

7. UNDERGROUND:
(Continued)

c. Stoping:

30 FT. SUB-LEVEL: (Cont.)

on the 50 ft. sub-level. In other words, this ore lens about 50 ft. wide between the two dikes, was being opened up preparatory to sub-level stoping.

20 FT. SUB-LEVEL:

Very little mining was done on the 20 ft. sub, although No. 25 contract did open up a small sub-level stope on our fee lands south of the Chase Leases near the 2000 West coordinate line. This stope was opened up in December.

-40 FT. SUB-LEVEL:

No. 24 contract, which was employed most of 1933 opening up a new timber transfer drift located about 90 ft. above the 8th level, after drifting northeast close to the east boundary of Chase Lease No. 9, started raising in the early part of 1934 and in June holed their inclined raise up to the 7th level on the south side of the main footwall drift. After the raise was holed, the main footwall drift was widened out near the top of the raise to make it possible to spot some timber trucks on the side track.

VENTILATION RAISE:

As mentioned briefly previously in this report the Inland Company decided early in 1934 to provide the Morris Mine with a new second outlet, the main idea being to provide better ventilation. The work was begun by diamond drilling on surface in the rock discovered in the main drainage ditch south of the office in order to make sure that the rock exposure was not float material but really ledge. To further confirm the fact as to whether or not the ledge had been really exposed, a shaft 6 ft. by 11 ft. in size was sunk as mentioned before for a distance of 51 ft.

Early in June miners brought down from the Cuyuna Range started on both day and night shift to put up a raise between the 7th and 6th and to strip our old ventilation raise from the 4th to the 6th. During 1934 both of these projects were completed and the raise started towards the surface from the 4th level was up 100 ft.

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1. GENERAL

Operations at the Tilden started April 21st and continued intermittently until the last cargo was shipped October 15th. Ore was loaded from both the East and West Pits until September 13th when both shovels were placed in operation at the West Pit for the balance of the season. The loading was done on one eight hour shift five days per week until July 15th when a slackened schedule curtailed operations to an intermittent basis. At the end of the season, 1 shovel was moved back to the East or low phosphorus pit, in readiness for 1935 operations.

Several exploration churn drill holes were put down at the East Pit in March and April. Late in April blast hole drilling was started and 3 drills continued on double shift until the latter part of July when sufficient ore had been drilled and blasted ahead of the shovel to place the drilling on an intermittent basis with the loading. A large blast in 1933 had placed sufficient ore on hand at the West Pit so that no drilling was done until an exploration program to check the sulphur analysis of the ore to the east of this pit was started in October. Eight holes were drilled in this exploration and then 3 holes to blast down a loose mass of ore near the top of the West Pit face completed the drilling at the mine in 1934.

As noted, no blasts were made at the West Pit in 1934 and at the end of the season approximately 50,000 tons of broken ore remained to be loaded of the 225,000 ton blast of July 1933. At the East Pit, because of the confined space and necessity of keeping the shovel supplied with ore, 5 blasts were made, breaking a total of 87,000 tons of ore, of which, at the end of the season, approximately 34,000 tons are available for next year's loading.

The surface material stripping limits were extended at both Pits in 1934, a total of 11,570 yards of gravel and boulders being removed. Greater pressure and a larger volume of water accounted for a greatly improved hydraulicing program at the East Pit, which removed 10,790 yards at a cost of a little over 50¢ per yard. The balance of the total yardage was scraped back from the east edge of the West Pit to allow drilling operations to proceed while the 1934 explored area is being stripped. When the season's total ore shipments had been loaded, 6,206 tons or 3,989 cu. yds. of dike rock were separated, loaded and wasted at the West Pit. This waste rock was charged to the stripping account but is kept under separate classification because it has not uncovered or made available additional ore as in the case of surface stripping.

The simultaneous operation of both pits was more efficient during this season than last, because the higher iron content of the East Pit ore allowed a more even mixture with the West Pit ore in producing the Tilden Silica grade. In order to secure equally efficient loading

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1. GENERAL (Cont.)

conditions in both pits, however, the limits of the East Pit must be expanded so that a full train of pit cars can be loaded by the shovel. It is hoped that the higher iron content will persist in the East Pit during 1935 so that the loading can be so regulated. It is also believed that this pit will produce a higher proportion of low phosphorus ore during the coming season.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

	<u>Low</u> <u>Phos.</u>	<u>Tilden</u> <u>Silica</u>	<u>Total</u>
East Pit	15,419	35,060	50,479
West Pit		117,209	117,209
	<u>15,419</u>	<u>152,269</u>	<u>167,688</u>

This production compares with 94,104 tons produced in 1933, an increase of 73,584 tons.

b. Shipments

The shipments from the Tilden for 1934 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	57,579 tons
East Pit (Low Phos.)	<u>34,050 "</u>
Total Broken Ore	91,629 "

e. Product by Months

<u>Month</u>	<u>Days</u> <u>Operated</u>	<u>Average Daily</u> <u>Tonnage</u>	<u>Total</u> <u>Tons</u>
April	9 (1-8 hr.)	1,045	9,406
May	25 "	1,534	36,818
June	25 "	1,432	35,806
July	17 "	1,709	29,067
August	10 "	1,656	16,564
September	13 "	1,651	21,470
October	11 "	1,687	18,557
Total	<u>110</u>	<u>1,530</u>	<u>167,688</u>

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

f. Ore Statement

	<u>Year</u> <u>Tons</u>	<u>Last Year</u> <u>Tons</u>	<u>Increase</u>	<u>Decrease</u>
On hand Jan.1,1934	0	0		
Output for year	167,688	94,104	73,584	
Total	167,688	94,104	73,584	
Shipments	167,688	94,104	73,584	
Balance on hand	0	0		

1934 1-8 hr. shift as tonnage was required.

1933 1-9 hr. shift to July 16
1-8 hr. shift to end of season.

g. Delays

With the exception of a torn conveyor belt which took 8 hours to repair, there were no serious delays, either mechanical or electrical during the season. The total time lost, classified under three headings, is shown as follows:

<u>Shovel Repairs</u>	<u>Crushing Plant Repairs</u>	<u>Derailments</u>
48 hrs.	25 hrs.	3½ hrs.

h. Delays from Lack of Current

One hour delay from lack of current.

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</u> <u>Ignition</u>
Tilden									
Silica	39.19	.037	42.01	.10	.81	.35	.18	.011	.43
Tilden									
Low Phos.	36.73	.020	45.82	.09	1.05	.32	.20	.010	.61

b. Average Analysis on Straight Cargos

<u>Grade</u>	<u>Mine</u>			<u>Lake Erie</u>	
	<u>Iron</u>	<u>Phos.</u>	<u>Sil</u>	<u>Iron</u>	<u>Moisture</u>
Tilden	39.30	.038	41.85	39.11	1.95
Tilden Low Phos.	36.82	.020	45.57	36.46	1.97

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4. ESTIMATE OF ORE
RESERVES

a. Developed Ore

1. West Pit (Tilden Silica)

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

Grade: Tilden Silica

Ore in sight Jan. 1, 1934, Upper Bench	619,638 tons
Ore mined in 1934, " "	117,209 "
Ore in sight Jan. 1, 1935, " "	502,429 "
Ore in sight Jan. 1, 1935, Lower Bench	<u>1,870,000 "</u>

Total Developed Ore Jan. 1, 1935, West Pit 2,372,429 tons

2. East Pit (Tilden Low Phosphorus)

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

Total ore in sight Jan. 1, 1934	5,495,479 tons
Ore mined during 1934	<u>50,479 "</u>
Total developed ore Jan. 1, 1935	5,445,000 tons

Of this total of 5,445,000 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.

3.

West Pit total developed ore Jan. 1, 1935	2,372,429 tons
East Pit total developed ore Jan. 1, 1935	<u>5,445,000 "</u>
Total Tilden Mine	7,817,429 tons

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4. ESTIMATE
OF ORE
RESERVES (Cont.)

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 Pit. 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 to the East of the East 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
<u>2. East Pit</u>										
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 in 1935. The production figures are conservative and can be increased materially without difficulty.

<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>
E.Pit Low Phos.	25,000	37.00	.020	45.82	.009	2.5	36.07
E.Pit No.1							
Grade	50,000	37.00	.029	44.36	.009	2.5	36.07
W.Pit Tilden							
Silica	75,000	39.75	.040	41.28	.012	2.5	39.77

The estimate is based on a loading schedule that was followed the greater part of 1934, i.e., one shovel in each pit and an equal production from both. The balanced production may not be achieved during most of the season but with the continued expansion of the East Pit a portion of each blast becomes available for loading a full train of pit cars. From this it can be seen that the development of the East Pit is absolutely necessary from an operating standpoint.