

SOUTH JACKSON MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
PRODUCT	4,677	69,222		64,545
No.Shifts and Hours	1-10 hr	1-10hr		
AVERAGE NO.MEN WORKING				
Surface		7		
* Underground		4		
Total		11		
AVERAGE WAGES PER DAY				
SURFACE	4.39	3.74		1.35
UNDERground	4.16	6.73		2.57
Total	4.28	6.09		1.81
WAGES PER MONTH OF 25 DAYS				
Surface	109.75	143.50		33.75
Underground	104.00	168.25		64.25
Total	107.00	152.25		55.25
PRODUCT PER MAN PER DAY				
Surface	34.26	32.49	1.77	
Underground	39.14	59.92		30.78
Total	18.27	21.07		2.80
LABOR COST PER TON				
Surface	.128	.177		.049
Underground	.106	.112		.006
Total	.234	.289		.055
TOTAL NUMBER OF DAYS				
Surface	136½	2,130		1993½
Underground	119½	1,135		1015½
Total	256	3,265		3009
AMOUNT FOR LABOR				
Surface	599.26	12225.19		11625.93
Underground	497.32	7778.63		17281.31
Total	1096.58	20003.82		18907.24

Proportion Surface to Underground Men:

1921 -  
 1920 - 1 to .56  
 1919 - 1 to .6  
 1918 - 1 to 1.75  
 1917 - 1 to 6.5  
 1915 - 1 to 5

\* - Mine only operated 12 days with 5 men surface and 7 men in pit.

NORTH JACKSON MINE - 1921.

No work was done at this mine during the year. Late in the fall a piece of land to the East of the old Jackson office was leased to the City of Negaunee for a place to store their road building equipment. They are erecting a building on this plat now.

The State Constabulary still occupy the Jackson Office and barn as their Upper Peninsula headquarters.

MORRIS LLOYD MINE.

GENERAL

The current year started with these mines working to capacity for the first time in four years. Heretofore, our capacity has been limited by the number of men available. During the later part of 1920, due to curtailment at some of the Ishpeming mines, we were enabled to get a full compliment of men and our production was therefore increased for the first few months of this year. In March the mines were placed on a five day per week schedule and in June month operations were drastically curtailed to the extent of employing only our married men on half time which schedule is still in effect at the end of the year.

During the year the only new work undertaken on surface was providing of additional stocking grounds and trestles made necessary on account of available stock room having been filled and small shipments made therefrom during the past season. The two ore trestles at the Lloyd mine were both extended and additional ground graded. The north ore trestle at the Morris mine was extended and a complete new single bent trestle was erected south of the present stockpile. This trestle is 780 feet long and the ground underneath was graded and covered with jasper and lean ore to make a bottom in place of using plank. After the lean material was spread over the stocking area, lines of small poles were laid length wise four feet apart over the entire stocking ground. These poles were put down to act as a guide for the steam shovel when loading out the ore and thereby permit the ore to be loaded without contamination with the lean material making up the foundation. After the first years loading these poles may not be necessary due to the hard packing down of the foundation from the weight of the ore piles.

In spite of the curtailment we have prosecuted our development work on both day and night shifts underground and are glad to be able to report a large find of excellent ore on the bottom level (7th) of the Morris mine. This ore was entered by our drifts during the summer and is now being developed. Some of this ore is on fee lands but the greater tonnage is on Chase Lease No. 9.

MORRIS LLOYD MINE.

GENERAL  
(CONTINUED)

The long drift west across the Chase Leases was carried to a point 500 feet on Lease No. 27 where operations were discontinued in the month of August. This opening was in slate when stopped.

Ore is being mined on Chase Leases No. 9, 24 and 25, but with the exception of Lease No. 9, the ore bodies are small with a consequent small production. During the year no ore was developed on any of the Chase Leases with the exception of that on Lease No. 9 mentioned above.

Development work on the bottom level of the Morris mine is being carried on on both day and night shifts, changing the men every three days.

It was found necessary to provide a new domestic water supply for our location and this has been done by cutting a sump and taking the water from the abandoned second level in the Lloyd mine. This plant is now complete and as soon as the drive belt is received will be placed in commission. We are assured of an adequate supply of pure water from this place.

The new Pumping Plant was installed on the bottom of the Morris shaft during the year and is at work.

LABOR

We started the year working the greatest number of men in the history of the district, but in June month all of the single men were laid off and the married men were placed on half time.

Better results are being secured from our miners on our present basis of working than when on full time. The average tons per miner per day during the full time year of 1920 was 9.34, whereas at present working half time our tons per man will average about 11.00 tons per miner.

The labor situation is, of course, very easy just at present, although practically all of the young men have left the district.

MORRIS LLOYD MINE.

LABOR  
(CONTINUED)

We have let a contract to cut the timber standing on the Chase Leases and I find that in spite of the curtailment at the mines the contractor is unable to get sufficient men to efficiently carry on his work. At this writing he has but nine choppers, whereas, twenty-five to thirty are needed. Prices for timber and lagging are low this winter but even if high earnings could not be made one would think the men who are out of work would be glad of an opportunity to earn something.

A number of the men now employed by us in this district live in Ishpeming and walk out here to work.

The following statement shows the number of men employed each month on surface and underground during the year with previous years for comparison, Viz:

MEN EMPLOYED.

	SURFACE					UNDERGROUND					TOTAL				
	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
JAN.	49	50	49	51	58	240	208	206	232	280	289	258	256	283	338
FEB.	47	47	46	50	61	230	194	206	214	271	277	241	252	264	333
MAR.	51	46	46	45	60	230	201	217	210	301	281	247	263	255	361
APR.	46	40	46	43	53	229	184	213	198	279	275	224	259	241	332
MAY.	44	48	53	54	57	220	198	214	174	272	264	246	267	228	339
JUN.	44	39	50	47	54	216	202	232	186	186	260	241	281	233	240
JUL.	43	41	52	48	51	207	201	214	189	198	250	242	266	237	249
AUG.	42	45	50	46	53	187	195	216	186	209	229	240	266	232	262
SEP.	46	44	49	44	62	177	186	201	190	186	223	230	250	234	248
OCT.	45	48	50	47	61	181	182	205	193	194	226	230	255	240	255
NOV.	48	47	48	46	47	174	164	201	199	194	217	212	249	245	241
DEC.	41	48	51	45	49	176	174	212	246	187	217	222	263	292	236
AVG.	45	45	49	47	55	206	191	214	201	229	251	236	263	248	284

It is hoped that the coming year will be a better one for the mines than the one just closed and that all mines will be worked to capacity. It will, no doubt, take some time to get a full crew at all mines when operations are resumed.

There were three decreases in wages put into effect during the year,

Viz:

- February 1st, 1921 - 15%
- August 1st, 1921 - 12½%
- October 1st, 1921 - 10%

MORRIS LLOYD MINE.

LABOR  
(CONTINUED)

When the men were placed on half time the house rentals and doctor fees were reduced in like manner.

The average wage rates for each month and year are shown on the following statement with previous years for comparison, Viz:

AVERAGE WAGE RATE.

YEAR	SURFACE					UNDERGROUND					TOTAL				
	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
JAN.	3.19	3.86	5.15	5.10	5.73	3.51	4.36	5.83	5.82	6.31	3.45	4.26	5.70	5.69	6.18
FEB.	2.96	3.89	5.20	5.60	4.82	3.52	4.36	5.95	6.42	5.30	3.46	4.26	5.81	6.24	5.20
MAR.	3.16	3.85	5.23	5.55	4.82	3.53	4.41	6.01	6.49	5.35	3.47	4.30	5.87	6.31	5.24
APR.	3.10	4.02	5.16	5.60	4.84	3.53	4.64	6.01	6.40	5.16	3.44	4.52	5.85	6.24	5.07
MAY.	3.40	4.22	5.19	5.55	4.79	3.88	4.86	6.02	6.57	5.26	3.80	4.74	5.84	6.33	5.16
JUN.	3.42	4.21	5.16	5.47	4.83	3.90	4.91	6.13	6.62	5.55	3.81	4.78	5.94	6.38	5.39
JUL.	3.39	4.23	5.21	5.32	4.85	3.98	4.98	6.17	6.46	5.55	3.87	4.89	5.97	6.23	5.40
AUG.	3.43	4.70	5.17	5.50	4.32	4.05	5.52	6.03	6.64	4.93	3.93	5.36	5.86	6.38	4.79
SEP.	3.44	4.82	5.20	5.61	4.37	4.16	5.53	6.10	6.47	4.87	4.00	5.39	5.92	6.28	4.73
OCT.	3.86	5.32	5.19	5.65	3.96	4.42	6.11	6.00	6.71	4.44	4.29	5.97	5.85	6.46	4.30
NOV.	3.83	5.38	5.21	5.70	3.92	4.37	6.04	5.86	6.36	4.28	4.28	5.89	5.70	6.20	4.17
DEC.	3.88	5.23	5.18	5.69	3.89	4.34	5.94	5.83	6.26	4.34	4.25	5.79	5.70	6.14	4.21
AVG.	3.44	4.48	5.18	5.46	4.54	3.93	5.14	6.00	6.42	5.26	3.84	5.01	5.84	6.23	5.13

It will be noted that our wage schedule is now back about where it was in 1917.

The reduction in wages naturally show in a lower labor cost per ton. In fact the cost per ton for labor in November month checked exactly 37½%, the amount wages were reduced, lower than the labor cost per ton in November of 1920.

The cost per ton for labor, surface, underground and total each month are shown on the following statement with previous years for comparison, Viz:

COST PER TON FOR LABOR

	SURFACE					UNDERGROUND					TOTAL				
	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
JAN.	.180	.225	.294	.275	.242	.946	1.036	1.363	1.389	1.560	1.126	1.261	1.657	1.664	1.802
FEB.	.178	.237	.279	.319	.211	.888	1.017	1.347	1.514	1.274	1.066	1.254	1.626	1.833	1.485
MAR.	.173	.193	.267	.284	.196	.853	.952	1.394	1.465	1.304	1.026	1.145	1.661	1.749	1.500
APR.	.172	.205	.310	.346	.209	.876	.985	1.545	1.589	1.262	1.048	1.190	1.855	1.935	1.471
MAY.	.159	.202	.290	.397	.200	.897	.927	1.320	1.499	1.125	1.056	1.129	1.610	1.896	1.325
JUN.	.176	.166	.251	.327	.369	.960	.907	1.320	1.505	1.556	1.136	1.073	1.571	1.832	1.925
JUL.	.166	.181	.293	.333	.318	.907	.904	1.374	1.554	1.335	1.073	1.085	1.667	1.887	1.653
AUG.	.170	.212	.276	.288	.314	.851	.992	1.374	1.420	1.255	1.021	1.204	1.650	1.708	1.569
SEP.	.198	.212	.280	.287	.347	.869	.985	1.267	1.406	1.194	1.067	1.197	1.547	1.693	1.491
OCT.	.229	.213	.258	.281	.254	.954	.980	1.217	1.376	.946	1.183	1.193	1.475	1.657	1.200
NOV.	.232	.354	.307	.338	.225	.977	1.335	1.389	1.538	.952	1.209	1.689	1.696	1.876	1.177
DEC.	.254	.333	.300	.271	.239	1.077	1.311	1.333	1.586	.961	1.331	1.644	1.636	1.857	1.20
AVG.	.186	.229	.284	.309	.242	.908	1.027	1.354	1.482	1.248	1.094	1.256	1.638	1.791	1.490

MORRIS LLOYD MINE.

The following statement shows the number of men of the different nationalities at work in these mines in December month and for the same month during the previous five years, Viz:

	1921	1920	1919	1918	1917	1916
Americans, *	0	80	69	60	57	65
English,	35	14	14	10	13	12
Swedish,	22	9	9	9	10	13
French,	53	20	23	10	11	22
Finnish,	96	114	96	87	83	118
Italian,	22	60	53	45	51	45
Greeks,	0	0	0	2	1	3
Slavish,	0	2	3	1	0	0
Norwegian,	3	0	0	0	0	0
Irish,	4	0	0	0	0	0
Scotch,	2	0	0	0	0	0
<b>TOTAL,</b>	<b>237</b>	<b>299</b>	<b>267</b>	<b>224</b>	<b>226</b>	<b>278</b>

\* Basis of Classification changed year 1921.

PRODUCTION

During the year we produced a total of 209,034 tons as compared with 261,772 tons last year. The decrease is due to curtailment in operations. The mines are in condition to produce a much larger tonnage than in 1920 and during the first few months of the current year, we were producing at the rate of 325,000 tons per year.

The production for the year was made up of the following grades, Viz:

MINE	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris		68,593	30,179			98,772
Lloyd			15,350	94,741	171	110,262
TOTAL, 1921		68,593	45,529	94,741	171	209,034
" 1920	929	46,643	63,873	105,327	45,000	261,772
" 1919	14,674	23,142	78,755	121,623	44,289	282,483
" 1918	30,709	16,320	41,922	141,144	59,405	289,500
" 1917	55,772	9,530	52,848	138,235	27,615	284,000
" 1916	75,024	2,630	76,350	112,119	41,562	307,685

MORRIS LLOYD MINE.

Ore was hoisted on 289 days at the rate of 723 tons per day.

We made an effort to mine as much ore as possible from the Chase Leases as we are away behind on Royalty requirements, but the ore lenses are small and the production per man low with a corresponding high labor cost.

Our tons per man, due to curtailed operations, are slightly lower this year than last, but are still higher than pre war years.

The following statement shows the tons per man per day for each month and the average for the year with previous years for comparison, Viz:

TONS PER MAN PER DAY.

	SURFACE					UNDERGROUND					TOTAL				
	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
JAN.	17.75	17.09	17.66	18.53	22.64	3.71	4.20	4.28	4.19	4.04	3.07	3.37	3.44	3.42	3.43
FEB.	18.04	16.36	18.65	17.54	22.07	3.96	4.29	4.42	4.22	4.16	3.25	3.40	3.57	3.40	3.50
MAR.	18.37	19.80	19.61	19.58	23.72	4.14	4.63	4.31	4.43	4.10	3.38	3.75	3.54	3.61	3.49
APR.	17.88	19.60	16.65	15.85	22.12	4.02	4.71	3.89	4.03	4.08	3.28	3.80	3.16	3.22	3.45
MAY.	21.43	20.84	17.68	13.98	23.48	4.33	5.25	4.57	4.39	4.69	3.60	4.20	3.63	3.34	3.91
JUN.	19.28	25.18	20.40	16.71	13.02	4.06	5.42	4.64	4.40	3.57	3.36	4.46	3.78	3.48	2.80
JUL.	20.25	24.80	17.69	15.98	15.21	4.39	5.50	4.49	4.16	4.16	3.61	4.50	3.58	3.30	3.27
AUG.	20.09	22.37	18.63	18.54	13.73	4.75	5.56	4.39	4.77	3.93	3.84	4.45	3.55	3.73	3.05
SEP.	17.36	22.96	18.70	19.09	12.41	4.79	5.61	4.81	4.61	4.26	3.75	4.51	3.83	3.71	3.17
OCT.	16.76	25.35	20.31	19.45	15.07	4.63	6.23	4.93	4.88	4.70	3.63	5.00	3.97	3.90	3.58
NOV.	16.92	15.31	16.68	16.51	18.32	4.47	4.52	4.22	4.13	4.50	3.54	3.49	3.36	3.31	3.55
DEC.	15.28	15.81	17.29	20.27	15.60	4.04	4.53	4.38	3.95	4.51	3.20	3.52	3.49	3.30	3.50
AVG.	18.51	20.45	18.33	17.67	18.78	4.29	5.04	4.44	4.33	4.22	3.48	4.04	3.57	3.48	3.44

SHIPMENTS

Our shipments for the year were the lowest for any year since the mines of this district have been on a producing basis.

The Charcoal Furnaces stopped taking ore early in the year and have not yet resumed. These furnaces were a good source from which to secure customers for our ores and we miss their business.

The following statement shows the shipments by grades for the past five years and we are not very proud of our record for the current year.



MORRIS LLOYD MINE.

SHIPMENTS

	1916	1917	1918	1919	1920	1921
	TONS	TONS	TONS	TONS	TONS	TONS
Morris Bessemer,	52,275	59,620	23,785	5,000	7,789	
Lloyd Bessemer,	3,777	26,809	2,679			
TOTAL BESSEMER,	56,052	86,429	26,464	5,000	7,789	
Morris Ore,	5,433	14,050	13,576	3,613	37,402	7,868
Lloyd Ore,	134,928	126,753	155,166	121,198	111,922	38,582
Lloydale Ore,	31,786	19,280	60,087	27,699	11,438	
TOTAL NON BESSEMER,	172,050	160,083	228,829	152,510	160,762	46,450
Morrisville,	389	10,930	11,878	8,506	256	4,620
North Lake Silica,	111,107	45,813	48,369	24,541	31,581	14,780
TOTAL SILICA,	111,496	56,743	60,247	33,047	31,837	19,400
GRAND TOTAL,	339,598	303,255	315,540	190,557	200,388	65,850

Of the total shipments for 1921 43,552 tons were shipped from stock-pile and 22,298 tons from the pockets.

ORE IN STOCK

We reported last year as carrying the largest balances for any year in the history of the property and we regret to have to say that these balances are increased this year in place of being lowered.

We want to call attention to the large balances of Silica ore being carried. This grade has not moved very strongly during the past few years and we would like to see heavy sales of this grade during the coming year.

Our balances as of December 31, 1921 are as follows, Viz:

BALANCES IN STOCKPILES DECEMBER 31ST, 1921.

	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris,		87,371	74,849			162,220
Lloyd,			42,871	90,270	73,992	207,133
TOTAL, 1921		87,371	117,720	90,270	73,992	369,353
" 1920		26,917	91,591	33,840	73,821	226,169
" 1919	10,414	31,975	60,052	22,085	40,259	164,785
" 1918	2,669	10,571	14,203	21,992	23,424	72,859
" 1917	7,261	3,769	32,903	31,006	23,960	98,899
" 1916	61,251	333	37,077	3,866	15,526	118,152

MORRIS LLOYD MINE.

COSTS OF PRODUCTION

Our cost of production per ton does not show a reduction in line with the reduction in wages this year as compared with last, due to several reasons, chief among which are; First. We are carrying on the development work on the bottom levels of the Morris mine on both day and night shifts. Second. Our supply costs are still high as no reduction has been made in mine timber and electric power costs and certain other mine supplies are still high. Third. Our overhead items such as pumping, office, laboratory etc. show small reductions and the charges must be spread over a much smaller tonnage.

The following table shows -

PRODUCT MONTHLY, PER MAN PER DAY AND COSTS, FOR EACH MONTH DURING THE PAST YEAR, WITH COMPARISONS FOR PREVIOUS YEARS, AS PER FIGURES TAKEN FROM COST SHEETS.

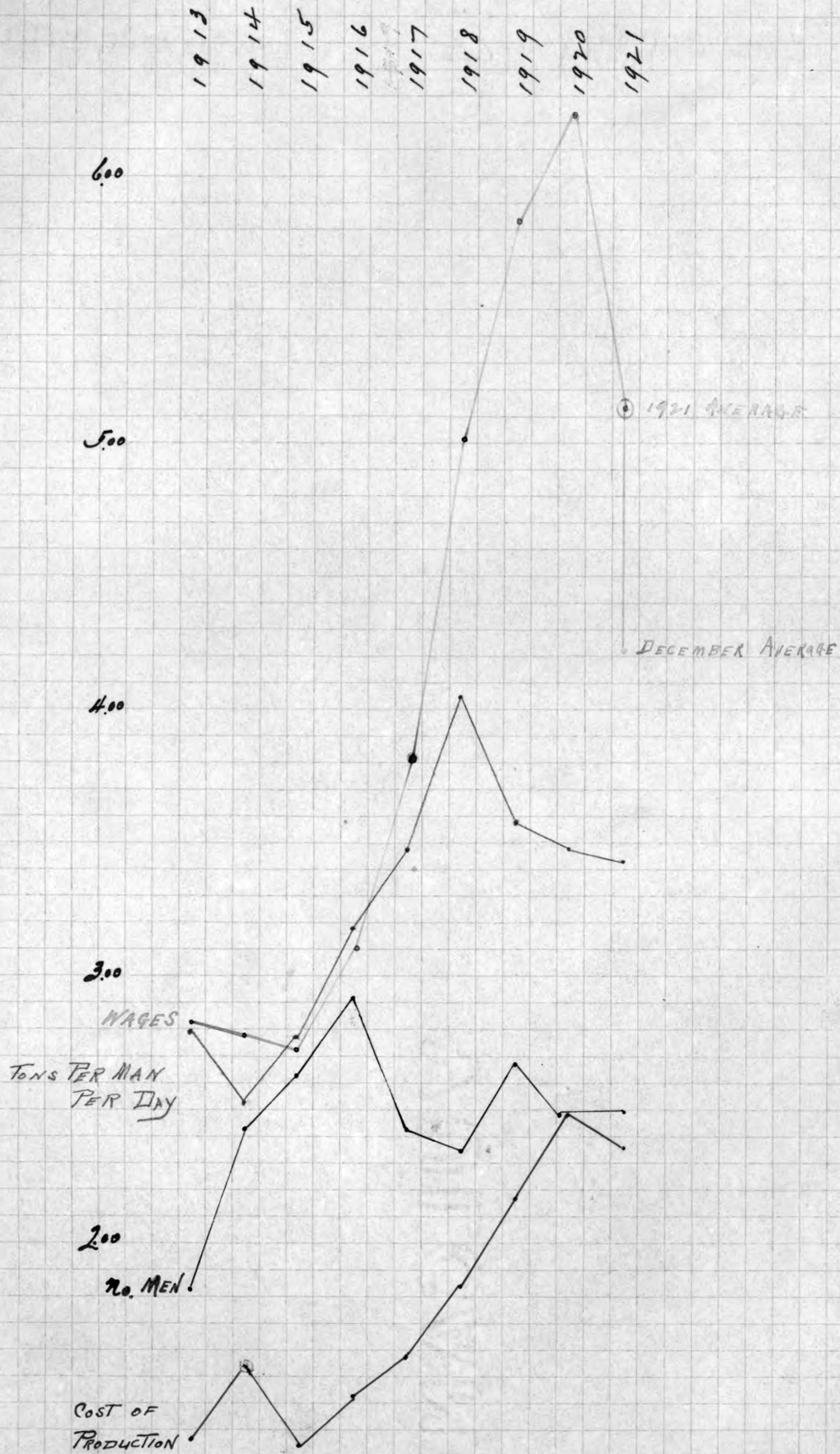
1921	PRODUCT TONS	TONS PER MAN PER DAY	TOTAL COST OF PRODUCTION			COST PER TON		
			LABOR	SUPPLIES	TOTAL	LABOR	SUPP.	TOTAL
JAN.	28,120	3.43	49,659.24	19,419.82	69,079.06	1.766	.690	2.456
FEB.	26,115	3.50	38,282.24	21,326.78	59,609.02	1.466	.817	2.283
MAR.	26,432	3.49	39,273.29	23,624.67	62,897.96	1.486	.894	2.380
APR.	23,134	3.45	33,589.41	18,202.83	51,792.24	1.452	.787	2.239
MAY.	27,328	3.91	35,594.96	18,190.47	53,785.43	1.303	.665	1.968
JUN.	9,036	2.80	16,428.15	10,531.44	26,959.59	1.818	1.165	2.983
JUL.	11,091	3.27	17,816.53	11,325.96	29,142.49	1.607	1.021	2.628
AUG.	11,606	3.05	17,657.67	10,254.72	27,912.39	1.522	.883	2.405
SEP.	10,652	3.17	16,693.58	11,697.74	28,391.32	1.568	1.098	2.666
OCT.	12,613	3.58	15,794.70	12,202.24	27,996.94	1.253	.967	2.220
NOV.	11,295	3.55	14,179.50	12,189.59	26,369.09	1.255	1.080	2.335
DEC.	11,612	3.50	14,813.68	12,915.30	27,728.98	1.276	1.112	2.388
ADJUSTMENT								
TOTAL-1921	209,034	3.44	309,782.95	181,881.56	491,664.51	1.482	.870	2.352
TOTAL-1920	261,772	3.48	458,245.96	192,164.29	650,410.25	1.751	.734	2.485
TOTAL-1919	282,485	3.57	438,614.70	173,261.44	611,876.14	1.553	.613	2.166
TOTAL-1918	289,500	4.04	358,003.72	174,378.33	532,382.05	1.237	.602	1.839
TOTAL-1917	284,000	*1-3.48	297,870.77	125,041.62	422,912.39	1.113	.467	1.580
TOTAL-1916	307,685	*2-3.18	257,025.03	139,995.37	397,020.40	.911	.501	1.412
TOTAL-1915	221,585	2.76	178,145.41	97,464.12	275,609.53	.804	.440	1.244
TOTAL-1914	192,145	2.53	193,822.98	103,064.08	296,887.06	1.010	.535	1.545

\*1 - 1917 Cost of Production and tons per man per day does not include 16,213 tons mined from open pit by Steam Shovel method.

\*2 - 1916 Cost of Production and tons per man per day does not include 25,852 tons taken from open pit by Steam Shovel method.

MORRIS LLOYD MINE.

COST OF PRODUCTION





MORRIS LLOYD MINE.

DWELLINGS

We have had to make a considerable number of minor repairs to our tenant houses during the past year and all of the earlier built houses will need considerable work done upon them during the coming year. The underpinning on a large number has become badly decayed and the exterior painting must be renewed. Strong recommendations are made that in erecting future tenant houses that they be built of cement or other material requiring small maintenance. If buildings are composed of wood construction, they should at least have concrete foundations under the entire building.

We have three vacant houses at the close of the year. Should operations be resumed at all mines in the Ishpeming district and in this also we might have difficulty in securing an adequate force as we have a great many married men working here who live in Ishpeming and who would, of course, work in the mines there in preference to coming away out here. All of our single employees have left the district and we should have more houses and thereby be in position to care for men of family, when business resumes.

The only new building erected during the year was a small frame shelter for the doctors and visiting nurses horses and automobiles. It was found necessary to provide this place as robes and other things have been stolen from their rigs, while they have been making calls. It is also necessary to have a shelter for the horses during the cold weather.

STORE BUILDING

This building has been occupied all the year by Mr. J. B. Casper who has been the tenant since it was completed in January 1918.

Mr. Casper has suffered heavy losses during the year, owing to the drop in prices on his stock.

A large stock of dry goods, groceries and notions is carried and prices have gone down over 50% in some cases.

MORRIS LLOYD MINE.

WELFARE WORK

The practice of awarding cash prizes for Best Kept Premises, Gardens Etc. is being continued and good results are secured from this practice.

We also have a large area of cleared land on Section Six which we have set aside for use of our men for planting potatoes, but during the year very few took advantage of this.

Our Club House has been open all the year and is used quite generally by our men and their families. Owing to the depression, moving picture shows are put on but twice a week, on Wednesdays and Saturdays. There is a small attendance at these shows at present and the admittance receipts hardly pay for the expense of the show. We continue to run the pictures for we feel we would not be justified in shutting them off as there is no other place out here for people to go for amusement.

During the past twelve months there were a total of 10,703 paid admissions to moving pictures compared with 21,768 last year and 23,822 in 1919.

DOCKS, TRESTLES AND POCKETS

Few repairs have been necessary to our permanent trestles and pockets and the only charges have been for renewing the steel plates in the shaft pockets and minor repairs to the trestles.

We have been compelled to do considerable grading for new stocking grounds and erecting additional trestles thereon. This has been necessary at both the Morris and Lloyd mines. On account of the small shipments this year our stocking room was completely filled and additional capacity was necessary to provide space for the winter's production.

TOP TRAM ENGINES AND CARS

We have been to no extraordinary expense on account of this equipment during the year and only the regular expense of repairs and maintenance have been necessary.

MORRIS LLOYD MINE.

TRACKS AND YARDS

No new work has been undertaken here during the year.

HOISTING MACHINERY

Maintenance charges on hoisting plants continued high during the year. Numerous repairs and renewals of electric equipment have been necessary.

We installed a new signal cable in shaft at a cost of \$687.00 and a new panel board in engine house at a cost of \$685.00 during the year.

Two new 1950 foot hoisting ropes were placed in work in the Morris shaft during the year at a cost of \$963.00.

PUMPS

The expense for maintaining our underground pumping plants was lower this year than last and the equipment is all in excellent condition.

Two new pumps were installed in the new pump house on the 7th level of the Morris mine during the year and are now at work. These pumps, one a centrifugal and one a vertical pump, are both of 500 G.P.M. and deliver the water to the main pumps on the 4th level.

A large sump with 350,000 gallons capacity was cut on the 7th level during the year and it is equipped with a raise from below for the cleaning out of the sediment which is carried into the sump with the mine water.

Our pumping expense is increased by the flow of water on this new level and the additional pumpmen and power necessary to care for same.

MINE VENTILATION

We use artificial ventilation on the 6th and 7th levels of the Morris mine. All other places in the mine are kept clear by natural ventilation.

The motors and fans in use on the 6th and 7th levels are in good condition and are adequate for the work imposed.

MORRIS LLOYD MINE.

ELECTRIC TRAM PLANT

The costs for maintaining this equipment is exceptionally heavy due to the large number of locomotives and cars in use and the exceptionally long distances they are compelled to travel.

We have added four new cars of 65 cubic feet capacity to this account, receiving same from the Lake Mine. There are several more of these cars in the yard received from same source which will be put in use as soon as the necessary repairs have been made.

CRUSHING PLANT

The crushing plant at the Lloyd mine was operated whenever necessary during the year and small expense has been necessary for repairs.

Only 19,512 tons passed through this crusher during the year.

WATER SUPPLY

The water from North Lake, where we have heretofore secured our water supply, has been diverted by the Barnes-Hecker drainage ditch and we were compelled to seek a new source of supply for water for domestic use. We have cut a sump and installed a pump on the second level of the Lloyd mine where we have a flow of pure water. This plant is about complete and will be placed in work within a few days.

MINE TIMBER AND LAGGING

We have a large stock of this material on hand, due to curtailed operations and none will be purchased during the present season.

The only timber we will take in is what is being cut on the surface of the Chase Leases. This timber must be removed in a limited time and a contract has therefore been let to Mr. Edward Lafave at very reduced prices over last year.



MORRIS LLOYD MINE.

MINE TIMBER AND LAGGING  
(CONTINUED)

Some of this lagging and poles will be shipped to other mines who are in need of material.

An excellent profit was made on last years operations in the Chase timber. Our profit on pulpwood sold was more than sufficient to return the entire purchase price of the entire tract of stumpage. This profit totaled \$1,796.81. The price paid was \$884.01.

PERSONAL INJURIES

We are glad to again be able to report that during the year we have had no fatal accidents.

We have had four serious accidents as follows: Viz:

Richard Lawry fell from one of the braces in the Morris shaft house on June 18th and broke his arm. He was laid up for six weeks.

John Lehtimacki suffered a broken ankle on July 15th, by a fall of ground from the side of drift and was out of work for six months.

William Quayle received a broken hip and bruised shoulder by a fall of ground from the back of drift on July 22nd and is still laid up.

John Mackie received a broken leg due to tram car jumping the track while he was riding on the electric locomotive on September 8th. This was a violation of rules.

ACCIDENTS TO EQUIPMENT

We have experienced few accidents to our equipment which entailed loss of time or product during the year.

MORRIS LLOYD MINE.

ACCIDENTS TO EQUIPMENT  
(CONTINUED)

The most serious accident was at the Morris shaft on August 31st, when the brakeman hoisted the skip too high breaking the top shieve and hoisting rope.

A number of minor breakages have occurred on our Nordberg Air Compressor but no delay of any consequence was had.

STEAM SHOVEL LOADING

Small shipments from stock were made during the year and only a small number of cars were loaded at a time. We loaded only 43,552 tons and the cost was .041 per ton, compared with a total loaded last year of 64,725 tons at a cost of .082 per ton. A reduction of 50% in this years cost.

ROCK DRIFTING

We drifted a total of 4303 feet in rock during the year as compared with 3062 feet in 1920.

In driving the crosscut from shaft to ore measures on the 7th level of the Morris mine some fast work was accomplished. Working but three miners in the breast for 18 days in March month the crosscut progressed 389 feet or 21 feet 2 inches per day.

At the close of the year we have two rock drifts underway: one on the 7th level and one on the 6th level of the Morris mine.

The following statement shows the rock drifting and raising for the past three years with the average number of men employed each year and the number of feet of rock work per man employed, Viz:

Year	1919	1920	1921
Total number of feet	3,043	3,062	4,303
Total number of men employed	263	248	249
Feet per man employed	11.57	12.34	17.68

MORRIS LLOYD MINE.

TAXES

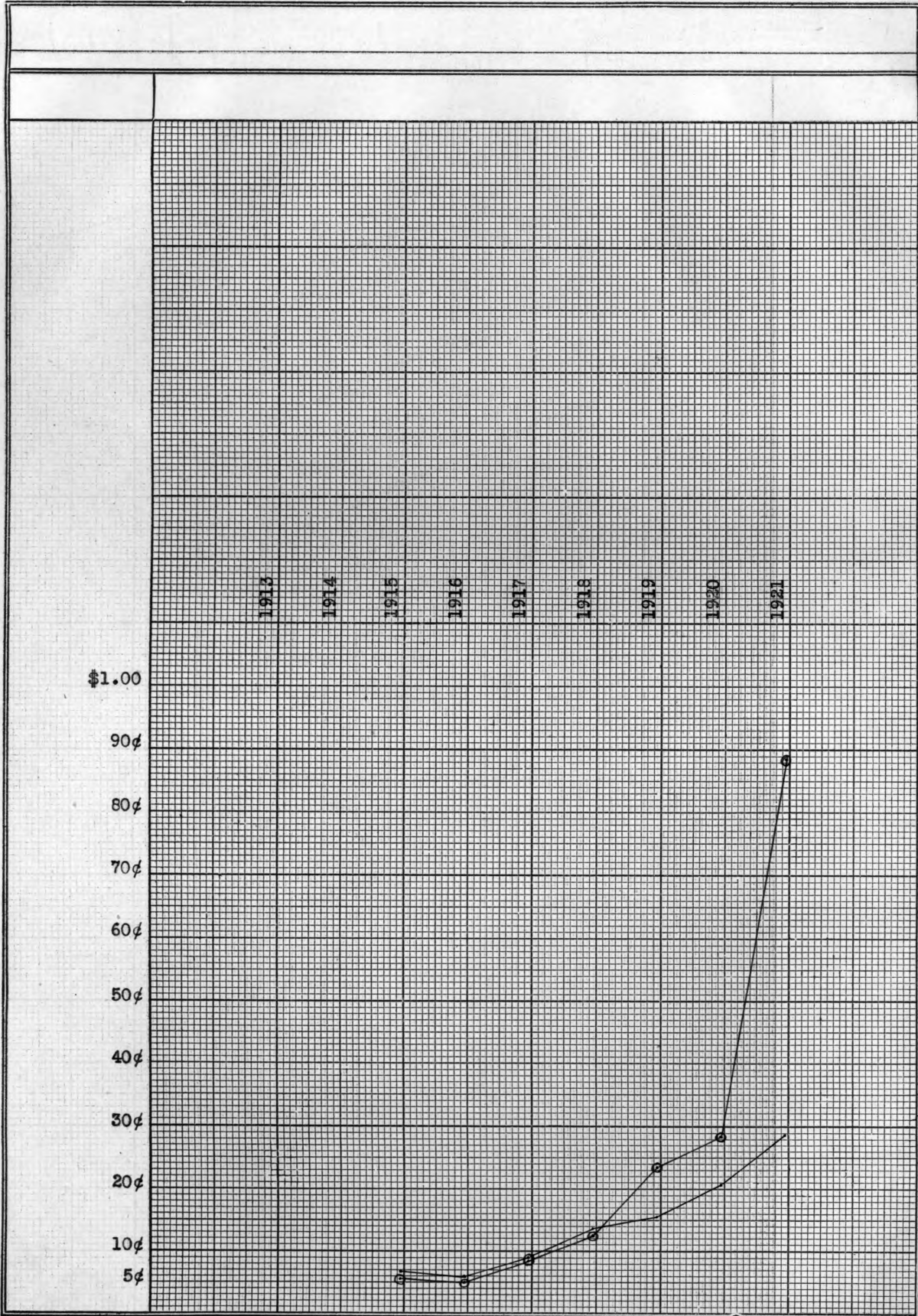
The valuation placed on the Morris mine was \$80,500.00 greater this year than last. The assessment on the Lloyd mine was also increased by \$54,500.00 over the previous year. These increases together with the large Tax Budgets now being raised causes another boost in the amount of taxes we must pay with a correspondingly large rate paid per ton produced and shipped. Due to the small number of tons shipped this year the rate per ton is extremely high. This is also true of the rate per ton on production which is low due to curtailment at the mines.

The following statement shows the valuations, taxes, etc., for the current year and the past three years for comparison, Viz:

	1918		1919		1920		1921	
	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT
LLOYD MINE.								
Realty	1139776.00	25032.19	1051450.00	28269.98	877064.00	29882.69	812850.00	26722.27
Personal	291639.00	6406.04	250524.00	6760.60	424884.00	14425.56	543544.00	17758.08
Section 6								
TOTAL LLOYD	1431415.00	31438.23	1301974.00	35030.58	1301948.00	44308.25	1356394.00	44480.35
MORRIS MINE								
Realty	327361.00	6146.86	287540.00	6736.32	223590.00	5667.30	341940.00	8139.45
Personal	119322.00	2240.02	118321.00	2777.50	276410.00	6999.24	244000.00	5789.10
TOTAL MORRIS	446683.00	8386.88	405861.00	9513.82	500000.00	12666.54	585940.00	13928.55
GRAND TOTAL,	1878098.00	39825.11	1707835.00	44544.40	1801948.00	56974.79	1942334.00	58408.90
PRODUCT TONS		289,500		282,483		261,772		209,034
TAXES PER								
TON PRODUCED		.1376		.1577		.2177		.2794
SHIPMENTS TONS		315,540		190,557		200,388		65,850
TAXES PER								
TON SHIPPED		.1262		.2338		.2845		.8870

MORRIS LLOYD MINE

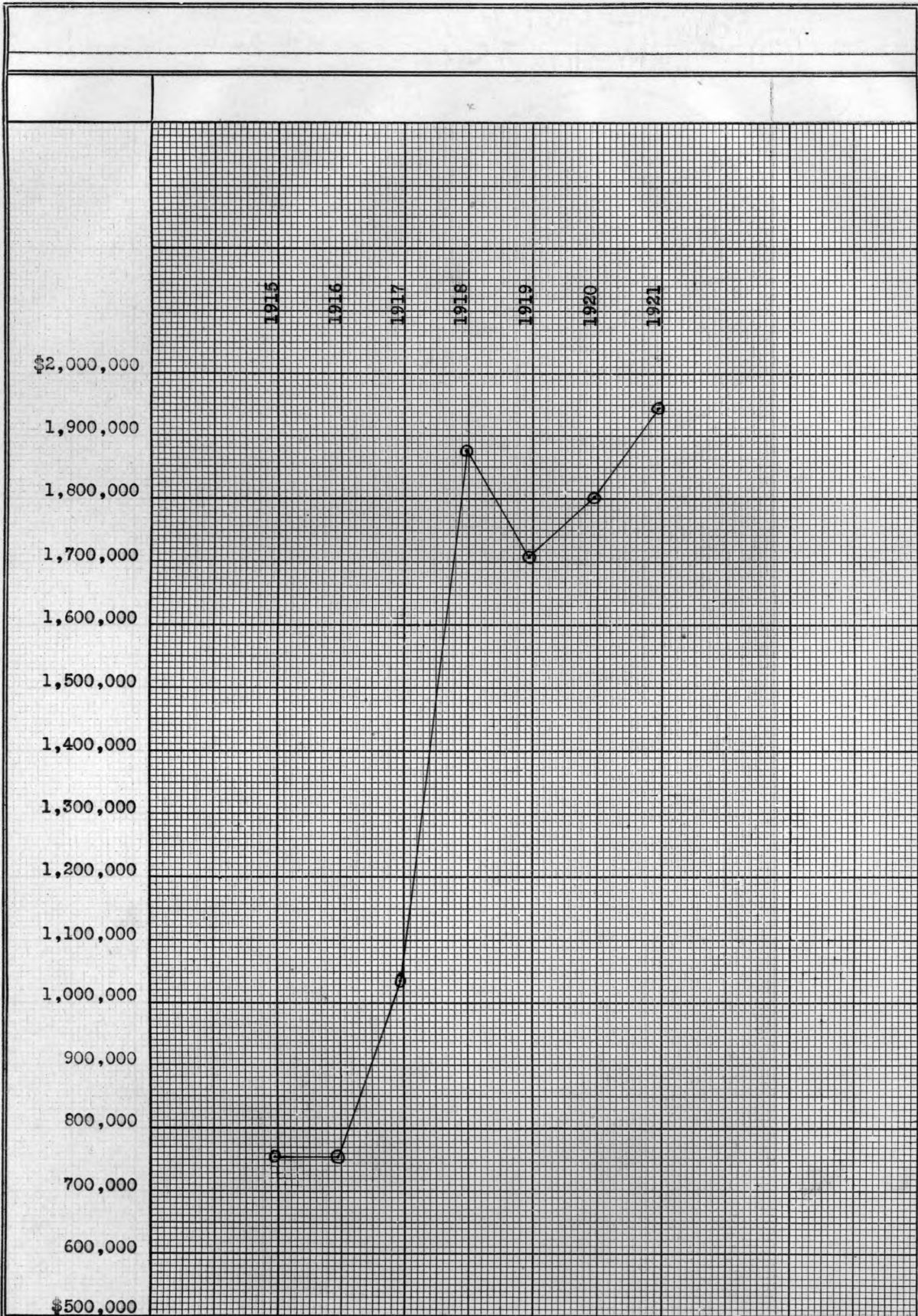
TAXES PER TON PRODUCED  
TAXES PER TON SHIPPED



— Taxes per ton Produced.  
— Taxes per ton Shipped. Morris-Lloyd Mines.

MORRIS LLOYD MINE.

VALUATIONS FOR TAXATION PURPOSES - MORRIS LLOYD MINES



Valuations for Taxation Purposes - Morris-Lloyd Mines

MORRIS LLOYD MINE.

UNDERGROUND  
MORRIS MINE

FOURTH LEVEL:

The west ore lens was worked down and completed to this elevation during the year and nothing now remains to be taken above this level on the west end.

We continue slicing and caving in the east ore lens above this level and a good product is being secured.

SIXTH LEVEL:

Considerable development work was done on this level during the year. The main drift west was carried across Chase Lease No. 26 and 500 feet over the line on Lease No. 27 where it was stopped in August month. No ore except a few small bunches was encountered in this drift during the year. The breast of the drift is now in slate.

Diamond Drill Hole No. 69 showed two small runs of ore near the 6000 coordinate west and a drift was put in to develop this. No ore of any quantity was found. Raises were put up and a crosscut run south but without result. The ore did not extend any distance.

One contract, No. 36, has been at work all the year on Lease No. 25 in the small lens of ore discovered last year. They followed the ore upwards with a raise to its limits and then mined with a shrinkage stope. At the end of the year but a small amount of ore remains to be broken and another month or two will suffice to complete the work at that point.

Two contracts have been at work in the ore found last year on Lease No. 24.

No. 35 is working a shrinkage stope and No. 51 are stoping out a small lens which is now about completed.

No. 28 finished taking the balance of the ore remaining above the level in the vicinity of Diamond Drill Hole No. 96 and no work is being done in that territory at present.

MORRIS LLOYD MINE.

UNDERGROUND  
MORRIS MINE

SIXTH LEVEL: Continued-

We continue slicing and caving west underneath the hanging in the large west ore lens on Lease No. 9 and an excellent product is being secured. We also have two gangs at work developing the bottom of the main deposit for mining on a sub level plan. One gang is engaged in putting in the two main drifts necessary and one gang is above the level putting in the sub levels.

A raise was put up through the ore body reported as being found by Drill Hole No. 56 last year. This raise went through to the 5th level mostly in lean material.

Some work was done during the year exploring the territory above this level penetrated by surface drill hole No. 58, but no ore of any great quantity was opened. No work is now being done here as the men are being used on development work elsewhere.

SEVENTH LEVEL:

We have wonderful good news to report from this level.

At the beginning of the year the crosscut south from the shaft to the ore measures was being driven. This crosscut broke through the footwall and at a determined point, two drifts were started west, in both of which large ore bodies of excellent quality were discovered.

In the north drift 80 feet of ore was encountered and in the south drift over 200 feet was cut.

Some exploration has been made in both of these ore bodies but not enough to make up definite estimates of tonnage but every indication points to a large amount of ore both above and below this level.

The footwall apparently has been faulted and pushed to the south at this elevation as slate was encountered in the north drift near the 1800 coordinate west and was entirely unexpected. A raise is now going up to explore this territory.

MORRIS LLOYD MINE.

UNDERGROUND  
MORRIS MINE

SEVENTH LEVEL: Continued-

The width of the ore in the north drift has been determined by putting up a raise just above the level and crosscutting south and the ore has been found to be 40 feet wide. The width of ore in the south drift was found by the same means to be 170 feet wide. Some of the ore in this south deposit has been found to run high in Manganese, some samples going as high as 2%.

A complete analysis of a lump of ore from this south deposit is as follows, Viz:

Iron	61.90
Phosphorus	.017
Silica	3.22
Alumina	2.89
Manganese	1.82
Lime	.85
Magnesia	.23
Sulphur	.014
Loss by Ignition	1.71

About 65 feet of ore in this south crosscut is of this character and the balance is our regular red and brown Hematite of non-bessemer grade, running high in Iron. The manganese ore is very soft and of a black color.

This crosscut is laid out on Chase Lease No. 9 and along the east line of said lease and the ore has been followed a distance of 250 feet south-west along the dike on this lease without determining its west boundary.

No work is now being done in this south deposit and we have started another main level drift to come west underneath this ore body.

One gang is at work driving a crosscut north from the raise 165 feet above the north drift to determine the location of the footwall and another crosscut 100 feet above this same north drift is being driven south to determine the width of the ore at that point.

This territory looks very promising at the end of the year and there is no doubt but what there will be proven a tremendous ore body to exist at depth.



MORRIS LLOYD MINE.

PUMP HOUSE AND SUMP

At the beginning of the year the sump on the 7th level was in process of being excavated. During the year this work was completed and the pumps installed and are now at work.

DIAMOND DRILLING

Five drill holes were put down during the year. No. 64 was being drilled at the beginning of the year on the 3rd level between the Lloyd and Section Six shafts and Nos. 65 and 66 were also drilled in the same territory. No new ore was found in any of these holes.

Holes Nos. 67 and 69 were drilled south from the long drift west on Chase Lease No. 26. No ore was cut in Hole No. 67, but two small runs were passed through in Hole No. 69. These lenses did not amount to anything we found after drifting in to same.

Hole No. 68 was drilled north from this same west drift on Lease No. 26 to determine the location of the footwall.

Hole No. 70 was drilled to ascertain whether or not the main ore lens on Lease No. 9 extended downward below the sixth level. No ore was cut by this hole.

While no ore in paying quantities was found in the long west drift across the Chase Leases the enriched character of the jasper and the small bunches of ore encountered would lead us to believe that at lower elevations, we should find some ore bodies.

UNDERGROUND  
LLOYD MINE

THIRD LEVEL:

We have continued slicing and caving in this central ore body above this level all the year and a fair product has been received. During the year a total of 40,980 tons were mined in this area.

MORRIS LLOYD MINE.

UNDERGROUND  
LLOYD MINE

THIRD LEVEL: Continued-

The ore limits have been quite definitely determined in this territory and no new ore was discovered here during the current year. We have added a few tons to our estimate due to extensions to our present ore areas.

FOURTH LEVEL:

No work has been done on this elevation during the year.

LLOYD EAST

FIRST SUB (1455')

We continue slicing and caving in this east ore body both under the open pit area and west underneath the hanging. The ore east of the line of main raises 51, 52 & 53 has been mined down below this main sub, but the ore to the west was found to extend further along the hanging and we are still working in ore above this main sub in that area. Two raises were brought up into this west territory from the main raises and this permits us to cut down the length of our trams and also to work more gangs on the elevation of this main sub.

We have increased our ore reserves on this main sub during the year on account of its west extension.

No. 17 raise has holed to this sub from the main 3rd level and this will provide an outlet for the ore to be mined in the lens to the north of this main sub level.

SECOND SUB (1305')

A small amount of ore was taken from the old workings on this level during the year but no work is now being done on this elevation, except the transferring to main raises the ore coming down from the contracts above, all mining now being confined to the territory above this level.

MORRIS LLOYD MINE.

UNDERGROUND  
LLOYD EAST

SECOND SUB (1305')  
CONTINUED-

A large product was received from this territory during the year and a total of 72,777 tons were mined from here.

While no large additions were made to the ore in sight in this end of the mine during the year, there still remains a large tonnage assuring a heavy product for years to come.

LEASES

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES

The following statement shows the condition of our royalty account on the different leases now in force in the North Lake District.

It will be noted that had it not been for the curtailment in working of the mines, we would have this year mined the minimum tonnage required for the Moore-Chase Leases on the Morris-Lloyd Mines. This due to the large excess mined on Lease No. 9 which can be applied on the other leases. No mining was done on Lease No. 31, Barnes-Hecker, except 213 tons taken from development work.

NORTH LAKE DISTRICT

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES

YEAR	LEASE NO. 9			LEASE NO. 24			LEASE NO. 25		
	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE
1908	2,283								
1919	10,000			1,088			1,088		
1910	10,000			15,000			15,000		
1911	10,000			15,000			15,000		
1912	10,000	968		15,000			15,000		
1913	10,000	15,345		15,000			15,000		
1914	10,000	36,267		15,000			15,000		
1915	10,000	67,740		15,000			15,000		
1916	10,000	68,524		15,000			15,000		
1917	10,000	34,514		15,000	2,569		15,000		
1918	10,000	24,002	145,077	15,000	288	133,231	15,000		136,088
1919	10,000	32,176	167,253	15,000	4,465	143,766	15,000		151,088
1920	10,000	32,907	190,160	15,000	18,707	140,059	15,000	1,481	164,607
1921	10,000	56,794	231,954	15,000	12,075	142,984	15,000	4,843	174,764
YEAR	LEASE NO. 26			LEASE NO. 27			LEASE NO. 28		
	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE
1909	1,088			1,088			545		
1910	15,000			15,000			7,500		
1911	15,000			15,000			7,500		
1912	15,000			15,000			7,500		
1913	15,000			15,000			7,500		
1914	15,000			15,000			7,500		
1915	15,000			3,750			1,875		
1916	15,000			3,750			1,875		
1917	15,000			15,000			7,500		
1918	7,500		128,588	7,500		106,088	3,750		53,045
1919	13,125		141,713	13,125		119,213	6,563		59,608
1920	15,000	1,292	155,421	15,000		134,213	7,500		67,108
1921	15,000	2,075	168,346	15,000	176	149,037	7,500		74,608
YEAR	LEASE NO. 31			GRAND TOTAL					
	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE			
1909									
1910									
1911	70,000								
1912	70,000								
1913	70,000								
1914	70,000								
1915	17,500								
1916	17,500								
1917	70,000								
1918	35,000		420,000	1,082,180	250,217	831,963			
1919	70,000		490,000	1,224,993	286,858	938,135			
1920	70,000		560,000	1,372,493	341,245	1,031,248			
1921	70,000	213	629,787	1,519,993	417,421	1,102,572			

NORTH LAKE DISTRICT

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES  
(CONTINUED)

The minimum royalties on the Chase Leases total 77,500 tons per year and we mined 75,963 tons during the year just closed.

The minimum on Barnes-Hecker Lease No. 31 is 70,000 tons per year. We did not get mining on this lease due to the large flow of water encountered.

It will be noted that the back royalties at the close of the year total 472,785 tons on the Chase Leases and 629,787 tons on Lease No. 31, Barnes-Hecker, making a total of 1,102,572 tons accrued for this district.

MADE IN U.S.A.

MORRIS-LLOYD MINE

ORE IN SIGHT DECEMBER 31ST, 1921.

Following is an estimate of ore in sight as of December 31st, 1921,  
calculating a deduction of 20% for rock and loss in mining, - Viz.:

MORRIS MINE

LOCATION OF ORE	BESSEMER ORE	MORRIS ORE	TOTAL TONS
Above 4th Lev. (Chase Lease #9)		37,544	37,544
" " " (C.C.I.Co. Land)		100,529	100,529
" 6th " (Chase Lease #9)		280,394	280,394
" " " (Chase Lease #24)		15,357	15,357
" " " (Chase Lease #25)		2,923	2,923
" " " (Chase Lease #26)		2,309	2,309
" " " (C.C.I.Co. Land)		143,643	143,643
" 7th " (Chase Lease #9)	47,568	142,710	190,278
" " " (C.C.I.Co. Land)	26,401	79,203	105,604
Below " " (Chase Lease #9)	18,136	54,406	72,542
" " " (C.C.I.Co. Land)	9,765	29,297	39,062
<u>PROSPECTIVE ORE</u>			
Above 4th Lev. (C.C.I.Co. Land)		3,125	3,125
" 7th " (Chase Lease #9)		61,751	61,751
" " " (Chase Lease #24)		57,551	57,551
" " " (Chase Lease #25)		1,313	1,313
" " " (Chase Lease #26)		3,166	3,166
" " " (C.C.I.Co. Land)		72,534	72,534
<b>TOTAL ORE, MORRIS MINE,</b>	<b>101,870</b>	<b>1,087,755</b>	<b>1,189,625</b>

LLOYD MINE

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS
Above 3rd Level	165,963		165,963
<u>PROSPECTIVE ORE</u>			
Below 3rd Level,	6,111		6,111
<b>TOTAL ORE, LLOYD MINE,</b>	<b>172,074</b>		<b>172,074</b>

MORRIS LLOYD MINE

ORE IN SIGHT DECEMBER 31ST, 1921

(CONTINUED)

LLOYD EAST

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS
Above 1455' Sub Level	27,053	9,016	36,069
" 1305' " "	190,171	63,390	253,561
" 1155' " "	43,075	209,727	252,802
" 1055' " "	10,752	89,964	100,716
" 3rd Level,	27,826	117,306	145,132
Above and below 4th Level,	209,754	629,261	839,015
PROSPECTIVE ORE			
Above 1455' Sub Level	1,039	3,118	4,157
" 1305' " "	2,708	8,126	10,834
" 1155' " "	2,264	2,265	4,529
" 1055' " "	9,000	21,000	30,000
<b>TOTAL LLOYD EAST,</b>	<b>523,642</b>	<b>1,153,173</b>	<b>1,676,815</b>

SUMMARY OF TOTAL ORE

MINE	BESSEMER	LLOYD & MORRIS	LLOYDDALE	TOTAL TONS
Morris, Lloyd, Lloyd East,	101,870	1,087,755 172,074	1,153,173	1,189,625 172,074 1,676,815
<b>GRAND TOTAL,</b>	<b>101,870</b>	<b>1,783,471</b>	<b>1,153,173</b>	<b>3,038,514</b>

	MORRIS MINE		TOTAL	LLOYD MINE		TOTAL	GRAND TOTAL TONS
	BESSEMER	MORRIS ORE	MORRIS MINE	LLOYD ORE	LLOYDDALE	LLOYD MINE	
Total ore developed,	101,870	888,315	990,185	674,594	1,118,664	1,793,258	2,783,443
Total Prospective ore,		199,440	199,440	21,122	34,509	55,631	255,071
<b>TOTAL,</b>	<b>101,870</b>	<b>1,087,755</b>	<b>1,189,625</b>	<b>695,716</b>	<b>1,153,173</b>	<b>1,848,889</b>	<b>3,038,514</b>

Total ore on Chase Lease No. 9,	642,509	Tons
" " " " " No. 24	72,908	"
" " " " " No. 25	4,236	"
" " " " " No. 26	5,475	"
Total ore on all Chase Leases,	725,128	"
Total ore on Company Lands,	2,313,386	"
<b>GRAND TOTAL,</b>	<b>3,038,514</b>	<b>"</b>

BARNES HECKER MINE.

GENERAL

At the beginning of the year drifting was underway on the first and third levels in this property.

On January 22nd a heavy flow of water was encountered in the first level drift and the pressure was so great that when blocked off with timber and lagging on the sides of the opening, the water immediately broke out again in the breast and washed the ground in such a way that it could not be held up. We were compelled to breast off the drift with timber and no work has been done there since.

On the third level, at a point 2200 feet from the shaft, we encountered ore and continued in same for a distance of forty feet. The ore was not clean and seams of jasper showed up but analysis of some of the samples were as high as 62.50% Iron. The average Iron was 56.59%. We took out and placed on stockpile 213 tons ore from this drift analyzing 58.92% Iron, .066 Phosphorus.

The flow of water increased with each foot advanced in this drift and on February 24th, the motor on our second level pump burned out and we were compelled to discontinue all operations and dam off the drifts as we were making more water than the pumps could handle.

At this time it was decided to excavate a ditch to divert the water on surface away from and around the swamp area overlying this property, in order to do away with the possibility of the water being pumped finding its way back into the mine.

It was also decided that all work, except pumping, at the property be discontinued until this ditch had been completed.

DITCH

The ditch was started on February 3rd, 1921 and completed on July 28th, 1921. The total length of the ditch was 8,470 feet and the total yardage moved was 50,060 cubic yards.



BARNES HECKER MINE.

DITCH  
(CONTINUED)

The total cost of the work was \$14,502.27.

A small revolving steam shovel was used in this work and proved very successful.

DRIFTING

FIRST LEVEL:

This opening has reached a point 1673 feet from the shaft and at the time the rush of water was encountered seemed to have just entered the ore zone.

During December month orders were received to go ahead with the work on this level and endeavor to develop the ore and if possible take out a slice over the ore area and cover same in such a manner as to compel all water being made on and above this elevation to flow out on this level and thereby prevent it from going down through the formation to the 2nd and 3rd levels. If this water can be kept out of the area below the first level it may be possible to go ahead with the development work in that territory.

The dam on this first level has been opened and the work of cleaning up the level is underway. As soon as this is completed, drifting will be started.

SECOND LEVEL:

This level is in a distance of 1856 feet from the shaft. No work of any kind has been done on this elevation during the year.

THIRD LEVEL:

This opening is in a distance of 2274 feet from the shaft.

Small progress was made during the first months of the year while working, due to the heavy flow of water. We encountered about forty feet of ore just prior to stopping work. This ore was not clean, being mixed with jasper seams. Not enough work has been done to determine the extent of the ore deposit.

Nothing has been done on this level since February month.

BARNES HECKER MINE.

MINE DAMS

Concrete dams were constructed on all three levels during 1920 and when it was decided to stop work until the diversion ditch had been completed, concrete plugs were placed in all these dams shutting off all water except a certain amount of leakage which had to be pumped.

These dams saved the mine from being drowned out at the time the motor on the pump burned out. Had we been unable to close off the drifts and hold back the water we would have been in real trouble and the mine would have been drowned out.

PUMPING

After the diversion ditch was completed the dams on the three levels were opened and pumping commenced. At the close of the year the water keeps coming in the same volume as when the dams were opened.

There is a thick overburden of water saturated sand overlying this property and it will take considerable time to get this underground lake pumped down to ledge. No decrease in the flow of water can reasonably be expected until this is accomplished.

On December 24th, a pump was started to unwater North Lake and at the end of the year the water had been lowered about three feet.

One four thousand G.P.M. pump is now at work and another pump of two thousand G.P.M. is being made ready for this work.

ACCIDENTS

We are glad to be able to report that no fatal or serious accidents occurred at this property during the year.

BARNES HECKER MINE. .

GENERAL

The water problem at this property is a very serious one and it is bound to make the development and mining of the ore a very high cost of production.

Every effort will be made from now on to determine the extent of the ore deposit in this property and properly mine the same.

Now that our ditch has been completed and North Lake in process of being dewatered, we are assured that none of the water we are now handling is finding its way back into the mine.

MORRIS LLOYD MINE.

ANALYSIS OF COST SHEETS, EXPLAINING INCREASE OR  
DECREASE IN VARIOUS ACCOUNTS BETWEEN THE YEAR 1920 AND 1921.

UNDERGROUND COSTS

ACCOUNT  
EXPLORING IN MINE

Year 1921	5,869.79	Cost Per Ton	.028
" 1920	<u>3,292.19</u>	" " "	<u>.013</u>
Increase,	2,577.60	" " "	.015

This increase is due to more diamond drilling in 1921 than the previous year.

ACCOUNT  
SINKING IN SHAFT

Year 1921	0	Cost Per Ton	0
Year 1920	<u>1,623.42</u>	" " "	<u>.006</u>
Decrease	1,623.42	" " "	.006

The cost for 1920 was for finishing the last lift in the Morris shaft. No sinking was done in 1921.

ACCOUNT  
DEVELOPMENT IN ROCK

Year 1921	30,541.83	Cost Per Ton	.146
Year 1920	<u>24,208.92</u>	" " "	<u>.092</u>
Increase	6,332.91	" " "	.054

The increase in this account is due to the greater amount of rock drifting done this year. The price per foot shows a decrease of \$3.05 which is due in a large measure to the decrease in wages. We drifted 4303 feet in 1921 compared with 3062 feet in 1920.

ACCOUNT  
DEVELOPMENT IN ORE

Year 1921	28,688.12	Cost Per Ton	.137
Year 1920	<u>0</u>	" " "	<u>0</u>

This account was not shown for 1920 and appears in 1921 cost sheet, due to change in card of accounts.

ACCOUNT  
STOPPING

Year 1921	131,709.05	Cost Per Ton	.63
Year 1920	<u>235,493.29</u>	" " "	<u>.900</u>
Decrease	103,784.24	" " "	.27

The decrease this year is due to the decrease in wages and curtailment of operations. The cost for development in ore was shown under this heading for 1920, which will also account for a larger part of this decrease as all drifting in ore on main levels is now charged to "Development in Ore."

MORRIS LLOYD MINE.

UNDERGROUND COSTS

ACCOUNT  
TIMBERING

Year 1921	65,057.14	Cost Per Ton	.311
Year 1920	<u>89,135.08</u>	" " "	<u>.341</u>
Decrease	24,077.94	" " "	.03

The decrease in this account is due to the decrease in wages and curtailment of operations.

ACCOUNT  
TRAMMING

Year 1921	46,505.28	Cost Per Ton	.222
Year 1920	<u>65,943.43</u>	" " "	<u>.252</u>
Decrease	19,438.15	" " "	.03

The decrease in this account is due to the decrease in wages and curtailment of operations.

ACCOUNT  
VENTILATION

Year 1921	1,397.67	Cost Per Ton	.007
Year 1920	<u>291.88</u>	" " "	<u>.001</u>
Increase	1,105.79	" " "	.006

The increase in this account is due to ventilating equipment used in opening the 7th level in the Morris Mine. The cost for 1920 being only for repairs and power used in ventilating the sixth level drift west across the Chase Leases in the Morris Mine.

ACCOUNT  
PUMPING

Year 1921	22,980.14	Cost Per Ton	.110
Year 1920	<u>20,546.42</u>	" " "	<u>.078</u>
Increase	2,433.72	" " "	.032

The increase in this account is due to a larger volume of water pumped, due to opening up the 7th level, Morris shaft. This necessitated putting on another pumpman on each shift to attend the new pump plant installed on the seventh level of the Morris Mine.

MAINTENANCE COSTS

ACCOUNT  
COMPRESSORS RECEIVERS  
AND AIR PIPES

Year 1921	32,855.86	Cost Per Ton	.157
Year 1920	<u>34,115.16</u>	" " "	<u>.130</u>
Decrease	1,259.30	" " "	.027

The cost per ton is higher this year due to opening up the 7th level at the Morris and working full time on the development work in the Morris Mine. The decrease in the amount expended is due to decrease in wages.

MORRIS LLOYD MINE.

MAINTENANCE COSTS

ACCOUNT  
UNDERGROUND SUPERINTENDENCE

Year 1921	14,540.13	Cost Per Ton	.070
Year 1920	<u>22,241.13</u>	" " "	<u>.085</u>
Decrease	7,701.00	" " "	.015

The decrease in this account is due to curtailment of operations and decrease in wages.

ACCOUNT  
CAVE IN

Year 1921	98.66	Cost Per Ton	0
Year 1920	<u>24.05</u>	" " "	<u>0</u>
Increase	74.61	" " "	0

The increase in this account is due to fencing and ditching around caved ground near Section 6 shaft.

ACCOUNT  
HAND TRAM EQUIPMENT

Year 1921	2,265.58	Cost Per Ton	.011
Year 1920	<u>2,047.22</u>	" " "	<u>.008</u>
Increase	218.36	" " "	.003

The increase in this account is due to increase in the upkeep of the small hand tram cars, a number of the cars being rebuilt this year and new cars built.

ACCOUNT  
ELECTRIC TRAM EQUIPMENT

Year 1921	19,135.93	Cost Per Ton	.092
Year 1920	<u>24,959.45</u>	" " "	<u>.095</u>
Decrease	5,823.52	" " "	.003

Decrease in this account is due to the reduction in wages and curtailment of operations. During this year a cable for the haulage motors on the 7th level, Morris shaft, was installed.

ACCOUNT  
PUMPING MACHINERY

Year 1921	3,280.15	Cost Per Ton	.016
Year 1920	<u>8,575.14</u>	" " "	<u>.033</u>
Decrease	5,294.99	" " "	.017

The cost for 1921 is only for upkeep of the pumping equipment. In 1920 both large Prescott pumps on the 4th level were practically rebuilt and new oil guards placed on gears.

MORRIS LLOYD MINE.

SURFACE COSTS

ACCOUNT  
HOISTING

Year 1921	16,378.17	Cost Per Ton	.078
Year 1920	<u>24,036.55</u>	" " "	<u>.092</u>
Decrease	7,658.38	" " "	.014

The decrease this year is due to reduction in wages and curtailment of operations.

ACCOUNT  
STOCKING ORE

Year 1921	9,003.57	Cost Per Ton	.043
Year 1920	<u>16,976.92</u>	" " "	<u>.064</u>
Decrease	7,973.35	" " "	.021

The decrease this year is due to reduction in wages and curtailment of operations and less work re-erecting stocking trestles due to small shipments.

ACCOUNT  
SCREENING AND  
CRUSHING AT MINE

Year 1921	955.88	Cost Per Ton	.005
Year 1920	<u>3,040.32</u>	" " "	<u>.012</u>
Decrease	2,084.44	" " "	.007

The decrease this year is due to reduction in wages and curtailment of operations, also there was a marked decrease in tonnage shipped from pockets, a large percentage of pocket ore usually being crushed at the mine crusher.

ACCOUNT  
DRY HOUSE EXPENSE

Year 1921	8,288.64	Cost Per Ton	.040
Year 1920	<u>10,678.43</u>	" " "	<u>.041</u>
Decrease	2,389.79	" " "	.001

The decrease this year is due to reduction in wages and curtailment of operations.

ACCOUNT  
GENERAL SURFACE

Year 1921	3,947.99	Cost Per Ton	.019
Year 1920	<u>5,871.88</u>	" " "	<u>.022</u>
Decrease	1,923.89	" " "	.003

The decrease in this account is due to reduction in wages also few improvements to the grounds about the several mine buildings were made during the year. The cost this year is only for the general upkeep of the mine grounds.

MORRIS LLOYD MINE.

MAINTENANCE COSTS

ACCOUNT  
HOISTING EQUIPMENT

Year 1921	5,368.17	Cost Per Ton	.026
Year 1920	<u>9,200.12</u>	" " "	<u>.035</u>
Decrease	<u>3,831.95</u>	" " "	<u>.009</u>

This decrease is due to curtailment of operations, also in 1920 new signal cables were installed in the Morris shaft and two new pinions on hoists.

ACCOUNT  
SHAFT

Year 1921	1,961.11	Cost Per Ton	.009
Year 1920	<u>2,246.34</u>	" " "	<u>.009</u>
Decrease	<u>285.23</u>	" " "	<u>.000</u>

The cost this year is only for the usual upkeep of the shafts and pockets underground.

ACCOUNT  
TOP TRAM EQUIPMENT

Year 1921	1,987.45	Cost Per Ton	.009
Year 1920	<u>3,009.94</u>	" " "	<u>.012</u>
Decrease	<u>1,022.51</u>	" " "	<u>.003</u>

No extraordinary expenditures were made this year for this account, this cost representing only the usual upkeep of the equipment.

ACCOUNT  
DOCKS TRESTLES  
AND POCKETS

Year 1921	3,821.49	Cost Per Ton	.018
Year 1920	<u>886.25</u>	" " "	<u>.003</u>
Increase	<u>2,935.24</u>	" " "	<u>.015</u>

The large increase in this account this year is due to making additional stocking room and putting up additional trestles to take care of the product. Total shipments this year are 65,850 tons against 200,388 tons last year.

ACCOUNT  
MINE BUILDINGS

Year 1921	815.98	Cost Per Ton	.004
Year 1920	<u>1,276.82</u>	" " "	<u>.005</u>
Decrease	<u>460.84</u>	" " "	<u>.001</u>

No extraordinary expenditures were made this year for this account, the cost representing only the usual upkeep of the mine buildings.



MORRIS LLOYD MINE.

GENERAL MINE ACCOUNTS

ACCOUNT  
INSURANCE

Year 1921	204.24	Cost Per Ton	.001
Year 1920	<u>203.24</u>	" " "	<u>.001</u>
Increase	1.00		.000

No change is noted in this account, the cost being only for the regular fire insurance.

ACCOUNT  
ENGINEERING

Year 1921	2,876.57	Cost Per Ton	.014
Year 1920	<u>2,967.41</u>	" " "	<u>.011</u>
Decrease	90.84	Increase	.003

The cost this year is for the usual engineering expense.

ACCOUNT  
ANALYSIS

Year 1921	7,110.99	Cost Per Ton	.034
Year 1920	<u>8,566.31</u>	" " "	<u>.033</u>
Decrease	1,455.32	Increase	.001

The decrease in this account is due to reduction in wages. In 1921 there were 31,385 determinations as compared with 34,022 in 1920. Less determinations this year due to small shipments.

ACCOUNT  
PERSONAL INJURY

Year 1921	3,332.85	Cost Per Ton	.016
Year 1920	<u>8,418.96</u>	" " "	<u>.032</u>
Decrease	5,086.11	" " "	.016

A large decrease in this account is due to the loss on the Ishpeming Hospital being carried in contingent expense this year, whereas, last year it was shown under Personal Injury Expense. Our total Personal Injury Expense this year is \$3332.85 compared with \$4897.21 last year.

ACCOUNT  
SAFETY DEPARTMENT

Year 1921	93.31	Cost Per Ton	.000
Year 1920	<u>136.53</u>	" " "	<u>.001</u>
Decrease	43.22	" " "	.001

This cost is only for the regular first aid practices and the supplies used in same.

MORRIS LLOYD MINE.

GENERAL MINE ACCOUNTS

ACCOUNT  
GENERAL WELFARE

Year 1921	4,022.83	Cost Per Ton	.019
Year 1920	<u>3,893.92</u>	" " "	<u>.015</u>
Increase	128.91	" " "	.014

The charges to this account are made at the Central Office and include, Club House and other local welfare expenses and the total is about the same as for last year.

ACCOUNT  
MINE OFFICE

Year 1921	14,663.17	Cost Per Ton	.070
Year 1920	<u>14,984.17</u>	" " "	<u>.057</u>
Decrease	321.00	Increase	.013

The decrease in this account is due to reduction in wages.

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MORRIS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1921.

GRADE	IRON	PHOS.	SILICA.
Morris Bessemer,	(No Production)		
Morris,	58.54	.081	7.92
Morrisville,	51.99	.073	17.38

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1921.

GRADE	IRON	Mine PHOS.	SILICA	Lake Erie IRON	Erie MOIST.
Morris Bessemer,	(No Shipments)				
Morris,	58.44	.082		58.57	11.09
Morrisville,	49.78	.071	20.43	51.32	8.94

ORE STATEMENT - DECEMBER 31ST, 1921.

	MORRIS BESSEMER	MORRIS	MORRISVILLE	TOTAL	TOTAL LAST YEAR
On hand January 1, 1921,	0	26,917	52,514	79,431	70,231
Output for Year,	0	68,593	30,179	98,772	79,372
Transferred,		271	3,224	3,495	
Total,	0	95,239	79,469	174,708	149,277
Shipments,		7,868	4,620	12,488	69,846
Balance on Hand,		87,371	74,849	162,220	79,431
Increase in Output,				19,400	
Increase in Ore on Hand,				82,789	

1921 -- 2-8 Hour Shifts, 6 days per week, Jan. 1st to March 5th, 1921.  
 2-8 Hour Shifts, 5 days per week, March 5th to June 1st, 1921.  
 1-4 Hour Shift, 6 days per week, June 1st to Dec. 31st, 1921.

1920 -- 2-8 Hour Shifts for Year.

MORRIS MINE  
SHIPMENTS FOR YEAR 1921

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Morris Bessemer,	0	0	0	7,789
Morris,	51	7,817	7,868	55,320
Morrisville,	56	4,564	4,620	6,737
Total,	107	12,381	12,488	69,846
Total Last Year,	31,776	38,070	69,846	
Decrease,			57,358	

LLOYD MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1921.

GRADE	IRON	PHOS.	SILICA
Lloyd,	58.70	.113	6.56
Lloyddale,	61.13	.244	4.30
North Lake Silica,	54.15	.092	12.69

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1921.

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Lloyd,	58.16	.125	58.41	11.44
Lloyddale,	(No Shipments)			
North Lake Silica,	50.90	.088	18.86	8.82

ORE STATEMENT - DECEMBER 31ST, 1921.

	LLOYD	LLOYDDALE	NO. LAKE SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1, 1921,	33,840	73,821	39,077	146,738	94,554
Output for Year,	94,741	171	15,350	110,262	182,726
Total,	128,582	73,992	57,651	260,495	277,280
Shipments,	38,582	0	14,780	53,362	130,542
Balance on Hand,	90,270	73,992	42,871	207,133	146,738
Decrease in Output,				68,969	
Increase in Ore on Hand,				60,395	

1921 -- 2-8 Hour Shifts, 6 days per week, Jan. 1st to March 5th, 1921.  
 2-8 Hour Shifts, 5 days per week, March 5th to June 1st, 1921.  
 1-4 Hour Shifts, 6 days per week, June 1st to Dec. 31st, 1921.

1920 -- 2-8 Hour Shifts for Year.

LLOYD MINE

SHIPMENTS FOR YEAR 1921

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lloyd,	20,745	17,837	38,582	94,003
Lloyddale,	0	0	0	11,438
North Lake Silica,	4,104	10,676	14,780	25,101
Total,	24,849	28,513	53,362	130,542
Total Last Year,	103,887	26,655	130,542	
Decrease,			77,180	

MORRIS-LLOYD MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
PRODUCT	209,034	261,772		52,738
Underground Costs	1.945	2.042		.097
Surface Costs	.251	.301		.050
General Mine Accounts	.156	.155	.001	
Cost of Production	2.352	2.498		.146
Original Cost	.039	.048		.009
Plant Account	.268	.261	.007	
Extraordinary Drifting	.094	.079	.015	
Taxes	.279	.218	.061	
Central Office	.094	.084	.010	
Contingent Expense	.048		.048	
Cost Adjustment	.096	.056	.040	
Cost on Stockpile	3.270	3.244	.026	
Loading & Shipping	.013	.059		.046
Total Cost on Cars	3.283	3.303		.020
No. Days Operating	289	300		2
No. Shifts & Hours	2-8;1-4	2-8		
Avg. Daily Product	723	873		150
<u>COST OF PRODUCTION</u>				
Labor	1.482	1.759		.277
Supplies	.870	.739	.131	
Total	2.352	2.498		.146

MORRIS-LLOYD MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
PRODUCT	209,034	261,772		52,738
No.Shifts and Hours	2-8;1-4	2-8hr		
AVERAGE NO.MEN WORKING				
Surface	47	47		
Underground	229	201	28	
Total	276	248	28	
AVERAGE WAGES PER DAY				
Surface	4.54	5.46		.92
Underground	5.26	6.42		1.16
Total	5.13	6.23		1.10
WAGES PER MONTH OF 25 DAYS				
Surface	113.50	136.50		23.00
Underground	131.50	160.50		29.00
Total	128.25	155.75		27.50
PRODUCT PER MAN PER DAY				
Surface	18.78	17.65	1.13	
Underground	4.22	4.32		.10
Total	3.44	3.47		.03
LABOR COST PER TON				
Surface	.242	.309		.067
Underground	1.248	1.484		.136
Total	1.490	1.793		.203
AVG.PRODUCT BRK'G & TRM'G	6.74	6.91		.17
" WAGES CONTRACT MINERS	5.64	6.84		1.20
" " " LABOR	5.64	6.84		1.20
TOTAL NUMBER OF DAYS				
Surface	11,130	14,831 $\frac{1}{2}$		3,701 $\frac{1}{2}$
Underground	49,595 $\frac{3}{4}$	60,558 $\frac{1}{4}$		10,962 $\frac{1}{2}$
Total	60,725 $\frac{1}{4}$	75,389 $\frac{3}{4}$		14,664
AMOUNT FOR LABOR				
Surface	50516.44	90964.63		40,448.19
Underground	260903.74	388517.51		127613.77
Total	311420.18	479482.14		168062.96

Proportion Surface to Underground Men:

1921 - 1 to 4.9	2-8hr 6 days a week to Mar.5;
1920 - 1 to 4.4	2-8hr 5 " " Mar.5 to May 31;
1919 - 1 to 4.4	1-4hr 6 " " June 1st to Dec.31st.
1918 - 1 to 4.24	
1917 - 1 to 4.57	



MORRIS-LLOYD MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1921.

KIND.	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1921	AMOUNT 1920
6" to 8" Timber	79,269	.0595	4,716.50	2,348.24
8 to 10 "	41,466	.1034	4,289.50	5,441.19
10 to 12 "	14,504	.124	1,920.49	3,140.71
12 to 14 "				242.40
Total - 1921	136,239	.082	10,926.49	
Total - 1920	144,159	.078		11,172.54
	LINEAL FEET	PER 100'		
5' Lagging	326,400	.938	3,062.00	3,742.32
8' "	372,130	1.222	4,547.84	3,471.68
Total Lagging	698,530	1.089	7,609.84	7,214.00
Poles	48,168	1.69	812.45	791.03
Total - 1921	746,698	1.128	8,422.29	
Total - 1920				8,005.03
Product			209,034	261,772
Feet timber per ton of ore			.652	.551
" lagging "			3.34	2.71
" " " foot of timber			5.13	4.92
Cost per ton for timber			.0522	.0426
" " lagging			.0364	.0276
" " poles			.0039	.003
" " timber, lagging & poles			.0925	.0732
Equivalent of stull timber to bd.measure			188,429	211,946
Feet bd.measure per ton of ore			.90	.81

Total cost for timber, lagging & poles - 1920	19348.78
1920	19177.57
1919	17277.93
1918	15676.42
1917	19623.30
1916	20682.74
1921 Mine operated full time Jan. & Feb. 1915	14219.21
" " 5 days per week Mar. Apr. May	

Balance of year 4 hours per day - 1 shift;  
 Development work was carried on in Morris shaft at full time greater part of the year, using a larger amount of 6" to 8" stulls for raising, etc.

MORRIS-LLOYD MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1921	AMOUNT 1920
40% Powder - - - - -	119,729	.1681	20,136.62	23,281.12
60% " - - - - -	28,600	.2128	6,087.10	2,345.26
Total Powder	148,329	.1767	26,223.72	25,626.38
Fuse - - - - -	398,560	7.50	3,012.31	3,911.44
Caps - - - - -	34	.88	29.79	10.93
Tamping Bags - - - - -	11,500	2.15	24.71	56.80
Total Fuse, Etc.			4,034.95	5,251.02
Total Explosives			30,258.67	30,877.40
Product - - - - -			209,034	261,772
Pounds Powder per ton of ore			.709	.57
Cost Per ton for Powder			.125	.0979
" " " " Fuse, Caps, Etc			.019	.0200 $\frac{1}{2}$
" " " " All Explosives			.144	.1180
Avg. Price per lb. for Powder			.1767	.1722

NOTE:

Mine operated full time January and February;  
 " " 5 days per week - March, April and May;  
 Balance of year - 4 hours per day - 1 shift;  
 Development work was carried on in the Morris shaft at full time  
 the greater part of the year, using 60% Powder, which will account  
 for the increase in the cost per ton for year.

Mr. M. M. Duncan, Vice-Pres. & Gen. Mgr.,

Ishpeming, Michigan.

Dear Sir:

I beg to submit the following report of the work done in the Gwinn District for the year ending December 31st, 1921.

The various subjects have been taken up under the following heads:

GENERAL REMARKS

AUSTIN MINE

STEPHENSON MINE

PRINCETON MINE

GWINN MINE

FRANCIS MINE

GARDNER AND MACKINAW MINES.

GENERAL SURFACE.

ANALYSIS OF COST SHEETS.

- - - - -

GENERAL REMARKS:

The product of the Gwinn District Mines for the years 1921  
and 1920 was as follows:

	<u>1921</u>	<u>1920</u>	<u>INCREASE</u>	<u>DECREASE</u>
Stephenson Mine,	196,539	174,782	21,757	
Princeton "	97,150	156,746		59,596
Gwinn "	* 63,501	96,595		33,094
Francis "	71,075	80,056		8,981
Mackinaw "	** 159	72,990		72,831
Gardner "	0	57,398		57,398
Austin "	0	0		
TOTAL,	428,424	638,567		
DECREASE, 1921,				210,143

\* Includes 15,000 tons in stock at end of year.  
" 5,502 " over-run from shipments.

\*\* Overrun from shipments.

The operating mines worked six days per week until the latter part of March, when they went on a 5-day per week basis. They operated 5 days per week until June 1st, when they started operating on a half-time basis.

The Stephenson and Francis Mines operated the entire year. Ore was hoisted on both the day and night shift at the Stephenson Mine until June 1st, when the mines went on half-time basis, since which time ore has been hoisted on the day shift only.

The Francis hoisted all ore on day shift, until June 1st, when it went on half-time basis, after which ore was hoisted on the morning shift only, until in November, when hoisting was continued through the day shift. At this time the miners started working alternate days, which kept them on half-time basis, this change being made on account of a shortage of working places in ore.

The Princeton Mine operated on day shift until June 1st, the ore was hoisted on both day and night shift up to this time. It went

on half-time basis June 1st, ore being hoisted on the day shift only, and continued to operate on this basis until the mine closed down on August 27th.

The Gwinn Mine operated on single shift until May 31st, 1921, when it closed down.

The Gardner-Mackinaw Mine closed down in November, 1920, and was idle throughout the year 1921.

The Austin Mine did not operate either in 1920 or 1921.

The following table gives the ore in stock at the mines in the Gwinn District at the end of the year 1921 and 1920:

	<u>1921</u>	<u>1920</u>	<u>INCREASE</u>	<u>DECREASE</u>
Stephenson Mine,	229,664	110,202	119,462	
Princeton "	243,460	170,226	73,234	
Gwinn "	15,000	16,014		1,014
Francis "	166,842	111,987	54,855	
Mackinaw "	24,408	44,138		19,730
Gardner "	76,598	76,598	-	-
Austin "	8,970	8,970	-	-
TOTAL,	764,942	538,135		
INCREASE, 1921,			226,807	

There has been no shortage of labor in the district during 1921. The problem of finding employment for the idle men started with the closing of the Gwinn Mine on May 31st. The number of idle men was further increased by the shut-down of the Princeton Mine on August 27th, and at the end of the year it was estimated there were about seventy-five idle men in the district. A considerable number have returned to their native countries to spend the winter rather than to work here on a half-time basis.

On January 1st, 1921, there were 709 men employed in the district, on December 31st, 1921, there were 422 men, the decrease for the year

being 287 men.

There has been no building during the past year. All of the company houses in the district, outside the Gardner-Mackinaw Location were occupied at the end of the year. At least one-half of the houses at the Gardner-Mackinaw are unoccupied; the balance have tenants who are employed at the Francis Mine.

On November 1st, Mr. J. R. Reigart, Assistant Superintendent, tendered his resignation. He left this district to accept the Superintendency of the United Comstock Mines Company property at Gold Hill, Nevada, where he felt the opportunities for advancement were much greater. His departure was regretted by everyone in the district.

On the night of October 27th, fire broke out in the hotel block beneath Koski & Company's store. The two store buildings were completely gutted, and twelve rooms of the hotel above the stores were also badly damaged. The origin of the fire is unknown. It was only by hard work on the part of the volunteer fire department of Gwinn that it was possible to gain control of the fire and save the main hotel building. The work of rebuilding was started in a few days and repairs were practically completed at the end of the year.

AUSTIN MINE.

The Austin Mine was idle during 1921, and there were no shipments from stockpile.

The ore in stock December 31st, 1921, was as follows:

Austinport, 8,970 tons.

The ore in sight on December 31st, 1921, was as follows:

	<u>AUSTIN BESSEMER</u>	<u>AUSTIN</u>	<u>AUSTINPORT</u>	<u>TOTAL</u>
Above 1st Level,	12,000	3,000	9,416	24,416
" 2nd "	36,800	5,251	20,700	62,751
" 3rd "	28,600	4,100	16,326	49,026
" 4th "	9,600	1,623	5,550	16,773
" 5th "	3,180	562	1,860	5,602
TOTAL TONS,	90,180	14,536	53,852	158,568

This is the same estimate as was submitted in the Annual Reports for the years 1919 and 1920; there were no changes, due to the mine not operating during 1921.

The estimated tonnage in the mine, sub-divided as required by the Tax Commission, is as follows:

	<u>AUSTIN BESSEMER</u>	<u>AUSTIN</u>	<u>AUSTINPORT</u>	<u>TOTAL</u>
Bessemer Ore:				
1. Developed,	90,180			
2. Prospective				
Non-Bessemer Ore:				
1. Developed,		14,536		
2.			53,852	
1. Prospective,				
2. D				
TOTAL,				158,568

AUSTIN - - UNDERGROUND.

Several inspections of the underground workings were made during 1921. A few sets have broken down in some of the drifts, but nothing has occurred that cannot be repaired a short time after the mine re-opens.

AUSTIN SURFACE.

Some repairs to No. 1 Shaft house were made in the fall, and a few repairs will be required before the mine re-opens in April, 1922.

All mining timber in stock was used at the Princeton and Stephenson during the past summer. There is a stock of 5-ft. and 8-ft. lagging at the mine but cribbing and stull timber has been ordered for delivery during the winter, in anticipation of opening the mine next April.

GENERAL REMARKS:

An agreement was made with the fee owners, the Escanaba River Land & Iron Co., November 26th, 1920, in which The Cleveland-Cliffs Iron Company agrees to remove the ore within five years from the above date, or before November 26th, 1925. Plans have been made to re-open the mine in April, 1922; this leaves 3-1/2 years in which to exhaust the ore. The mine will have to be operated continuously and plans have been made for stocking in the winter months. The present shaft can perhaps be used for six months, provided no further settlement takes place, after which the ore will have to be hoisted through the incline shaft, commonly called "No. 2". Material for stocking trestles and loading pocket to be used in connection with No. 2 Shaft, has been ordered, and some of it has arrived at the Mine. The balance of construction work necessary for the operation of No. 2 Shaft must be completed early in 1922.



AUSTIN MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1921.

GRADE	IRON	PHOS.	SILICA	MANG.
Austin Bessemer,	(No Production)			
Austin,	(No Production)			
Austinport,	(No Production)			

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1921.

GRADE	Mine	IRON	PHOS.	SILICA	MANG.
Austin Bessemer,	(No Shipments)				
Austin,	(No Shipments)				
Austinport,	(No Shipments)				

ORE STATEMENT - DECEMBER 31ST, 1921.

	AUSTIN BESSEMER	AUSTIN	AUSTINPORT	TOTAL	TOTAL LAST YEAR
On hand January 1, 1921,	0	0	8,970	8,970	12,562
Output for Year,	0	0	0	0	73
Total,	0	0	8,970	8,970	12,635
Shipments,	0	0	0	0	3,665
Balance on Hand,	0	0	8,970	8,970	8,970

1921 -- Mine Idle during Year.

1920 -- Mine Idle during Year.

AUSTIN MINE

SHIPMENTS FOR YEAR 1921.

	GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Austin Bessemer,		0	0	0	3,231
Austin,		0	0	0	434
Austinport,		0	0	0	0
Total,		0	0	0	3,665
Total Last Year,		0	3,665	3,665	
Decrease,				3,665	

*Warranted*

*Quality*

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AUSTIN MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
PRODUCT		73		
No. Shifts and Hours				
AVERAGE NO. MEN WORKING				
Surface	2	2		
Underground				
Total	2	2		
AVERAGE WAGES PER DAY				
Surface	4.12	5.27		1.15
Underground				
Total	4.12	5.27		1.15
WAGES PER MONTH OF 25 DAYS				
Surface	103.00	131.75		28.75
Underground				
Total	103.00	131.75		28.75
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG. PRODUCT BRK'G & TRM'G				
" WAGES CONTRACT MINERS				
" " " TRAMMERS				
" " " LABOR				
TOTAL NUMBER OF DAYS				
Surface	331½	506½		165½
Underground				
Total	331½	506½		165½
AMOUNT FOR LABOR				
Surface	1365.71	2670.16		1304.45
Underground				
Total	1365.71	2670.16		1304.45

Proportion Surface to Underground Men:

1919 - 1 to 2.1  
1918 - 1 to 3.2

Not producing in 1918 on account of flood. Started production on small scale again in August, 1919. Closed again Dec. 31, 1919. Not operated during 1920 or 1921.

STEPHENSON MINE.

The Stephenson Mine was operated on one 8-hr. shift, ore being hoisted on both day and night shift until June 1st, when it started operating on half-time basis. Since June 1st ore has been hoisted 8 hours per day but all employees are working on half-time basis. There were not a sufficient number of working places to maintain the product when operating one 4-hr. shift, so that the miners have worked 8 hours on alternate days. From the last week of March until June 1st, the mine operated 5 days per week.

The product by months for the year was as follows: (This includes the ore hoisted from both the Stephenson property and C. & N.W. Ry. Co., Lease, Sec. 29):

January,	19,851 tons	
February,	21,044	"
March,	22,224	"
April,	18,352	"
May,	19,716	"
June,	12,821	"
July,	13,212	"
August,	13,593	"
September,	14,154	"
October,	14,798	"
November,	12,899	"
December,	<u>13,875</u>	"
Total Ore,		196,539 tons
Rock,		<u>22,616</u> "
Total Ore and Rock,		219,155 "

The product increased each month for the first three months, then decreased slightly during the time the mine operated five days per week; a larger decrease occurred when the mine started operating on a half-time basis.

~~Stephenson~~ Bond  
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The ore statement showing the amount on hand January 1st, 1921, the output for the year, shipments for the year and the amount on hand January 1st, 1922, is as follows:

	<u>STEPH. BESS.</u>	<u>STEPH. ORE</u>	<u>STEPH- WOOD</u>	<u>NORTH- DALE</u>	<u>TOTAL</u>
On Hand Jan. 1st, 1921,	3,986	51,996	48,999	5,221	110,202
Output for Year,	60,171	119,479	0	16,889	196,539
TOTAL,	64,157	171,475	48,999	22,110	306,741
Shipments,	0	56,828	96	20,153	77,077
In Stock Jan. 1st, 1922,	64,157	114,647	48,903	1,957	229,664

Shipments in 1921 were 77,077 tons as compared with 111,065 tons in 1920, the decrease being 33,988 tons. There were 110,061 tons in stock on January 1st, 1921, as compared with 229,664 tons on January 1st, 1922, the increase in 1921 being 119,603 tons.

The ore in sight on the Stephenson Lease on December 31st, 1921, was 1,012,785 tons, a year ago it was estimated to be 1,023,331 tons. The decrease in 1921 was 10,546 tons, but since the product from the lease in 1921 was 179,650 tons, there is actually an increase of 169,104 tons, shown by the estimate of December 31st, 1921.

77077  
The most important development of the year was the discovery of ore at the South-East end of the 6th Level. There had been no drill holes from surface in this area, so that there was no knowledge of the existence of ore on the Stephenson property at this elevation. It has been developed by a drift on the main level and also by drifts on a sub-level, 20' above the level, so that its outline is fairly well known. The ore above the sub-level, located 20 ft. above the 6th, is considered developed ore.

A number of raises have been put up from the 6th Level to the 5th, in the main Stephenson ore body, but they have been located so far back in the footwall that they have not given much information concerning the ore below the 5th. Due to lack of information, it is not possible to

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accurately estimate the tonnage and division by grades of the main Stephenson ore body below the 5th Level. The division by grades is necessarily subject to changes later after this ore body has been fully developed. This ore is considered prospective ore the same as in 1920.

The ore in sight on December 31st, 1921, was as follows:

LOCATION:	<u>STEPHENSON BESSEMER</u>	<u>STEPHENSON NO.1</u>	<u>STEPHEN- SON</u>	<u>STEPHEN- WOOD</u>	<u>TOTAL</u>
Ore above 1st Level,				4,893	4,893
" " 3rd "				1,533	1,533
" " 4th "	10,000	10,000	44,929	33,884	98,823
" " 5th "	55,365	55,365	263,759	-	374,489
" " 6th "	13,089	13,089	52,367	-	78,535
Developed Ore,	78,454	78,454	361,055	40,310	558,273
Prospective, 6th to 5th,	70,000	70,000	232,945		372,945
" Below 6th,	13,594	13,594	54,379		81,567
	83,594	83,594	287,324		454,512
<b>TOTAL ORE,</b>	<b>162,048</b>	<b>162,048</b>	<b>648,379</b>	<b>40,310</b>	<b>1,012,785</b>

The estimated tonnage in the mine, sub-divided as required by the Tax Commission, is as follows:

Bessemer Ore:

Developed	1. Stephenson Bessemer,	78,454
Prospective	1. Stephenson Bessemer,	83,594
	<b>Total,</b>	<b>162,048 tons</b>

Non-Bessemer Ore:

Developed	1. Stephenson No. 1,	78,454
	2. Stephenson,	361,055
	3. Stephenwood,	40,310
Prospective	1. Stephenson No. 1,	83,594
	2. Stephenson,	287,324
	3. Stephenwood,	---
	<b>Total,</b>	<b>850,737 "</b>
	<b>GRAND TOTAL,</b>	<b>1,012,785 "</b>

There has been some extraordinary expense at the Stephenson during the past year under the Account "Pumping Machinery". This expense, however,

is less than in the previous year, but at the same time it is much above the ordinary normal expense. It was mainly due to the expense of the work done in connection with drill hole No. 66 from surface. As it was not possible to open the drill hole, a drift was later driven around the concrete dam and a raise started towards surface. There was also the expense of the dam on 5th level, which was installed in October to control the water which came in at the South-East end of the mine. The cost of all the above work was charged to this account.

The general expense under other accounts has been normal during the past year. Your attention is called to the fact that <sup>at</sup> a number of the operating mines it has been possible to practically stop all development work in rock, but, however, at this property such a program was not possible. There was an average of 8 contracts working on rock throughout the year. For the year there was a total of 3,400 feet of rock work done at an expense of \$29,101.70, as compared with 4,031 feet, costing \$47,002.47, in the previous year. This shows a decrease in expense as compared with the previous year, but still much higher than at the majority of the operating mines.

The important problem at the Stephenson Mine is to gain control of the water which overlies the ledge, particularly on the G. & N. W. Lease, Section 29 property. Production from this lease had practically ceased at the end of the year. Development work is under way which will permit of some product being obtained from this lease during 1922, but the major product must continue to come from the Stephenson lease, until such a time as control has been gained of the water.

On October 13, 1921, there was a sudden increase in the water at the South-East end of the Stephenson property on the 1st sub below the 4th level. Ledge contours inconjunction with the known water level indicated that there is from 40 to 50 feet of sand saturated with water above this particular area. The flow of water amounted to from 500 to 700 gals.

per minute, and has continued. The possibility of a further sudden increase was such that it was considered advisable to install a concrete dam on the 5th level to seal off this part of the mine. Access to this territory is still possible on the 4th level, but preparations have been made for a dam here also, which, when installed, will entirely seal off this water from the mine. Frequent examinations have been made at the point where the water came in to determine if there has been any increase. Thus far, however, the flow has been constant. It is interesting to note that it has dried up a portion of the territory near the hanging in the main ore body, so that the actual increase of water is only about 300 gallons per minute. It is also gratifying to note that the water level as determined by measurements in stand-pipe from surface has shown a decided drop since October 13th. This indicates that the increased flow entering the mine is having an appreciable effect in lowering the general water level.

From calculations made in December, it was apparent that the greater part of the main Stephenson ore body can be mined without danger. There is a small territory at the South-West end of the mine, near the point where the water came in, which flooded the mine in 1917, that will not be available and also the entire deposit at the South-East end of the mine. However, it is evident that if the water level can be lowered from 40 to 50 feet, all of the Stephenson ore body could be mined. To mine all the Section 29 ore body will require the water to be lowered at least 130 feet. The actual area of the water decreases quite rapidly with depth, so that it is not assumed there will be as large a quantity to drain at the lower levels as is true at the present elevation. It is hoped that the raise towards surface on Section 29 will lead to this solution of the water problem.



STEPHENSON LEASE - SECTION 20.

Work has been done during 1921 at the following points:

FOURTH LEVEL  
1ST, 2ND AND 3RD SUBS BELOW 4TH.  
FIFTH LEVEL  
2ND, 3RD, 4TH AND 5TH SUBS BELOW 5TH.  
SIXTH LEVEL.

- - - - -  
FOURTH LEVEL.

In 1920, the extension of the main deposit along the contact to the South-East was developed and some ore mined from the tops of raises put up from the 5th level. Mining was continued at this point for the first seven months in 1921, by which time all available ore had been mined. The greater part of the ore was found on a flattening of the footwall. One drift was driven in Jasper a distance of approximately 100 feet to the East, which proved that there was no extension of the ore body beyond the limits established last year. This does not definitely prove that there may not be ore further to the East, but it indicates at least that the enrichment at this particular point does not extend further, and if there is ore on the contact it will probably only be found by diamond drilling, as there is a barren area beyond the present limits. All the ore mined on the 4th level in 1921 came from the South-East end of the ore body, at a point located about 2,000 feet from the shaft along the line of the haulage road.

1ST SUB BELOW FOURTH LEVEL.

Work was started on this sub-level in the month of May, to mine that part of the ore body which had been mined out earlier in the year on the 4th level. Work was continued here until October 13th, when there was a sudden increase in the amount of water coming in on this sub-level.

~~Stephenson~~ Bond  
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Work was then stopped, all tools removed and this body sealed off from the shaft by a concrete dam on the 5th level. About one-half of this sub-level was mined out in 1920; the balance could not be mined until the ore was mined out on the 4th level. At the time the water came in, all of the ore had been mined except one small pillar near the hanging, and the ore at the point where the footwall flattened.

2ND SUB BELOW FOURTH LEVEL.

A sub-level was opened at the South-east end of the mine, and the West part of this ore body mined out. A drift was also driven along the hanging, outlining the ore practically to its East limit. Work was abandoned on this sub-level on October 13th, when there was a sudden increase in the amount of water coming in on the sub above. It had been planned to finish mining on this sub-level and then abandon work at this point until the water level had been lowered sufficiently to make it safe to continue operations in this territory. As stated above, however, water came in before this work was completed. Owing to the nature of the ore at the South-East end of the mine, the drifts through this entire territory will soon cave, and a sub-level will have to be opened again when the water over the ledge has been lowered.

, One small pillar in the main Stephenson ore body on this sub-level was mined out in 1921. This completed the mining of the main Stephenson ore body on this sub-level, with the exception of a pillar left to support the haulage drifts near the shaft.

3RD SUB BELOW FOURTH LEVEL.

In the early part of 1921, the greater part of the product was obtained from this sub-level. Mining was continued throughout the year, but at a gradually decreasing rate. Mining was practically finished in the main Stephenson ore body the last of the year, except for one small

~~Stephenson~~ Bond  
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pillar in the main ore body, and the pillar left to support the haulage drifts near the shaft. There are also some pillars left near the limit of mining, near the C. & N. W. Lease, Section 29 boundary line, which will not be available until the water level is lowered, as is also the case with the ore body at the South-East end of the Stephenson Mine.

#### 4TH SUB BELOW FOURTH LEVEL.

Mining has been carried on on this sub-level during the entire year. It was opened early in the year and as mining was completed on the 3rd sub, the contracts were moved down, until in the latter months of the year there were between 20 and 30 gangs working here. Approximately one-half of the available ore on this sub-level had been mined out at the end of the year. Several areas under the hanging on this sub-level had been quite wet, until in October, when the increased flow of water started on the 1st sub below the 4th, at which time the water near the hanging on this sub-level disappeared. This greatly improved mining conditions in this territory. Some irregularities in the outline of the ore body along the hanging were observed on this sub-level, where a considerable area that was supposed to be ore was found to be hanging. This was probably due to a local roll in the foot and hanging, which brought the latter down to the elevation of this sub-level.

#### FIFTH LEVEL.

A large amount of retimbering was necessary in the early part of the year on the 5th level. As mining approached this level, the crosscuts had to be abandoned, and ore handled through raises put up from the 6th level. During the year there was approximately 650 feet of drifts driven under the hanging. The last of the year mining was started in practically the center of the main Stephenson ore body, where mining had been completed on the 1st sub above the 5th. Some extension of the

main Stephenson ore body to the South-East was found the last of the year, by a drift along the hanging. From the 5th level up to the 4th there is a barren area which separates the main Stephenson ore body from the ore body found at the South-East end. The work done on the 5th and 6th levels during 1921 indicate that this barren area has finally been replaced with ore, and that from the 5th down to the 6th, the ore body at the South-East end will be found to connect with the main Stephenson ore body. Until the water level is lowered it will not be possible to do any extensive mining in this territory. However, the greater part of what is known as the main Stephenson ore body can be mined without danger.

It has been possible to do away with practically all of the repair work on the 5th level drifts and crosscuts, owing to the completion of rock drifts in the footwall on subs below the 5th, connecting quite a number of raises from the 6th to the 5th level. Timber is handled on this sub below the 5th, and hoisted up to the point where work is being done, a short distance above.

When mining is completed on the 4th sub below the 4th, the contracts will be moved down to work on the 5th level.

At the time the water came in on the 1st sub below the 4th level, it was decided to put a concrete dam on the 5th level in the barren area between the main Stephenson ore body and the ore body at the South-East end. This dam was installed in October, at a cost of about \$1,200.00. It effectually sealed off the ore body at the South-East end on the 5th level, and the valves on the pipes through the dams gives control of the amount of water going to the pump station.

#### 2ND SUB BELOW FIFTH LEVEL.

During 1921 there was 470 feet of rock drifting on this sub-level. Drifts have been driven in the footwall connecting the raises from the 6th level. Timber is thrown down from the footwall drift on the 5th level to this sub, and then trammed and hoisted up the raises to the 1st sub above the 5th, where mining is in progress. These rock drifts will serve

as timber roads down to the elevation of this sub-level, which is about 22 feet below the floor of the 5th level.

3RD SUB BELOW FIFTH LEVEL.

This sub-level was opened in 1921, and 60 feet of ore drifts driven under the hanging, just North of the Section 29 boundary line. This work was done inconjunction with the outlining of the ore body on C. & N. W. Lease, Section 29, near the limit of mining.

4TH SUB BELOW FIFTH LEVEL.

This sub-level has also been opened near the C. & N. W. Lease, Section 29 boundary line, by a drift in ore, 130 feet in length. It is planned to outline the ore in this immediate vicinity along the hanging, as this information is needed in order to determine the number and location of raises to be put up from the crosscuts on the 6th level.

5TH SUB BELOW FIFTH LEVEL.

This sub-level was opened at the South-East end of the Stephenson ore body to develop the ore encountered in the 6th level haulage drift. At the end of the year there had been 560 feet of drifting in ore on this sub-level. These drifts have been driven along the footwall, which had to be located in order that the main 6th level haulage drift might be driven in rock far enough back from the contact to insure that it would stand. The ore body has been outlined by following the footwall to the South to a point within 20 feet of the Section 29 boundary line. It has also been developed along the North footwall for a length of 300 feet and the drift going East, following the footwall, still has a full breast of ore. It is not known how far this drift will continue to the East, as there has been no development work done in this ore body below the 2nd sub below the 4th level. As a result of the work done on this sub-level, the available ore in the Stephenson Mine, as well as the prospective ore below the 6th level

has been increased. It must be remembered, however, that only a small amount of this ore can be mined until the water level has been lowered at least 40 feet.

#### SIXTH LEVEL.

The development of the 6th level was continued during 1921. During the year there has been 360 feet of rock drifting in the main haulage drift and crosscuts, and 270 feet of drifting in ore at the South-East end of the Stephenson lease. Ore was encountered in the main haulage drift at a point approximately 1,800 feet from the shaft, measured along the haulage drift. It was thought that the drift in ore would stand without much repair work. The ore in the drift, however, started to swell, throwing the haulage track out of line and breaking the sets, the same as occurs constantly in the main Stephenson ore body. It was then decided to develop this ore by opening a sub-level 20 feet above the main level. The last of the year drifting was resumed in the breast of the ore drift, it being turned almost due South towards the Section 29 boundary line, from which it is about 120 feet distant. It is planned to drive into the hanging to a point near the Section 29 boundary line, and do some diamond drilling here to prove up the downward extension of this ore below the 6th level. This information is essential in order that plans may be made for mining the ore below the 6th level. There is no reason for speed, as far as the Stephenson Lease is concerned, but in order to get out a reasonable tonnage from the C. & N. W. Lease, it is necessary that the ore below the 6th level be developed as soon as possible. All the ore in this territory will be available provided the sand above the ledge can be drained, but as this will probably not be entirely accomplished within the life of the Stephenson Lease, it is figured that only part of this ore will eventually be available. This will make it necessary to adopt a system of mining similar to that which has been used at the Gwinn Mine, viz: to mine

a portion of the ore body and leave a pillar to support the capping. Owing to the fact that the capping above the ore body does not average over 200 feet in thickness, it will not be advisable to mine more than the two sub-levels, then leave a pillar of approximately two sub-levels, then mine again.

In No.1 crosscut several raises were put up to the 5th level during the past year. In No. 2 crosscut, three raises were finished. No. 3 crosscut advanced 55 feet during the year, and one raise was put up to the 5th level. No. 4 crosscut advanced 105 feet during the year, and as yet no raises have been put up on Stephenson property, from this crosscut. Turn-outs were made along the North-East haulage drifts for six raises. Chutes were built for these raises and two of the raises have been put up to the 5th level; work will soon be started in the others. There is approximately 1,050 feet of rock drifting yet to be done in the crosscuts in order to fully develop the main Stephenson ore body. To develop the ore body at the South-East end will require at least 400 feet of rock drifting, making a grand total of 1,440 feet of rock drifting remaining to be done on the 6th level. In addition to the above, there will probably be in the neighborhood of sixty raises to be put up. This rock program can, however, be extended over several years, as it has already advanced to a point which will permit of continued operations on the present half-time system.

The Armstrong Loader has been used in both the rock and ore drifts driven on the 6th level during 1921. For the greater part of the year it loaded broken material into two-ton tram cars. The latter part of the year, however, it was decided to cut down the backs of four motor cars, so that it would load directly into the larger cars. This has proven a decided advantage, and has reduced the cost of drifting materially.

C. & N. W. LEASE - SECTION 29.

The product for the year was as follows:

Northdale, 16,889 tons.

The 1921 shipments and balance on hand December 31st, 1921, were as follows:

	<u>SHIPMENTS</u>	<u>BALANCE ON HAND</u>
Northdale,	20,153 tons	1,957

The estimated ore in sight December 31st, 1921 was as follows:

	<u>NORTH- BESSEMER</u>	<u>NORTH- WESTERN</u>	<u>NORTHDALE</u>	<u>TOTAL</u>
Developed ore above 5th level,	5,700	1,900	14,604	22,204
" " below 5th "			59,961	59,961
Total Developed Ore,	5,700	1,900	74,565	82,165
Prospective Ore below 5th,	25,000	25,000	256,139	306,139
GRAND TOTAL,	30,700	26,900	330,704	388,304

The estimated tonnage in mine, sub-divided as required by the Tax Commission:

			<u>TOTAL</u>
<b>Bessemer Ore:</b>			
Developed,	1. North Bessemer,	5,700	
Prospective,		25,000	30,700
<b>Non-Bessemer Ore:</b>			
Developed,	1. Northwestern,	1,900	
	2. Northdale,	74,565	76,465
Prospective:	1. Northwestern,	25,000	
	2. Northdale,	256,139	281,139
	TOTAL,		388,304



As in previous years, the old estimate of probable ore, figured from surface diamond drill holes, has been used in making up the estimate. The development work in 1921 has indicated the outline of the ore body above the 6th. It has shown that there is an area in which the ore body is so thin as to render it unprofitable to mine, lying between the ore body near the limit of mining and the ore body shown by drilling further to the South-East. The South-East ore body has been developed on the 2nd sub above the 6th so as to permit of a fairly accurate estimate of the tonnage of ore above the 6th level. The outlining of the ore at this point made it possible to lay out the crosscut in rock, from which raises will be put up for mining this ore. Work on this crosscut was started in the fall and will be continued until it is possible to fully develop the ore body by raises put up from 6th level.

Mining was continued in the ore body near the limit of mining on a small scale throughout the year, until the latter part of December, when work practically ceased. Mining will be resumed as soon as raises are put up from the new crosscut now being driven. There is so much water over-lying this ore that it is not advisable to run any risk of caving the capping. For this reason work was stopped on the 3rd sub below the 5th level, near the limit of mining, when it had been outlined by drifts and cut up into pillars. Due to the thinning out of the ore further to the South-East under the hanging, below the 3rd sub-level, it has not been possible to open a new sub-level at this point, under the hanging. Mining must be started in the ore body further to the South-East, which is now being developed.

During the past year work has been done on this lease at the following points:

2ND SUB BELOW FIFTH LEVEL  
3RD SUB BELOW FIFTH LEVEL  
4TH SUB BELOW FIFTH LEVEL  
5TH SUB BELOW FIFTH LEVEL  
SIXTH LEVEL.

2ND SUB BELOW FIFTH LEVEL.

In 1920 mining was practically completed on the 2nd sub below 5th level, near the limit of mining. In 1921, a small pillar, 50 x 12 feet in size was mined out.

3RD SUB BELOW FIFTH LEVEL.

This sub was opened in 1921 and fully developed, the ore being entirely outlined at this elevation by drifts and crosscuts. The ore has been divided into pillars, and all work which it was possible to do at this time, was finished in December. This sub-level will not be mined as there has been two sub-levels, as well as the ore on the main 5th level, mined out above this point. As the ore body here is comparatively close to the point where the water came in that flooded the mine, it is not considered advisable to do any further mining at this point, until the water level has been lowered.

4TH SUB BELOW FIFTH LEVEL.

The latter part of the year, two drifts were driven from raises put up from the 6th level, beneath the 3rd sub-level. The small amount of work done here indicated that it would not be advisable to continue work on this sub, as it would render it more difficult to mine out the ore on the sub-level above. There is apparently no extension of the ore body on this sub, to the East, under the hanging.

5TH SUB BELOW FIFTH LEVEL.

Considerable development work was done on this sub-level in outlining the ore under the hanging. This ore body is approximately 400 feet South-East of the body located near the limit of mining. The physical character of the ore on this sub-level is the same as the main Stephenson ore body, that is, it is plastic ore. It shows the same characteristics in regard to swelling when exposed to the air. One crosscut has been driven from the hanging over to the foot-wall, which showed the ore to be

about 60 feet in width. The ore body at the South-East end of the Stephenson Mine has been developed on this same sub-level nearly to the Section 29 boundary line. The work done on C. & N. W. Lease, Section 29, although it is 200 feet distant from the limits of the work on the Stephenson, on this same sub-level, has made it possible to outline the ore between these two points. This gave the needed information for locating rock drifts on the 6th level, for mining this ore. The last of the year a raise was started near the footwall on this sub-level, to prove the height of the ore above the sub. Results were rather surprising, in that it showed the ore to extend from 20 to 30 feet above this sub. This can only be accounted for by an up-turn in the hanging, which has increased the possibility of ore in this territory. From the present rate of advance made in the development work on the main level, it will be possible to start mining in this territory within 90 days.

#### SIXTH LEVEL.

Crosscuts Nos. 4, 5 and 6 are partially located on the C. & N.W. Lease, Section 29. During 1921, No. 4 crosscut was extended 85 feet in rock, at which point it passed over the boundary line on to the Stephenson Lease. No. 5 crosscut is the one that is being driven to mine the ore body recently developed on the 5th sub below the 5th. This crosscut was carried on its North-East course a distance of 80 feet, then turned on a curve, which brought the main line of the crosscut around to a due South direction. The curve is practically 100 feet in length, and the tangent beyond the curve, to the South, had been driven a distance of 50 feet by the end of the year; the total rock drifting in this crosscut was 230 feet. It is possible that a connection will later be made from this crosscut to No. 5 crosscut, on the Stephenson property, but additional development work will have to be done on the sub-level to determine whether it will be

necessary to drive this drift. It is planned to start raises within 30 days in No. 5 crosscut, to develop this ore body and permit some production from this lease.

During the year three raises were put up in No. 4 crosscut, on this lease, and one raise in No. 5. The raise in No. 5 was carried to the elevation of the 3rd sub below the 5th. No ore was found in the raise, the ore formation was thin and lean. Some drifting was done on this sub-level, but no ore was found. The work done here indicates that there is a barren area here that may be in the neighborhood of 300 feet in width.

In addition to the above work, considerable rock work has been done on this lease, in carrying out the plan of draining the over-burden. No. 66 hole, which was being put down from surface to the 6th level, had reached a depth of 482 feet in December, 1920. It was continued to a depth of 514 feet to the elevation of the 6th level drift. It did not, however, hole to the drift which had been driven to a point beneath the location of the hole. Sounding indicated that the drill hole would be found to the right of the underground drift. The drill hole was found after drifting 30 feet to the right. An attempt was made to pull the stand-pipe in order that water might enter the mine, but this work was unsuccessful, and it was finally decided to blast the standpipe so as to give the water a chance to enter the drill hole. Following the blast the water for a time flowed freely through the hole, but within a few hours the hole clogged. Attempts to open the hole were continued for sometime by chopping and blasting, both with powder lowered from above and with powder pushed up in the drill hole from the 6th level. All attempts were unsuccessful, and it was finally decided to drive a haulage drift around the dam and put up a raise near the line of the drill hole.

This haulage drift was necessary in order that the material in the raise could be removed, as it was not possible to take it through the concrete dam. This drift which was 120 feet in length, was completed in the fall and raising started. At the end of the year this raise was up 96 feet. It is planned to continue it to a point 109 feet above the 6th level, then reverse its direction, and continue it about 90 feet further, which will bring the top within 40 or 50 feet of the ledge. It is hoped to be able to open the drill hole from this point. If it develops that there is not sufficient water coming through the hole to lower the water level, another plan will have to be adopted. It may be possible to put other drill holes through from the sub-level which will be opened at a point about 40 feet below ledge, or an alternate plan would be to drive a drift and put up a number of raises a short distance, then drill ahead until water comes. What ever plan is pursued, it will be necessary to install a concrete dam in the haulage drift which was driven around the first dam, in order to seal off the water. The future of the mine depends largely on the water problem, so that every effort will be made to get sufficient water to enter the mine here, so that the water level can be lowered and all danger of flooding removed.

STEPHENSON MINE SURFACE.

The air line on surface near the Stephenson Shaft, had caused a great deal of trouble in previous winters due to freezing. It has been relocated and placed beneath the surface in a wooden launder which will eliminate all future trouble.

It was necessary to remove one outside leg from the double Stephenson Ore trestle in order to load out the ore shipped during the summer. When shipping was finished, this trestle was repaired. It proved to be quite a task as a number of the center legs were broken and had to be replaced in addition to the outside legs. The Norway pine trestle legs purchased in recent years do not last more than a year in the ore piles. If a slide of ore occurs, when loading with steam shovel, they break off and also they rot when standing in the ore pile in less than two years. The expense for maintenance of trestles was materially increased during 1921, due to the pine trestle legs.

Several bents on the Northdale trestle were torn down during 1921, and re-erected in the fall, when shipping was finished.

The floor of the Northdale permanent trestle was renewed in the summer of 1921, as was also part of the planking on the Stephenson ore permanent trestle.

The coal dock at the Stephenson Mine was overhauled in the summer of 1921; a number of legs, caps and stringers, which had rotted, were replaced with new ones.

An electric light signal system, to give advance information to the landers of the grade of ore to be hoisted, was perfected by the district electrician and put into commission in the summer. It gives advance warning for the skip to be cleaned if Bessemer ore is to be hoisted, gives warning of wet ore and prevents errors in the signals

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given by the bells. Where several grades of ore are hoisted from different leases, this signal system helps to prevent error in tally of skips from each lease.

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STEPHENSON MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1921.

GRADE	IRON	PHOS.	SILICA	MANG.
Stephenson Bess.,	62.08	.053	5.55	
Stephenson,	61.55	.246	4.52	1.152
Stephenwood,	(No Production)			
Northdale,	60.96	.283	5.45	.967

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1921.

GRADE	IRON	PHOS.	SILICA	MANG.
Stephenson Bess.,	(No Shipments)			
Stephenson,	(All Mixed)			
Stephenwood,	(No Shipments)			
Northdale,	(All Mixed)			

ORE STATEMENT - DECEMBER 31ST, 1921.

	STEPHEN- SON BESSEMER	STEPHEN- SON	STEPHEN- WOOD	NORTHDALÉ	TOTAL	TOTAL LAST YEAR
On hand Jan. 1, 1921,	3,986	51,996	48,999	5,221	110,202	46,344
Output for Year,	60,171	119,479	0	16,889	196,539	174,782
Total,	64,157	171,475	48,999	22,110	306,741	221,126
Shipments,	0	56,828	96	20,153	77,077	110,924
Balance on Hand,	64,157	114,647	48,903	1,957	229,664	110,202
Increase in Output,					21,757	
Increase in Ore on Hand,					119,462	

1921 -- 1-8 Hour Shift, 6 days per week, Jan. 1st to March 26th, 1921.  
 1-8 Hour Shift, 5 days per week, March 26th to June 1st, 1921.  
 2-4 Hour Shifts, 6 days per week, June 1st to Dec. 31st, 1921.

1920 -- 1-8 Hour Shift for Year.



STEPHENSON MINE  
SHIPMENTS FOR YEAR 1921.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Stephenson Bessemer,	0	0	0	8,773
Stephenson No. 1,	0	0	0	6,086
Stephenson,	20,790	36,038	56,828	68,768
Stephenwood,	0	96	96	24,041
Northdale,	4,042	16,111	20,153	3,256
Total,	24,832	52,245	77,077	110,924
Total Last Year,	85,827	25,097	110,924	
Decrease,			33,847	

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STEPHENSON MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
Product	196,539	174,782	21,757	
Underground Costs	1.706	2.419		.713
Surface Costs	.283	.351		.068
General Mine Accounts	.205	.205		-
Cost of Production	2.194	2.975		.781
Original Cost	.001	.001		
Plant Account	.028	.003	.025	
Equipment	.001	-	.001	
Uncompleted Construction	.004	.026		.022
Taxes	.123	.139		.016
Central Office	.077	.084		.007
Contingent Expense	.009		.009	
Cost Adjustment	.100	.072	.028	
Cost on Stockpile	2.537	3.300		.763
Loading & Shipping	.052	.077		.025
Total Cost on Cars	2.589	3.377		.788
No. Days Operating	293	302		9
No. Shifts & Hours	1-8hr-115 2-4hr-178	1-8 hr		
Average Daily Product	671	575	96	
<u>COST OF PRODUCTION</u>				
Labor	1.348	1.933		.585
Supplies	.846	1.042		.196
Total	2.194	2.975		.781

1-8hr 6 days a week Jan. 1st to Mar. 28;  
 1-8hr 5 " " Mar. 27 to May 31;  
 2-4hr 6 " " June 1 to Dec. 31.

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STEPHENSON MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 1	1 9 2 0	INCREASE	DECREASE
PRODUCT	196,539	174,782	21,757	
No.Shifts and Hours (a)		2-8hr		
AVERAGE NO.MEN WORKING				
Surface	43	43		
Underground	178	129	49	
Total	221	172	49	
AVERAGE WAGES PER DAY				
Surface	4.64	5.54		.90-16.24%
Underground	5.29	6.51		1.22-18.74
Total	5.14	6.27		1.13-18.02
WAGES PER MONTH OF 25 DAYS				
Surface	116.00	138.50		22.50
Underground	132.25	162.75		30.50
Total	128.50	156.75		28.25
PRODUCT PER MAN PER DAY				
Surface	18.18	13.13	5.05	
Underground	5.14	4.43	.71	
Total	4.01	3.31	.70	
LABOR COST PER TON				
Surface	.255	.422		.167
Underground	1.029	1.470		.441
Total	1.284	1.892		.608
AVG. PRODUCT BRK'G & TRM'G	8.58	8.26	.32	
" WAGES CONTRACT MINERS	5.56	7.18		1.62
" " " TRAMMERS				
" " " LABOR	5.56	7.18		1.62
TOTAL NUMBER OF DAYS				
Surface	10,811	13,306		2,495
Underground	38,231	39,434 <sup>3</sup> / <sub>4</sub>		1,203 <sup>3</sup> / <sub>4</sub>
Total	49,042	52,740 <sup>1</sup> / <sub>4</sub>		3,698 <sup>3</sup> / <sub>4</sub>
AMOUNT FOR LABOR				
Surface	50186.97	73696.13		23509.16
Underground	202297.69	256904.12		54606.43
Total	252484.66	330600.25		78115.59

Proportion Surface to Underground Men:

1921 - 1 to 4.14  
 1920 - 1 to 3  
 1919 - 1 to 1  
 1917 - 1 to 2.9  
 1916 - 1 to 3.07  
 1915 - 1 to 2.73

No mining done during 1918 and 1919  
 on account of mine being flooded.

(a) 1-8hr 6 days a week Jan.1st to Mar.26;  
 1-8hr 5 " " Mar.27 to May 31;  
 2-4hr 6 " " June 1 to Dec.31.

STEPHENSON MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1921.

KIND	LINEAL FEET	AVG. PRICE PER FOOT.	AMOUNT	AMOUNT
			1 9 2 1	1 9 2 0
4" to 6" Timber	3,960	.046	182.16	2398.69
6" to 8" "	71,192	.0469	3332.78	1598.93
8 to 10 "	57,664	.1055	6082.84	8036.42
10 to 12 "	40,024	.1362	5447.56	1774.71
12 to 14 "	22,186	.1742	3865.86	1211.75
14 to 16 "	4,254	.185	787.10	-
Total - 1921	199,280	.0988	19698.30	15020.50
Total - 1920	309,848	.0485	15020.50	
	LINEAL FEET	PER 100'		
5' Lagging	413,950	1.019	4219.54	5416.32
8' "	441,840	.9806	4333.82	3459.47
Total Lagging	855,790	.999	8553.36	8875.79
Poles	49,900	1.245	621.40	1100.21
Total - 1921	905,690	1.013	9174.76	9976.00
Total - 1920	1,110,663	.898	9976.00	
5.8" Covering Bds (ft)	22,474	1.832	411.75	
Product			196,539	174,782
Feet of timber per ton of ore			1.013	1.773
" lagging "			4.354	5.617
" " per foot of timber			4.294	3.168
Cost per ton for timber			.1002	.086
" " lagging			.0435	.0507
" " poles			.0032	.0063
" " covering boards			.002	.1430
" " timber, lagging, poles & bds,			.1489	497,368
Equivalent of still timber to bd.measure			441,230	2,845
Feet of bd.measure per ton of ore			2.244	
Total cost for timber, lagging & poles - 1921				28873.06
1920				24996.50
5/8" Maple covering boards used 1917				14089.63
during year in place of lagging. 1916				16540.20
1915				9643.88
1914				12362.13
Mine worked 6 days per week 1913				16053.54
Jan.1st to Mar.26th; 1912				11897.82
" " 5 days per week				
Mar.26 to June 1st;				
" 3 days per week June 1st to Dec.31st.				

STEPHENSON MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING & DEVELOPING IN ORE (BREAKING ORE)

KIND	QUANTITY	AVERAGE PRICES	AMOUNT 1921	AMOUNT 1920
40% Powder - - - - -	14,200	.1605	2,279.48	3,014.37
50% " - - - - -	22,680	.1805	4,093.39	3,979.66
60% " - - - - -	6,400	.214	1,369.53	469.80
<u>Total Powder - -</u>	<u>43,280</u>	<u>.1788</u>	<u>7,742.40</u>	<u>7,463.83</u>
Fuse - - - - -	190,800	8.13	1,550.60	1,404.60
Caps - - - - -	38,200	14.81	565.38	603.18
Cap Crimpers - - - - -	32	.497	15.93	17.14
Tamping Bags - - - - -	12,500	.201	25.16	37.65
<u>Total Fuse, Etc. -</u>			<u>2,157.07</u>	<u>2,067.57</u>
<u>Total All Explosives -</u>			<u>9,899.47</u>	<u>9,531.40</u>
Product - - - - -			196,539	174,782
Pounds Powder per ton of Ore			.220	.243
Cost per ton for Powder			.0394	.0484
" " " " Fuse, Etc.			.0109	.0118
" " " " All Explosives			.0503	.0602
Avg. Price per Lb. for Powder			.1788	.1893

For operating conditions see "Comparative Wages & Product".

PRINCETON MINE.

The Princeton Mine was operated on one 8-hr. shift, six days per week, ore being hoisted on both day and night shift, until the last week of March, when it started operating five days per week. It operated five days per week until the first of June, when it went on half-time basis, working six half days per week, ore being hoisted 8 hours per day. It operated on half time basis from June 1st until August 27th, when it closed down.

The product by months for the year was as follows: (This includes ore hoisted from both the Princeton property and C. & N. W. Lease, Sec.19)

January,	15,182 tons	
February,	15,734 "	
March,	15,930 "	
April,	12,024 "	
May,	13,236 "	
June,	8,512 "	
July,	8,287 "	
August,	8,170 "	
September, *	3 "	
October, *	34 "	
November, *	38 "	
December,	0	
Total Ore,		97,150 tons
Rock,		<u>8,508</u> "
Total Ore and Rock,		105,658 "

(\* Ore obtained from retimbering main level drifts)

The statement of the monthly product shows a decrease in the hoist due to changes made in the working time.

The Ore Statement for 1921, is as follows: (This includes both Princeton and C. & N. W. Lease, Section 19 ores):

	<u>ON HAND</u>	<u>PRODUCTION</u>		<u>SHIP-</u>	<u>IN STOCK</u>
	<u>JAN. 1, 1921</u>	<u>1921</u>	<u>TOTAL</u>	<u>MENTS</u>	<u>DEC. 31 '21</u>
Princeport,	155	13,466	13,621	4,461	9,160
Princeport - Sec.19	270	1,650	1,920	607	1,313
Cambridge,	149,895	73,052	222,947	16,748	206,199
Cambridge, - Sec. 19	19,906	8,982	28,888	2,100	26,788
TOTAL,	170,226	97,150	267,376	23,916	243,460

The product for 1921 decreased 72,900 tons over that of the previous year. In 1921, the product from the Princeton Mine lease was 86,518, while in 1920 it was 109,598; the decrease in 1921 amounting to 23,080 tons. There was a comparatively small decrease in the output from the Princeton property as compared with the previous year, although the mine only operated eight months in 1921.

The delays, due to accidents to equipment, during 1921 amounted to 50 hours, as compared with 138 hours in 1920.

Additional work has been done on E. & A. #401, covering alterations to existing equipment, and also new equipment. With the exception of railroad tracks at the shaft, new coal dock, transfer of motor and electric equipment to the new engine house, the raising of shaft house and alteration of dumps in shaft house, the work in connection with this E. & A. has been completed.

During the past year there has been an average of 37 contracts working; with an average of 31 on ore, 4 on rock and 2 repairing drifts. As compared with the previous year, this shows a slight decrease in the number of gangs working on rock, as also in the number doing repair work.

Mining of the #1 shaft pillars was continued during 1921, and also some additional development work done to the North of #1 shaft, which was necessary in order to mine some of the pillars.

The new rotary dump was installed on the 7th level, and 20 tram cars purchased for use on this level. After the installation of this new equipment, development work was resumed on Section 19, but as the mines were then operating half time, comparatively little hear-way was made to the time the mine closed down.

Practically all development work necessary for the mining of No.1 shaft pillars has been completed, and there is only a few hundred of drifting necessary on the 7th level to fully develop the Section 19 ore body. There is also only very little rock work needed on the 6th level to fully develop

the ore body near No. 3 shaft. The 7th level has not yet been developed towards No. 3 shaft, and at this point a large amount of rock drifting and raising will be necessary. However, this work on the 7th level will not have to be done for sometime after operations are resumed at the mine. It, therefore, can be done gradually.

With the completion of E. & A. No. 401, production costs at the Princeton Mine should show a considerable decrease, when it is figured that also during the next several years of operation there will be comparatively little development work in rock.

Since the mine closed down, a gang of timbermen have worked keeping the main levels in repair. There has been a total of over 60 sets of timber installed in these drifts as also a number of legs and props. The sub-levels in the plastic ore will not stay open, and it would be a needless expense to keep them retimbered, except around the tops of the raises. For this reason, it was necessary, when the mine closed down, to remove the rails and sub-level cars from all the sub-levels near No. 3 shaft. On the resumption of operations there will be some delay in getting the mine back to full production, due to the time it will take to open the sub-levels again. In a mine containing plastic ore, however, this cannot be avoided.

During the past year there has been a further extension of the cave near No. 3 shaft. However, no large areas have broken down, so that there has not been the heavy crushing of the drifts on the sub-levels as was the case in the previous year.

At the end of the year there was 232,987 tons of Cambridge ore in stock, as compared with 170,052 tons in the previous year. The Cambridge stockpile grounds were filled in 1920, since which time the ore has been stocked by raising the trestle on the stockpile and side-dumping across the old pile. It was necessary to raise the trestle twice in 1921 and the ore at the far end of the stockpile is now nearly 50 feet high. Some additional ore could be stocked, but only a comparatively small amount. At the close



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of the shipping season there was 10,473 tons of Princeport ore in stock, as compared with 425 tons at the end of the previous year. There is a considerable area available for stocking Princeport, however.

The ore in sight at the Princeton Mine on December 31st, 1921, is as follows:

<u>PRINCETON MINE - SECTION 20.</u>	<u>PRINCEPORT</u>	<u>CAMBRIDGE</u>	<u>TOTAL</u>
Ore above 2nd Level,	2,552		2,552
" " 4th "		78,325	78,325
" " 5th "	20,000	58,778	78,778
" " 6th "	<u>50,000</u>	<u>425,058</u>	<u>475,058</u>
Total Developed Ore, Sec. 20	72,552	562,161	634,713
Prospective ore below 6th Level,	<u>20,000</u>	<u>418,815</u>	<u>438,815</u>
Grand Total Ore, Section 20,	92,552	980,976	1,073,528
 <u>PRINCETON MINE - SECTION 18:</u>			
Shaft pillars,	10,318	20,636	<u>30,954</u>
Grand Total Princeton Mine Secs. 20 and 18,			1,104,482

The above statement shows that there has been a decrease of 89,517 tons in the estimated ore on the Princeton property. The product for 1920 was 86,518 tons, which shows that there was an actual decrease of 2,999 tons in the estimate of ore due to the development work of 1921. The estimated ore on Section 18 in #1 shaft pillars decreased 20,714 tons. The product from Section 18 did not amount to this figure; the difference is due to development work which showed that some of the pillars that had been figured as part ore in the previous estimate were so lean that they had to be omitted from the new estimate.

The estimated tonnage in the mine, sub-divided as required by the Tax Commission:

Non-Bessemer Ore:

Developed,	Sec. 20,	1. Princeport,	72,552 tons
		2. Cambridge,	562,161 "
Developed,	Sec. 18,	1. Princeport,	10,318 "
		2. Cambridge,	20,636 "
Prospective,	Sec. 20,	1. Princeport,	20,000 "
		2. Cambridge,	<u>418,815</u> "
		TOTAL,	1,104,482 "

The above estimate does not include the ore on C. & N. W. Lease, Section 19, which is shown under a separate report. The probable ore below 6th level has been estimated the same as in the previous year. There has been a further decrease in the tonnage between the 5th and 6th levels in No. 3 shaft territory, where the ore body has been shown to have a smaller area than had previously been used in the estimate.

Mining operations during 1921 were carried on at widely separated points over a territory  $3/4$  of a mile in length. In addition to the mining near No. 3 shaft, some ore was mined in the pillars near No. 2 shaft, and also the pillars at No. 1 shaft were mined. The rock work during 1921 was confined principally to the work at No. 1 Shaft on the 6th level, to one cross-cut near No. 3 shaft on the 6th level, and to a small amount of work on the 7th level, Section 19.

During 1921 work was carried on at the following points:

FIFTH LEVEL  
SUBS BELOW FIFTH LEVEL  
SIXTH LEVEL  
SEVENTH LEVEL

The work in detail for the year was as follows:

FIFTH LEVEL.

Mining of the ore body on the 5th level, in No. 3 shaft territory, had been nearly completed in 1920. There were 5 gangs working here in January, 1921, which number gradually decreased, until there were only 2 in the early part of August, and when the mine closed down all the ore had been mined in this territory. There is still an ore pillar left on the 5th level which extends from a point about half way between Nos. 2 and 3 Shafts, over to No. 2. The main ore body, however, is near No. 3 Shaft, and as stated above, mining had been completed here at the time the mine closed down in August.

1ST SUB BELOW FIFTH LEVEL.

This sub-level was opened in 1920 near No. 3 Shaft, and by the end of the year it was estimated that 75% of this ore body had been mined. There were 9 gangs working here in January, 1921, and 6 in August, when the

mine closed. All of the ore, with the exception of one large pillar 40 x 50 ft., in size, and a few small pillars, has been mined out.

2ND SUB BELOW FIFTH LEVEL.

This sub level was opened in November, 1920, and in January, 1921, there were 7 gangs working here. This number increased to a maximum of 10 in April, and dropped to 8 by the time the mine closed in August. At the end of the year it was estimated that 75% of the ore on this sub had been mined. This sub-level is also located in the territory adjacent to No. 3 Shaft.

3RD SUB BELOW FIFTH LEVEL.

This sub-level was opened near No. 3 Shaft in April, 1921. When the mine closed down in August there were 4 gangs working here. No mining has yet been done on this sub-level; it has been opened by drifts from four raises, preliminary to slicing.

5TH SUB BELOW FIFTH LEVEL.

This sub-level had been opened a number of years ago North and West of No. 2 Shaft. Mining had been stopped, after it was developed and divided up into pillars, on a part of this sub-level, due to the fact that it was partially located beneath the old engine house. Mining was resumed in January, 1921, and when the mine closed, there were 3 gangs working here. It was considered that there was no danger of caving from the mining of this one sub-level, and that by the time this ore was removed, the new engine house would be in use and the old engine house removed to safe ground. The greater part of the ore body here has been taken out by stoping without timber. The ore was about 15 feet in height above the floor of the sub, up to the hanging, and as the jasper hanging was very hard it was safe to remove it without timbering. There are still a few pillars to be mined on this sub-level.

SIXTH LEVEL.

During the time the mine operated in 1921 one raise was put up from the 6th to the 5th level, in No. 3 Shaft territory, and No. 3 cross-cut near No. 3 Shaft was driven 55 feet in hard jasper. This comprises all

the work which was done on the 6th level on Section 20.

SEVENTH LEVEL.

The only work done on the 7th level on the Princeton property in 1921 consisted of timbering part of the main haulage drift which had been driven in 1920. The rock started breaking in the back, so that it was necessary to install timber in a portion of this haulage drift.

The work of installing the new rotary dump on the 7th level was started the last week in April and completed on May, 20th. This new dump will handle two cars at one time; it is also of heavier construction than the old dump, and it is expected that there will be less repairs required, to keep it in operation.

NO. 1 SHAFT TERRITORY - SECTION 18.

6th Level,  
In 1920 the haulage drift between Nos. 2 and 1 Shafts was widened and straightened and electric haulage installed. By the end of 1920 two raises had been completed up to the pillars and mining was under-way, also two raises were being put up. Mining and development work was continued here until the mine closed. The work of drifting beyond No. 1 Shaft was started in March, 1921, and completed in July. Additional raises were put up and in April there were 5 gangs mining the pillars on the 345' sub-level which is at the elevation of the old 6th level, No. 1 Shaft. At one point the ore was found to extend 12 feet above the old 6th level, and a pillar 60 x 20 feet was mined out. Five pillars were being mined at the elevation of the old 6th level when the mine closed down in August. Up to this time the ore in the pillars on the foot-wall above the elevation of this sub-level was being mined. At one point the ore was handled on the flat foot-wall by a scraper, directly to the raise. In addition to the 5 gangs mining on the 345' sub, there were 3 on the 360' sub. There is now approximately 16,000 tons to be mined on the 345' sub, and 14,000 tons on the 360' sub. There will probably be two or three more raises to put up to the elevation of the 360' sub North of No. 1 Shaft. Some development work was done in