

were taken during the year, completing the mining in this section early in October. This sub level was opened several years ago. It has been decided to stop further mining here for the time being.

170' SUB LEVEL.

During the year a drift South from #404 raise was advanced 60' where a holing was effected to the 185' sub level by a stub raise to be used as a traveling road.

FOURTH LEVEL.

No. 603 raise was put up to the Southwest from the main drift near the Negaunee boundary to the 215' sub level. This raise will hasten the mining in the area to the West of #602 and #604 raises.

UNDERGROUND IN GENERAL.

The mining during the year was in areas which had been previously opened, i.e., in the East end of the mine from a point midway between the first and second levels to the traming sub level between the third and fourth levels, also in the South end of the mine above the fourth level along the Negaunee Mine boundary.

Little main level work was done, a short drift being driven on the third level to connect the new foot wall drift with the old haulage drift and a connection made on the second level to the Negaunee Mine Tenth Level to provide a traveling road.

Work in the Traming Sub Level which was started last year was continued during the present year and raises extended to the third level. This will handle a large tonnage as soon as the mining reaches the third level elevation. More contracts are being concentrated in this section of the mine, the supply being secured from the South end near the Negaunee boundary, which area we wish to keep intact as long as possible, for in mining this latter territory, it is necessary to leave pillars to support the surface.

The method of mining used during the year has been the ordinary top slicing. One slusher has been employed and quite satisfactory results obtained.

It is proposed during the coming year to install three Mayne Loader which have been tried out at the Negaunee Mine and found to be efficient for this kind of mining. A section of the mine above the 245' sub level has been blocked out with drifts and raises planned to start mining on the incline system. Two contracts have used this system at the Negaunee Mine for the past three or four months and excellent results have been obtained.

PUMPSTATION.

At the time when the mine cave broke through to surface in March 1918, the water in the mine practically doubled. Up to that time the mine had been equipped with one horizontal plunger pump and one centrifugal pump, each with a capacity of 800 gallons per minute. These were located in a pumphouse just East of the shaft on the third level. After the cave, in order to provide more pumping facilities, a vertical quintiplex Aldrich pump of 600 gallons capacity was secured from the Holmes Mine and installed on the second level in a temporary pumpstation East of the shaft. From that time the pumpman has had to divide his time between the second and third level pumpstations. It was decided during the past year to enlarge the third level pumpstation and move the Aldrich pump to this place. In March drilling was started in the Southeast end of our present pumpstation and a room 35' by 22' cut. The work of cutting this station was slow as breasting had to be built to protect the pumps which were operating during the time the excavation was being made. The blasting necessarily could not be heavy on account of danger of damaging the pumps. The material was extremely hard, being fine grained quartzite. The excavation was made without accident of any kind to the equipment. Here the Aldrich pump was installed and started operating October 30th. The pumping capacity of the Aldrich and Prescott pumps is 1400 gallons, with the Alburger centrifugal as a spare. This latter pump has given us trouble almost every time it has been called into use in an emergency, and I would recommend that it be replaced with a pump of 600 or 800 gallons capacity of the plunger type.

SUMP.

At a point 40' below the third level plat a drift has been started

from the cage compartment which will extend under the third level pump sump. A clean-out raise will be put up to the sump directly below the suction. At the bottom of the raise a dam will be built supplied with pipes and valves for cleaning the sump.

UNDERGROUND FIRE.

On the evening of the 19th of January, a fire was discovered in the main haulage drift on the second level at a point 150' East of the Negaunee boundary. There was no one in the mine at the time except the pumpmen. It was probably caused by a live trolley wire coming in contact with one of the caps of the drift.

Smoke was noticed in the Negaunee Mine about nine o'clock by one of the pumpmen at the tenth level pumpstation, who at once notified the surface watchman, the Captain and Superintendent. An investigation showed that the smoke was coming from a point near the Maas-Negaunee boundary. As the circulation was from the Maas to the Negaunee, the helmet crew went down the Maas shaft and in on the second level. The fire was found, as stated above, near the Negaunee boundary in the back of the drift where the lagging and blocking were burning. It was a little hard to quench on account of the back caving. It required all night to put it out. The fire was confined to two sets.

There was no loss in production due to this fire.

SLUSHER.

In July one of the new Ingersoll-Rand double drum tugger hoists with slusher was installed on the 325' sub level and employed in drifting. From that date this equipment has been in use and has consistently given a much higher product per man per day than hand shovelling.

WATER.

The average quantity of water pumped throughout the year as compared with 1921 is as follows:-

	<u>1922</u>	<u>1921</u>
January	944	1008
February	959	1040
March	943	1042
April	938	1069

May	957	936
June	975	943
July	1012	953
August	1028	969
September	1036	918
October	1093	946
November	984	958
December	958	1018
Average -	985	983

PLANT AND EQUIPMENT.

The Maas plant has been greatly improved during the past few years by the installation of electrical skip and cage hoists and two Ingersoll-Rand electrically operated compressors. The Engine Room has been enlarged and both engine and boiler houses have been covered with fire-proof roofs.

Two years ago separate heating plants were installed at the dry house and the mine office.

In order to make the plant more efficient, I would recommend changes in the shaft, headframe and stocking trestles.

SHAFT.

The present shaft is not standard. The skipways are narrow and the cage compartment short - both of which give us considerable trouble. The narrow skip is hard to load without excessive spillage and the skip roads are hard to maintain. The short cage compartment will not permit handling of regulation length timber on the trucks, all timber longer than 7'10" has to stand on end on the cage and be rehandled at the various plats.

At a cost of \$57,000.00 it has been estimated that the present shaft could be enlarged so as to accommodate standard skips and provide a cage only 4" shorter than our standard cage. The sets would be of steel and the walls of the shaft concrete, making it fire-proof. To make this alteration in the shaft, we estimate it would require shutting down the mine for practically three months, part of the work, including concreting, can be done when the mine is operating.

HEADFRAME.

Changes in the shaft would necessitate changes in the headframe.

I would recommend further that the dump be changed, providing it with a butterfly the same as at the Athens and Negaunee, permitting the top tram cars to enter the headframe from the East and West, rather than from the North and South. The present wood sheave stands between the headframe and the engine house must be replaced this summer. I would recommend that they be made of steel. Mr. McClure has estimated that the changes proposed in the headframe would cost about \$4,000.00.

STOCKING TRESTLE.

At the Athens and Negaunee Mines we are now using steel stocking trestles. The Maas has a life as long as either of these two mines and as figures have proved that there is a material saving in every ton of ore trammed to the stockpile, I would recommend that steel stocking trestles be provided here. We have estimated the cost of this improvement, consisting of 475' of permanent trestle and 1,558' of stocking trestle, together with a change in the timber yard at \$65,000.00.

SURFACE.

SHIPMENTS.

During the past season very little ore was shipped from the Maas Mine, requiring stocking throughout the summer months. The ore shipped from the pocket was 15,527 tons and from the stockpile 1,710 tons, leaving in stock December 31st, 112,529 tons of Bessemer ore and 337,678 tons of Maas ore, a total of 450,207 tons.

TRESTLES.

On account of the small shipments from the mine during the past summer, all of the available stocking room was filled - most of the ore stocked during the summer was by side dumping on the old stockpile. To provide room for the winter output, 200' of permanent trestle to the South had to be repaired, a new stocking trestle of twenty-five bents erected for the Maas ore, and twelve bents added to the Bessemer trestle.

FIRE - CARPENTER SHOP.

On Friday night December 29th at 9:30 o'clock, fire destroyed the roof of the carpenter shop and also damaged the adjoining roofs of the Machine and Blacksmith shops. The origin of the fire is unknown. Although it was discovered before it had gained much headway, it almost immediately reached the roof and was not under control until after the arrival of the City Fire Department. The damage was estimated at about \$1500.00 and was not covered by insurance.

SEWER.

Since the mine has been operating, cess pools have been used for sewage disposal. They have given us constant trouble. In December of this year an 8" sewer line was laid from the change house to the end of Cherry Street where it connects with the city sewer. This should obviate all trouble from this source in the future.

STEAM TURBINE.

The steam turbine operated from August 26th to September 8th, from September 19th to November 8th, and from December 7th to December 22nd.

MAAS CRUSHER.

The Crusher operated throughout the summer months, handling the following product:-

Morris-Lloyd,	83,470 tons,
Athens,	60,848 "
South Jackson,	16,101 "
Angeline,	612 "
Total -	161,031 tons.

Before starting operations in the spring quite extensive repairs will have to be made at the crusher proper where there has been considerable wear since its installation. A new conveyor belt will also have to be installed.

ESTIMATE OF ORE RESERVES IN MAAS MINE DECEMBER 31, 1922.

Assumption 12 cu. ft. equals one ton.

10% deduction for rock.

10% deduction for loss in mining.

AVAILABLE ORE

Ore reserve above 2nd level	- - - - -	324,860 tons,
Ore reserve between 2nd and 3rd levels	- - - - -	1,338,346 "
Ore reserve between 3rd and 4th levels	- - - - -	<u>2,199,657</u> "
Total available	- - - - -	3,862,863 tons.

NON-AVAILABLE ORE

Between 3rd and 4th levels	- - - - -	1,440,893 tons.
Total all ore	- - - - -	5,303,756 tons.
Percentage of Bessemer equals 10%	- - - - -	530,376 tons.

<u>BESSEMER ORE</u>	<u>TRADE NAME</u>	<u>TONS</u>
Developed	Maas-Bessemer	386,286 tons

NON BESSEMER ORE

Developed	Maas	<u>3,476,577</u>
-----------	------	------------------

Total Bessemer and Non-Bessemer - - 3,862,863

ESTIMATED ANALYSIS.

	<u>IRON</u>	<u>PHOS.</u>	<u>SILICA</u>	<u>ALUM.</u>	<u>MANG.</u>	<u>LIME</u>	<u>MAG.</u>	<u>SUL.</u>	<u>IGNI.</u>	<u>MOIST.</u>
Dried 212°										
Maas-Bessemer	61.00	.044	7.50	1.79	.206	.510	.218	.007	1.50	
Natural	53.39	.039	6.56	1.57	.181	.446	.191	.006	1.31	12.50
Dried 212°										
Maas	59.90	.116	7.60	2.34	.280	.820	.256	.009	2.80	
Natural	52.25	.101	6.63	2.04	.244	.715	.224	.008	2.44	12.75

MAAS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA
Maas Bessemer,	61.13	.047	8.19
Maas,	59.43	.105	8.37

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Maas Bessemer,	(All Mixed)		-	-
Maas,	59.93	.095	-	-

ORE STATEMENT - DECEMBER 31ST, 1922.

	MAAS BESSEMER	MAAS	TOTAL	TOTAL LAST YEAR
On hand January 1, 1922,	65,201	187,263	252,464	112,403
Output for Year,	49,348	167,252	216,600	208,288
Total, Shipments,	114,549	354,515	469,064	320,691
	2,020	16,837	18,857	68,227
Balance on Hand,	112,529	337,678	450,207	252,464
Increase in Output,			8,312	
Increase in Ore on Hand,			197,743	

1922 -- 1-4 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
 1-8 Hour Shift, 6 days per week, June 5th to Dec. 31st, 1922.

1921 -- 1-8 Hour Shift, 6 days per week, Jan. 1st to March 25th, 1921.
 1-8 Hour Shift, 5 days per week, Mar. 25th to June 1st, 1921.
 1-4 Hour Shift, 6 days per week, June 1st to Dec. 31st, 1921.

MAAS MINE

SHIPMENTS FOR YEAR 1922.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Maas Bessemer,	2,020	-	2,020	5,669
Maas,	14,924	1,913	16,837	62,558
Total,	16,944	1,913	18,857	68,227
Total Last Year,	27,464	40,763	68,227	
Decrease,			49,370	

MAAS MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	216,600	208,288	8,312	
Underground Costs	1.271	1.624		.353
Surface Costs	.183	.257		.074
General Mine Accounts	.152	.170		.018
Cost of Production	1.606	2.051		.445
Original Cost	.076	.073	.003	
Plant Account	.251	.256		.005
Equipment		.002		.002
Taxes	.338	.363		.025
Central Office	.086	.089		.003
Contingent Expense	.012	.010	.002	
Cost Adjustment	.003	.085		.082
Cost on Stockpile	2.372	2.929		.557
Loading & Shipping	.002	.009		.007
Total Cost on Cars	2.374	2.938		.564
No. Days Operating	303	292	11	
No. Shifts & Hours	1-4-131 1-8-172	1-8		
Avg. Daily Product	715	713	2	
<u>COST OF PRODUCTION</u>				
Labor	.962	1.233		.271
Supplies	.644	.818		.174
Total	1.606	2.051		.445

MAAS MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	216,600	206,288	10,312	
No.Shifts & Hours	1-4;1-8	1-8;1-4		
AVG.NO.MEN WORKING				
Surface	38	41		3
Underground	165	188		23
Total	203	229		26
AVG.WAGES PER DAY				
Surface	3.71	4.53		.82-18.1%
Underground	4.19	5.21		1.02-19.6%
Total	4.10	5.07		.97-19.7%
WAGES PER MO.OF 25 DAYS				
Surface	92.75	113.25		20.50
Underground	104.75	130.25		26.50
Total	102.50	126.75		24.25
PRODUCT PER MAN PER DAY				
Surface	22.11	20.70	1.41	
Underground	5.48	5.32	.16	
Total	4.39	4.23	.16	
LABOR COST PER TON				
Surface	.168	.219		.051
Underground	.764	.979		.215
Total	.932	1.198		.266
AVG.PRODUCT BRK'G & TRM'G	9.01	8.61	.40	
" WAGES CONTRACT MINERS	4.29	5.40		1.11
" " " LABOR	4.29	5.40		1.11
TOTAL NO.OF DAYS				
Surface	9,795 $\frac{1}{4}$	10,060		.264-3/4
Underground	39,500	39,175-3/4	324 $\frac{1}{4}$	
Total	49,295 $\frac{1}{4}$	49,235-3/4	59 $\frac{1}{2}$	
AMOUNT FOR LABOR				
Surface	36343.90	45561.69		9217.79
Underground	165566.44	204022.62		38456.18
Total	201910.34	249584.31		47673.97

Proportion Surface to Underground Men:

1922 - 1 to 4.34
 1921 - 1 to 4.58
 1920 - 1 to 4.56
 1919 - 1 to 4.23
 1918 - 1 to 4.08

1921
 1-8hr 6 days a week to Mar.26;
 1-8hr 5 " " Mar.28 to May 31;
 1-4hr 6 " " June 1 to Dec.31.

1922
 1-8hr June 5, 1922.

MAAS MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1922.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT	AMOUNT
			1 9 2 2	1 9 2 1
6" to 8" Timber	74,500	.0313	2,331.78	4,429.45
8" to 10" "	52,335	.0569	2,977.65	6,051.69
10" to 12" "	27,352	.0807	2,206.79	3,702.45
12" to 14" "	3,591	.1044	375.12	1,326.35
Total - 1922	157,778	.05	7,891.34	
Total - 1921	177,254	.0875		15,509.94
	LINEAL FEET	PER 100'		
7' Lagging	825,992	.721	5,960.33	7,963.99
Poles	31,170	1.24	386.64	256.07
Total - 1922	857,162	.74	6,346.97	
Total - 1921	713,734	1.15		8,220.06
Covering Boards (sq.ft.)	78,582	1.32	1,039.28	
" " " 1921	99,200	1.895		1,880.04
Total Timber			15,277.59	25,610.04

Product	216,600	208,288
Feet of Timber per ton of Ore	.7284	.851
Feet of Lagging "	3.35	3.32
Feet of Lagging per foot of Timber	5.23	3.89
Cost per ton for Timber	.0364	.0745
" Lagging	.0275	.0382
" Covering Boards	.0048	.0091
" Poles	.0018	.0012
" All timber	.0705	.1230
Equivalent of stull timber to bd. measure	239,083	279,967
Feet of bd. measure per ton of ore	1.10	1.34

Total cost of timber, lagging and poles, 1922	15,277.59
1921	25,610.04
1920	25,103.12
1919	27,284.08
1918	17,426.96

The average price per foot for timber decreased 75% compared with the 1921 prices.

The feet of timber per ton of ore was 16% less than 1921.

The mine worked six 4-hour shifts per week from January 1st to June 5th; worked six 8-hour shifts per week from June 5th to January, 1st, 1923.

The decrease in price per foot for timber is due to inventory adjustment of 1921, inventory effecting 1922 sales.

MAAS MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING AND DEVELOPING IN ORE
-1922-

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1922	AMOUNT 1921
40% Powder	48,700	.1434	6,984.35	9,225.01
60% "	32,025	.1796	5,750.40	7,299.45
#1 Hercules Powder	250	.1525	38.12	
Total Powder	80,975	.1577	12,772.87	
Total Powder - 1921	89,450	.1847		16,524.46
Fuse	256,000	.6843c	1,751.87	2,208.09
Caps	52,100	1.148c	598.52	818.19
Cap Crimpers	31	1.00ea	31.00	43.46
Total Fuse, Etc.			2,381.39	3,069.74
Total All Explosives,			15,154.26	19,594.20
Product			216,600	208,288
Pounds of Powder per ton of Ore			.3738	.429
Cost per ton for Powder			.059	.0793
" " Fuse, Caps, etc.			.011	.0147
" " All Explosives			.07	.094
Avg. Price per Lb. for Powder			.1577	.1847

A 15% decrease is shown in the average price per pound for powder against the 1921 price.

The mine worked six 4-hour shifts per week from January 1st to June 5th, 1922; worked six 8-hour shifts per week from June 5th to January 1st, 1923.

A 13% decrease in pounds of powder per ton of ore is shown against 1921.

ATHENS MINE - 1922.

The production for the year was as follows:-

Athens Ore,	193,259 tons,
Rock,	392 "

The ore from the various leases was as follows:-

Athens,	190,187 tons,
Mitchell Lease,	3,072 "

The Athens operated on a four-hour shift per day schedule until June 5th at which time the regular eight-hour day was again adopted. Beginning with October, the force was gradually increased and on October 30th a night shift started with the idea of reaching an ultimate production of 33,333 tons per month or 400,000 tons per year. This being the yearly production necessary to exhaust the ore on the property to the East side of Lot #11 Mitchell Lease before the Mitchell Lease expires.

The operations for the year were in areas previously opened with the exception of the territory above the sixth level Northeast of the large dike. Here development raises reached the top of the ore and mining has started. The balance of the product came from the sub levels on the South foot above the fourth level and in the sub levels above the sixth and ninth levels North of the dike which cuts through the deposit in a Northeast-Southwest direction.

UNDERGROUND.

SUBS ABOVE THE FOURTH LEVEL.

300' SUB LEVEL.

At the end of 1921 there remained at this elevation one of the pillars between #432 and #433 raises. This was mined during January.

315' SUB LEVEL.

This sub had been opened at #334 raise in November 1921. During 1922 the remainder of the sub level was mined from #431-32-33-34 raises, the boundaries

being the hanging jasper to the North and West, jasper and foot wall slate to the South and the mining limit to the East. Work at this elevation was finished in September.

330' SUB LEVEL.

This sub level was opened at #434 raise in August 1922 and mining has continued to date starting at the South boundary and retreating to the North. East of #433 raise ore was mined by the incline slicing method.

In December two gangs were stoping at #431 raise, one to the North and one East; two stoping East of #432 raise and two stoping Southwest of #434.

355' SUB LEVEL.

This sub level was opened at #433 raise in September and a drift driven East to the West line of Mitchell Lease Lot #11. From this drift four single compartment raises were put up to the 330' sub level and were used for incline slicing. In November an exploratory drift was started West from this same raise.

During December the drift to the West from #433 raise was advanced 40' at which point jasper came in at the Southwest corner. This jasper will be tested as it is likely that ore will be found behind it.

SUBS ABOVE THE SIXTH LEVEL.

455' SUB LEVEL.

Northwest of Dike.

Work at this elevation was completed in February with the removal of the pillars at #644 raise.

Southeast of Dike.

Raise #635 from the sixth level which was started in December of 1921 encountered jasper in the back of the raise at 55'. Raising was continued in mixed material to the elevation of the 515' sub level. At this point it was decided to cut out on the foot or Northwest side of the raise and drift to the dike. Ore was cut immediately and later the raise was continued to the elevation of the 455' sub level which was at the top of the ore. This sub level

was opened in May and finished in December. The boundaries being the dike to the Northwest, jasper to the Southeast, South and Southwest, and the limit of mining to the Northeast.

470' SUB LEVEL.

Northwest Side of Dike.

This sub level had been opened in 1921. Work continued between #644 and #648 raises, being finished in August. The boundaries being the jasper to the North and West, dike to the Southeast and the mining limit to the Northeast.

Southeast of Dike.

This sub level was opened from #635 raise in November. In December one gang drifted North from #635 raise to the dike, then drifted Northeast along the dike toward the mining limit. When #636 raise reached this elevation a connection was made to #635 raise, after which a drift was started to the Northwest from #636 toward the dike.

In December two gangs were developing on this sub level.

480' SUB LEVEL.

Northwest of Dike.

This sub level was opened at #647 raise in July and from #644 raise in August. From these points mining has retreated towards #655 raise.

In December two contracts were mining at #655 raise, one to the Northeast, the other to the Southeast. The boundaries are the same as for the sub level above, but this sub is considerably larger as the hanging jasper is making back to the Northwest.

495' SUB LEVEL.

Northwest of Dike.

This sub was opened from #647 raise in September and from #644 raise in November. The mining has retreated from the Southwest boundary toward the Northeast.

In December one contract was stoping West of #647 raise, one North

and one Southwest of #646, one developing East from #646, one developing North and one West from #644.

515' SUB LEVEL.

Southeast of Dike.

A drift was started North from #635 raise in February and was continued to the dike. This drift was exploratory and was driven to drain off the water.

550' SUB LEVEL.

This sub level, at the Southwest end of the sixth level, was finished in January 1922 by removing the pillars at #650 raise.

565' SUB LEVEL.

This was opened at #652 raise in 1921. During 1922 the sub was worked from #650 and #652 raises, being finished in August. The boundaries are, jasper to the North, slate and dike to the South and the mining limit to the East.

575' SUB LEVEL.

This was opened in July at #852 raise from the eighth level, the raises to the sixth level having crushed. The sub was mined from this one raise as #853 was blocked at the sixth level. The boundaries of the sub level are, jasper to the North, jasper to the West, slate foot wall and dike to the South and the limit of mining to the Northeast.

In December three contracts were stoping near #852 raise, one to the Southeast, one to the Southwest and the third to the Northwest. The sub will be finished within a month.

SIXTH LEVEL.

During the year #3 crosscut West was extended Southwest 100' at which point jasper was encountered on all sides. For the entire 100' ore extends but 20' above the rail of the level.

Raise #635 from #3 crosscut which was started in December 1921 was put up to the 455' sub level, a distance of 160'. This raise showed the

following material:-

0' to 55' Ore,
55' to 85' Jasper,
85' to 155' Ore,
155' to 160' Jasper.

Raise #636 was started in October and stopped at the 470' sub level, a distance of 150'. This raise showed the following material:-

0' to 18' Ore,
18' to 150' Mixed ore and jasper.

Raise #637 was started in April and was put up 43', showing the following material:-

0' to 30' Ore,
30' to 43' Jasper.

Raise #647-B single compartment in #4 crosscut, on December 29th was 30' high, all in ore.

Raise #655-B single compartment from #5 crosscut West started in December, on the 29th was 85', reaching the height of the 515' sub level. The material was ore.

Raise #655-A, single compartment, from #5 crosscut West was also started in December and on the 29th was 15' above the rail.

In December mining was started at the West end of the sixth level from #852 raise, one contract drifting South to #853, one drifting North toward the jasper and one to the Southwest toward the slate foot wall.

EIGHTH LEVEL.

Mining was in progress at this elevation near #840 crosscut on the first of the year and was continued as far East as the mining limit between #820 and #840 crosscuts. The work at this elevation was finished in May.

SUBS ABOVE THE NINTH LEVEL.

The ore between the eighth and ninth levels has been mined through raises put up from the two main level drifts on the ninth level. Along the East mining limit the ore is continuous; on the North it is cut off by the large dike and to the West it is separated into two areas by the jasper hanging, on the South is the slate foot wall. On the South side of the jasper

the ore has been mined in two sections which we have termed the West and East blocks. The area to the North of the jasper we have termed the North block.
800' SUB LEVEL.

Mining in the West block from #915 to #918 raise had been finished in 1921. In 1922 the mining of the East block was started in January from #914 raise and in the North block in July from #924 raise.

This sub level was finished in December with the removal of the pillars at #913 raise.

815' SUB LEVEL.

The West block was opened in 1921 from #916 and #919 raises. This block was completed during the past year. The East block was started in October from #915 raise and the block to the North of the jasper in September from #924 raise.

In December two contracts were stoping North of #926 raise, one North and two South of #914 raise and one developing at #913 raise.

830' SUB LEVEL.

The West block was opened in August from #919 raise and the East and North blocks opened in November from #915 and #924 raises,

In December contracts were stoping to the Northwest and Southwest of #916 raise; two were stoping Southwest of #915 raise, one stoping to the South of #924 raise, while at #925 one was developing to the North, another to the South.

855' SUB LEVEL.

This sub level was opened in March from #919 raise to drain off the water from the sub levels above. A drift West struck the jasper 10' from the Bunker Hill line. A drift was then run South to the slate foot wall.

NINTH LEVEL.

In March a drift was started North from #1023 raise and holed to the North main drift between #924 and #925 raises in April. This drift was driven for ventilation and to provide a new traveling road.

No. 915 raise was started in February and holed to the 800' sub level in April, a distance of 100'. The material was ore.

TENTH LEVEL.

The retimbering of this drift which was started in 1921 was continued during the year to within a few feet of the Bunker Hill line. The fungus growth and poor circulation caused the timber to rot quickly and although re-timbering was started as soon as the condition was noticed, it was impossible to complete the work before several sections of the main drift caved. On this account the retimbering was slow.

UNDERGROUND IN GENERAL.

The original plan of mining the Athens ore deposit is being carried out, i.e., starting at the bottom and retreating toward the top. The area on the West end adjacent to the Bunker Hill line is progressing nicely and every effort is being made that there be no interruption in the retreating from this end. Mining started under the hanging between the sixth and seventh levels, a limit being established on the East side and has now reached the third sub level below the eighth level. Work in the territory immediately East of the established limit cannot be started until the mining Northwest of the dike above the sixth level is completed. The ore here in places reaches the height of the fourth level and has been "subbed" to the elevation of the fifth level on the East end and to the sixth level on the West. With each succeeding sub level a larger area is opened but as many contracts are used as it is practical to work.

In order to facilitate the mining, we are trying out the new type of Ingersoll-Rand tuggger hoist and slusher and have ordered three Mayne Loaders, which are working so successfully at the Negaunee Mine. We are also experimenting with incline slicing.

The main level drifts at the Athens are hard to maintain due to crushing in the ore body and early deterioration of the wood due to fungus growth. Over the former we have no control, but we are trying to help the latter by

treating the timbers with zinc chloride and by improving the ventilation.

VENTILATION.

It was necessary to shut down the fan in January on account of ice in the cage compartment which extended a distance of 1200' from surface. This made it dangerous to operate the cage. The ventilation in the mine was good during the winter months, but with the advent of warm weather, it immediately became poor. The fan seemed to help it but little so air was blown into all working places the full twenty-four hours. When operations went on the full time basis in June, there was a decided improvement. We find, however, that it is necessary to blow compressed air as the fan seems inadequate to supply the fresh air needed. In December a 75 horsepower motor was installed to drive the fan, replacing the 40 horsepower motor. This gives increased capacity.

INCLINE SLICING.

An incline system of mining was started in October on the 330' sub level above the fourth level. After taking out one sub level to the East of #433 raise, this system was abandoned temporarily until the work at the raises to the North and South have reached this same elevation. The new system will be tried out thoroughly during the coming year before any recommendation is made.

WATER.

The average number of gallons of water pumped per minute throughout the year as compared with 1921 is as follows:-

	<u>1922</u>	<u>1921</u>
January	146	143
February	146	144
March	147	134
April	152	138
May	157	142
June	163	142
July	169	141
August	174	137
September	175	136
October	178	125
November	177	140
December	184	141
Average -	164	139

WATER COLUMN.

In January a leak occurred at one of the flanges in the water column at a point 300' from surface. This water formed ice in the shaft. It was necessary to place a new section in the column at this point.

SURFACE.

AIR COMPRESSOR.

An Ingersoll-Rand P.R.E.-2 air compressor was purchased from the government Hog Island shipyard in August. Excavations were made and the foundations completed in September. The rock excavation had to be made in our present engine room which was successfully done without accident to any of the machinery. The new compressor was started on November 22nd and is now being used daily. It is equipped with a 450 horsepower General Electric motor and has a capacity of 2275 cubic feet per minute.

TIMBER TREATING PLANT.

A small plant for the treating of our main level timbers was installed at the West end of the timber yard in September. Two steel tanks 6' in diameter by 19'6" in length were made from old boilers obtained from the Negaunee Mine. These were set vertically in the ground and are used to hold the treating solution, which is water containing 4% zinc chloride. A small shed for the storage of the zinc chloride and a tank for a concentrated solution were placed to the South of the treating tanks adjacent to the railroad track. The elevation of this tank permits the concentrated solution to flow by gravity to the treating tanks. The timber to be treated is dipped in this solution, being handled by means of a derrick which picks up the peeled timber from the skidway, drops it in the tank and later lifts it from the tank and deposits it on another skidway where it can be easily transferred to the timber trucks which go into the mine.

The open tank process is being used, i.e., first immersing the framed timber in the liquid which is heated for a few hours by means of steam, after which the steam is shut off and the liquid permitted to cool. A complete cycle

taking twenty-four hours. New timber is placed in the tanks each morning. We are assured by the government experts that this will give satisfactory and economical treatment. Zinc chloride is used extensively in pressure systems for treating ties.

SHIPMENTS.

The shipments for the year were 88,069 tons from the pocket and 165,375 tons from the stockpile. Practically all of the shipments to charcoal furnaces were from the stockpile, where the ore averaged slightly less in phosphorous and moisture than that coming from the pocket.

STEEL STOCKING TRESTLE.

Early in the year estimates were made on the cost of providing steel stocking trestles. On account of limited room, it was necessary to figure on two trestles, one running due East from the shaft parallel to the L. S. & I. tracks along the North side of the Athens property, another to the Southeast of the shaft in the direction of the Lucky Star shaft. Steel stocking trestles at the Negaunee Mine proved that they made a material saving in the cost of stocking ore. In July these trestles were authorized.

In preparing the ground for the erection of the trestles, it was necessary to remove the small rock pile to the South of the shaft and spread the rock in the hollow across where #2 trestle was planned to go. This work was started on July 8th with a steam shovel, dinky engine and dump cars, and was completed on August 5th - 4,807 yards being moved.

The Worden-Allen Company of Milwaukee was awarded the steel work, the contract being signed August 7th and blue-prints of the foundation plan were received September 13th. The excavation of the piers began on September 16th. The first form was built on the 21st and concrete poured the next day. The column foundations being completed on November 4th. On November 3rd the steel men arrived and started erecting. On December 6th all steel on #1 trestle had been erected and the columns brought into alignment. The steel work on #2 trestle was practically completed on December 31st, the final work

being done on January 3rd.

The placing of concrete in the tubular columns for the North trestle was started on November 28th and the first column finished the following day. As the other columns were not in alignment, concrete work was delayed until December 9th. On December 15th the second and third columns were finished and concreting was again postponed while decking was placed on the approach of this trestle, and the sheaves, rollers and rope put in place. Stocking of ore was started on the South track of this North trestle December 18th. Concreting the remaining columns on this trestle is now in progress.

The new trestles are of practically the same design as at the Negaunee Mine with the exception that the columns are $4\frac{1}{2}$ ' in diameter instead of 4'. The plate girders and cantilevers are 48" deep instead of 42". The permanent trestles are horizontal and the stocking trestles are built on a one percent up grade where the Negaunee is horizontal. The span between columns is 114'.

The trestle is designed to carry a loaded car weighing approximately 20,000 pounds.

ESTIMATE OF ORE RESERVES IN ATHENS MINE DECEMBER 31, 1922.

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

Percentage of Bessemer equals 0.

DEVELOPED ORE.

Fourth level and above - - - - -	1,196,777 tons,
Fourth level to sixth level, North side of dike - - - - -	565,764 "
Sixth level to 660' sub level, North side of dike - - - - -	551,644 "
660' sub level to eighth level - - - - -	1,166,738 "
Eighth level to ninth level - - - - -	624,063 "
Ninth level to Tenth level - - - - -	443,155 "
Below tenth level - - - - -	<u>61,130 "</u>
Total developed ore - - - - -	4,609,271 tons.

PROSPECTIVE ORE.

Fourth level to sixth level, South side of dike - - - - -	2,100,438 tons,
Sixth level to 660' sub level, South side of dike - - - - -	<u>475,049 "</u>
Total prospective ore - - - - -	2,575,487 tons.
Total All Ore - - - - -	7,184,758 tons.

ESTIMATED ANALYSIS

	<u>IRON</u>	<u>PHOS.</u>	<u>SILICA.</u>	<u>ALUM.</u>	<u>MANG.</u>	<u>LIME.</u>	<u>MAG.</u>	<u>SUL.</u>	<u>IGNI.</u>	<u>MOIST.</u>
Dried 212°	59.80	.140	8.45	.264	.530	.430	.480	.012	1.15	
Natural	52.03	.121	7.35	.230	.461	.374	.418	.010	1.00	13.00

ATHENS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA
Athens,	60.46	.136	6.80
Athens - Mitchell Lease,	61.40	.154	4.70

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Athens,	59.97	.135	59.83	12.40
Athens - Mitchell Lease,	(All Mixed)			

ORE STATEMENT - DECEMBER 31ST, 1922.

	ATHENS	MITCHELL LEASE	CORBETT LEASE	TOTAL	TOTAL LAST YEAR
On hand January 1, 1922,	204,703	14,732	2,294	221,729	92,049
Output for Year,	190,187	3,072	-	193,259	176,077
Transferred,	2,361	827	1,534	-	-
Total,	397,251	16,977	760	414,988	268,126
Shipments,	257,868	7,291	-	265,159	46,397
Balance on Hand,	139,383	9,686	760	149,829	221,729
Increase in Output,				17,182	
Decrease in Ore on Hand,				56,570	

1922 -- 1-4 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
 1-8 Hour Shift, 6 days per week, Jan. 5th to Dec. 31st, 1922.

1921 -- 2-8 Hour Shifts, 6 days per week, Jan. 1st to March 25th, 1921.
 2-8 Hour Shifts, 5 days per week, March 25th to April 25th, 1921.
 1-8 Hour Shift, 6 days per week, April 25th to May 17th, 1921.
 1-4 Hour Shift, 6 days per week, May 17th to Dec. 31st, 1921.

ATHENS MINE

SHIPMENTS FOR YEAR 1922.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Athens,	84,551	173,317	257,868	44,213
Athens - Mitchell Lease,	-	7,291	7,291	600
Athens - Corbett Lease,	-	-	-	1,584
Total,	84,551	180,608	265,159	46,397
Total Last Year,	33,021	13,376	46,397	
Increase,	51,530	167,232	218,762	

ATHENS MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	193,259	176,077	17,182	
Underground Costs	1.100	1.413		.313
Surface Costs	.199	.248		.049
General Mine Account	.102	.088	.014	
Cost of Production	1.401	1.749		.348
Plant Account	.210	.210		
Taxes	.424	.393	.031	
Central Office	.096	.070	.026	
Contingent Expense	.003	.004		.001
Cost Adjustment	.007	.059		.066
Cost on Stockpile	2.127	2.485		.358
Loading and Shipping	.042	.009	.033	
Misc. Debits & Credits	0	.002	.002	
Total Cost on Cars	2.169	2.492		.323
No. Days Operating	303	294	9	
No. Shifts & Hours	1-4; 1-8	2-8 11-8 1-4		
Avg. Daily Product	638	599	39	
<u>COST OF PRODUCTION</u>				
Labor	.856	1.065		.209
Supplies	.545	.684		.139
Total	1.401	1.749		.348

ATHENS MINE
COMPARATIVE WAGES AND PRODUCT

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	193,259	176,077	17,182	
No.Shifts & Hours	1-4	2-8;1-8 1-4		
AVG.NO.MEN WORKING				
Surface	32	32		
Underground	120	124		4
Total	152	156		4
AVG.WAGES PER DAY				
Surface	3.81	4.61		.80-17.4%
Underground	4.25	5.42		1.17-21.6%
Total	4.15	5.25		1.10-20.9%
WAGES PER MO. OF 25 DAYS				
Surface	95.25	115.25		20.00
Underground	106.25	135.50		28.25
Total	103.75	131.25		27.50
PRODUCT PER MAN PER DAY				
Surface	22.28	23.69		1.41
Underground	6.40	6.41		.01
Total	4.97	5.05		1.08
LABOR COST PER TON				
Surface	.171	.195		.024
Underground	.664	.845		.181
Total	.835	1.040		.205
AVG.PRODUCT BRK'G & TRM'G	10.14	9.99	.15	
" WAGES CONTRACT MINERS	4.46	5.85		1.39
" " " TRAMMERS				
" " " LABOR	4.46	5.85		1.39
TOTAL NO. OF DAYS				
Surface	8,673	7,430	1,243	
Underground	30,195	27,469	2,726	
Total	38,868	34,899	3,969	
AMOUNT FOR LABOR				
Surface	33019.46	34282.88		1263.42
Underground	128420.96	148848.50		20427.54
Total	161440.42	183131.38		21690.96

Mine started on operating basis Jan.1,1919.

Proportion Surface to Underground Men:

1922 - 1 to 3.75
1921 - 1 to 3.88
1920 - 1 to 3.83
1919 - 1 to 3.

1921.
2-8hr 6 days a week Jan.1st to Mar26;
1-8hr 5 " Mar.27 to May 17;
1-4hr 6 " May 17 to Dec.31.
1922
1-8hr 6 days a week June 5,1922.

ATHENS MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1922.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT	
			1 9 2 2	1 9 2 2
6" to 8" Timber	67,958	.036	2,449.29	4,176.73
8" to 10" "	74,101	.0606	4,488.67	6,486.40
10" to 12" "	25,618	.0849	2,173.86	2,347.43
12" to 14" "	3,348	.11	368.41	1,247.05
Total - 1922	171,025	.0554	9,480.23	
Total - 1921	160,197	.089		14,257.61
	LINEAL FEET	PER 100'		
7' Lagging	612,533	.754	4,617.77	6,204.61
Poles	176,248	1.112	1,960.52	1,629.52
Total - 1922	788,781	.834	6,578.29	
Total - 1921	647,526	1.209		7,834.13
Cover Boards (sq.ft.)	37,560	1.352	507.69	1,077.45
Product for year			193,259	176,077
Feet of Timber per ton of Ore			.885	.998
Feet of Lagging per ton of ore			3.169	3.018
Feet of Lagging per foot of Timber			3.582	3.317
Cost per ton for Timber			.049	.081
" Lagging			.024	.0352
" Covering Boards			.0026	.0061
" Poles			.0101	.0093
" Timber, Lagging, Poles & Boards			.0857	.1316
Equivalent of stull timber to bd. measure			254,091	250,897
Feet of bd. measure per ton of ore			1.315	1.425

Total cost for timber, lagging poles & boards -

1922	16,566.21
1921	23,169.19
1920	22,622.15

9.19

ATHENS MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING AND DEVELOPING IN ORE
-1922-

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1922	AMOUNT 1921
40% Powder	55,700	.1403	7,813.24	10,366.39
60% "	10,550	.1767	1,865.12	1,795.04
#1 Hercules Powder	200	.1525	30.50	
80% Powder				39.75
Total Powder	66,450	.1461	9,708.86	12,201.18
Fuse	242,900	7,3242	1,779.05	2,037.88
Caps	46,500	11.563	537.68	634.16
Cap Crampers	24	.481	11.55	25.83
Total Fuse, Etc.			2,328.28	2,697.87
Total All Explosives			12,037.14	14,899.05
Product			193,259	176,077
Pounds of Powder per ton of Ore			.3438	.3998
Cost per ton for Powder			.0502	.0693
" " Fuse, Caps, Etc.			.0120	.0153
" " All Explosives			.0622	.0846
Avg. Price per Lb. for Powder			.1461	.1733

G. H.

SOUTH JACKSON MINE - 1922.

The product for the year was 16,101 tons.

Orders to open the pit were received on May 16th and loading started on the 19th. The product for this month, which amounted to 5,386 tons, came from the Southwest and South sides. In June the shovel was first moved to the Northeast end of the pit and later to a new cut which was started in the Southwest end. During this month 6,520 tons were loaded. The mine was shut down on June 17th.

On September 15th the pit was reopened and 4,195 tons loaded, the work being stopped on the 27th instant. This completed the loading for the season, after which the steam shovel and dinky engine were moved to the Hard Ore Shops for repairs.

In the latter part of June and early in July, two men were employed in making repairs to the drainage tunnel which runs beneath the pit.

ESTIMATE OF ORE RESERVES OF DECEMBER 31, 1922.

Above present pit available by present system of mining:

On Southwest side - - - - -	35,000 tons,
North of Lucy Pit - - - - -	7,000 "
South and Southwest of Lucy Pit - - - - -	<u>3,000 "</u>
Total -	45,000 tons.

Below present pit and above drainage tunnel available by milling:

West of Crusher - - - - -	186,000 tons,
Area below bottom present pit by churn drilling - -	<u>149,300 "</u>
Total -	335,300 tons.

GRAND TOTAL - 380,300 tons.

ANALYSIS

	<u>IRON</u>	<u>PHOS.</u>	<u>SUL.</u>	<u>MANG.</u>	<u>MOIST.</u>	<u>SIL.</u>
Natural	36.83	.066	.010	2.00	7.00	31.56

South Jackson Mine Bond
MADE IN U.S.A.

SOUTH JACKSON MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA	MANG.
So. Jackson,	39.05	.068	33.58	2.24

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	Mine				Lake Erie		
	IRON	PHOS.	SILICA	MANG.	IRON	MOIST.	MANG.
So. Jackson,	39.01	.070	33.50	2.33	39.77	7.20	2.61

ORE STATEMENT AND SHIPMENTS FOR YEAR 1922.

	YEAR	LAST YEAR
Output for Year,	16,101	4,677
Shipments,	16,101	4,677
Balance on Hand,	-	-
Increase in Output,	11,424	
Increase in Shipments,	11,424	

1922 -- Idle Jan. 1st to May 18th, 1922.
 1-8 Hour Shift, May 19th to June 18th, 1922.
 Idle June 18th to Sept. 15th, 1922.
 1-8 Hour Shift, Sept. 15th to Sept. 28th, 1922.
 Idle Sept. 29th to Dec. 31st, 1922.

1921 -- Idle Jan. 1st to Sept. 27th, 1921.
 1-10 Hour Shift Sept. 27th to Oct. 14th, 1921.
 Idle Oct. 14th to Dec. 31st, 1921.

South Jackson Mine Bond
MADE IN U.S.A.

SOUTH JACKSON MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	16,101	4,677	11,424	
Open Pit Costs	.398	.726		.328
General Mine Accounts	.025	.054		.029
Cost of Production	.423	.780		.357
Original Cost	.803	.803		
Plant Account		.046		.046
Taxes	.271	1.198		.927
Central Office	.013	.024		.011
Contingent Expense	.003	.003		
Cost Adjustment	.035	.167		.132
Winter Expense	.129	/190		.061
Total Cost on Cars	1.677	3.211		1.534
No. Days Operating	35	12	23	
No. Hours & Shifts	1-10	1-10		
Avg. Daily Product	460	390	70	
<u>COST OF PRODUCTION</u>				
Labor	.215	.279		.064
Supplies	.208	.501		.293
Total	.423	.780		.357

SOUTH JACKSON MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	16,101	4,677	11,424	
No.Shifts & Hours	1-10hr	1-10hr		
AVG. NO. MEN WORKING				
Surface	2	5		3
Underground(Pit)	11	7	4	
Total	13	12	1	
AVG. WAGES PER DAY				
Surface	4.04	4.39		.35
Underground	4.20	4.16	.04	
Total	4.18	4.28		.10
WAGES PER MO. OF 25 DAYS				
Surface	101.00	109.75		8.75
Underground	105.00	104.00	1.00	
Total	104.50	107.00		2.50
PRODUCT PER MAN PER DAY				
Surface	179.40	34.26	45.14	
Underground	26.60	39.14		12.54
Total	23.17	18.27	4.90	
LABOR COST PER TON				
Surface	.022	.128		.106
Underground	.158	.106	.052	
Total	.180	.234		.054
TOTAL NO. OF DAYS				
Surface	89-3/4	136-1/2		46-3/4
Underground	605	119-1/2	485-3/4	
Total	695	256	439	
AMOUNT FOR LABOR				
Surface	362.75	599.26		236.51
Underground	2540.42	497.32	2043.10	
Total	2903.17	1096.58	1806.59	

1921 - Mine only operated 12 days with 5 men surface and 7 men in pit.
 1922 - " " 35 " 2 " " 11 " "

NORTH JACKSON MINE - 1922.

There was no work done at this property during the year.

Faint, illegible text, possibly bleed-through from the reverse side of the page.

MORRIS LLOYD MINES.

GENERAL

These mines commenced the year and continued until the first week in June on the curtailed basis put into effect last year. We worked our men one-half time only, and operations were carried on on day shift only except that we prosecuted our development work on the bottom of the Morris Mine on both day and night shifts, working full time and changing the men every three days.

On June 5th, 1922 our mines were placed on a full time one shift basis, working days only. We continue to carry on our development work in the Morris Mine on both day and night shifts.

During the past summer considerable grading and landscaping was accomplished around our Morris and Lloyd engine houses and also on the office grounds.

No new work was undertaken on surface during the year and the work here consisted of the regular surface expense.

In spite of curtailed operations we have prosecuted our development work on both day and night shifts and have further increased our tonnage of ore reserves during the year.

The long drift across the Chase Leases was driven 2800 feet during the year and is now on Lease No. 25. A number of lenses of ore were cut in this drift.

Ore is being mined on Chase Leases Nos. 9 and 24. A small tonnage only from No. 24, but a good product is being won from Lease No. 9. During the year a tonnage sufficient to meet the total Chase Lease requirements was mined, principally from Lease No. 9.

The new pumping plant for domestic water supply was placed in work and this gives us an ample supply of very excellent water for our tenants. Samples of this water are analyzed at regular intervals, in order to make sure of its purity.

MORRIS LLOYD MINES.

GENERAL
(CONTINUED)

A truck has been fitted up holding a 265 gallon tank which will be used in case of fire underground. This tank is equipped with nozzle, water and air hose connections and can be readily switched to any part of the mine in which it may be needed.

LABOR

Since starting work on a full time basis, we have found it difficult to hold a supply of men. It is always difficult to get and hold efficient men in these outlying districts. At the time operations were curtailed in 1921, all of our single men were laid off and only married men were retained. The single men have practically all left the district.

Somewhat better results are secured by working our miners on day shift only.

We have barely sufficient labor to get along and could use additional miners if they were available.

We have let a contract to cut the balance of the timber remaining on the surface of the Chase Leases and the contractor is having difficulty in getting men.

There was a reduction in wages put into effect on June 1st, 1922 and an increase in wages placed in effect September 1st, 1922.

A nine hour day was placed in effect on surface in December month 1922.

MORRIS LLOYD MINES.

LABOR
(CONTINUED)

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				
	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922
JAN.	50	49	51	58	53	208	206	232	280	189	258	256	283	338	242
FEB.	47	46	50	61	52	194	206	214	271	193	241	252	264	333	245
MAR.	46	46	45	60	50	201	217	210	301	189	247	263	255	361	239
APR.	40	46	43	53	47	184	213	198	279	198	224	259	241	332	245
MAY.	48	53	54	57	53	198	214	174	272	196	246	267	228	339	249
JUN.	39	50	47	54	53	202	232	186	186	164	241	281	233	240	217
JUL.	41	52	48	51	57	201	214	189	198	153	242	266	237	249	210
AUG.	45	50	46	53	58	195	216	186	209	157	240	266	232	262	215
SEP.	44	49	44	62	60	186	201	190	186	159	230	250	234	248	219
OCT.	48	50	47	61	54	182	205	193	194	157	230	255	240	255	211
NOV.	47	48	46	47	50	164	201	199	194	163	212	249	245	241	213
DEC.	48	51	45	49	51	174	212	246	187	166	222	263	292	236	217
AVG.	45	49	47	55	53	191	214	201	229	174	236	263	248	284	227

We trust these mines will be worked to capacity during the coming year and that we may add to our forces employed.

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				
	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922
JAN.	3.86	5.15	5.10	5.73	3.87	4.36	5.83	5.82	6.31	4.29	4.26	5.70	5.69	6.18	4.17
FEB.	3.89	5.20	5.60	4.82	3.89	4.36	5.95	6.42	5.30	4.24	4.26	5.81	6.24	5.20	4.15
MAR.	3.85	5.23	5.55	4.82	3.84	4.41	6.01	6.49	5.35	4.24	4.30	5.87	6.31	5.24	4.14
APR.	4.02	5.16	5.60	4.84	3.93	4.64	6.01	6.40	5.16	4.22	4.52	5.85	6.24	5.07	4.16
MAY.	4.22	5.19	5.55	4.79	3.89	4.86	6.02	6.57	5.26	4.23	4.74	5.84	6.33	5.16	4.13
JUN.	4.21	5.16	5.47	4.83	3.61	4.91	6.13	6.62	5.55	3.90	4.78	5.94	6.38	5.39	3.82
JUL.	4.23	5.21	5.32	4.85	3.50	4.98	6.17	6.46	5.55	3.81	4.89	5.97	6.23	5.40	3.72
AUG.	4.70	5.17	5.50	4.32	3.46	5.52	6.03	6.64	4.93	3.84	5.36	5.86	6.38	4.79	3.71
SEP.	4.82	5.20	5.61	4.37	3.93	5.53	6.10	6.47	4.87	4.34	5.39	5.92	6.28	4.73	4.20
OCT.	5.32	5.19	5.65	3.96	3.95	6.11	6.00	6.71	4.44	4.47	5.97	5.85	6.46	4.30	4.33
NOV.	5.38	5.21	5.70	3.92	3.96	6.04	5.86	6.36	4.28	4.39	5.89	5.70	6.20	4.17	4.29
DEC.	5.23	5.18	5.69	3.89	3.73	5.94	5.83	6.26	4.34	4.43	5.79	5.70	6.14	4.21	4.33
AVG.	4.48	5.18	5.46	4.54	3.72	5.14	6.00	6.42	5.26	4.19	5.01	5.84	6.23	5.13	4.08

MORRIS LLOYD MINES.

LABOR
(CONTINUED)

During the past year we have had full benefit of the wage reductions made in 1921.

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				
	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922
JAN.	.225	.294	.275	.242	.265	1.036	1.363	1.389	1.560	.911	1.261	1.657	1.664	1.802	1.176
FEB.	.237	.279	.319	.211	.247	1.017	1.347	1.514	1.274	.891	1.254	1.626	1.833	1.485	1.138
MAR.	.193	.267	.284	.196	.232	.952	1.394	1.465	1.304	.828	1.145	1.661	1.749	1.500	1.060
APR.	.205	.310	.346	.209	.280	.985	1.545	1.589	1.262	.970	1.190	1.855	1.935	1.471	1.250
MAY.	.202	.290	.397	.200	.235	.927	1.320	1.499	1.125	.852	1.129	1.610	1.896	1.325	1.183
JUN.	.166	.251	.327	.369	.183	.907	1.320	1.505	1.556	.723	1.073	1.571	1.832	1.925	.906
JUL.	.181	.293	.333	.318	.183	.904	1.374	1.554	1.335	.648	1.085	1.667	1.887	1.653	.831
AUG.	.212	.276	.288	.314	.175	.992	1.374	1.420	1.255	.650	1.204	1.650	1.708	1.569	.825
SEP.	.212	.280	.287	.347	.212	.985	1.267	1.406	1.194	.752	1.197	1.547	1.693	1.491	.964
OCT.	.213	.258	.281	.254	.213	.980	1.217	1.376	.946	.810	1.193	1.475	1.657	1.200	1.023
NOV.	.354	.307	.338	.225	.210	1.335	1.389	1.538	.952	.790	1.689	1.696	1.876	1.177	1.000
DEC.	.333	.300	.271	.239	.219	1.311	1.333	1.586	.961	.872	1.644	1.636	1.857	1.20	1.091
AVG.	.229	.284	.309	.242	.221	1.027	1.354	1.482	1.248	.786	1.256	1.638	1.791	1.490	1.000

Our labor cost per ton shows quite a decrease this year. This is due to our increase in tons mined per man per day and to the decrease in wages. We were enabled to largely increase our tons per man on account of the large product we are receiving from a sub stope now in work above the sixth level of the Morris Mine. This sub stope, without timber, turns out a large tonnage with very few men.

The following statement shows the number of men of the different nationalities at work in these mines in December month 1922, and for the same month during the previous five years, viz:

	1922	1921	1920	1919	1918	1917
Americans,	0	* 0	80	69	60	57
English,	16	35	14	14	10	13
Swedish,	17	22	9	9	9	10
French,	60	53	20	23	10	11
Finnish,	89	96	114	96	87	83
Italian,	32	22	60	53	45	51
Greeks,	0	0	0	0	2	1
Slavish,	0	0	2	3	1	0
Norwegian,	2	3	0	0	0	0
Irish,	0	4	0	0	0	0
Scotch,	1	2	0	0	0	0
TOTAL,	217	237	299	267	224	226

*Basis of Classification changed year 1921.

MORRIS LLOYD MINES.

PRODUCTION

During the year we produced 221,979 tons as compared with 209,034 tons last year.

The mines are in condition to produce a much larger tonnage.

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

MINE	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris		109,227	17,398			126,625
Lloyd			5,452	89,902		95,354
TOTAL, 1922		109,227	22,850	89,902		221,979
" 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

We hoisted ore on 301 days at the rate of 737 tons per day.

Mining from Chase Leases was prosecuted as rapidly as possible all through the year as we are away behind on royalty requirements. During the year we mined 101,974 tons from these leases, whereas, the total requirements on all leases is 77,500 tons.

Our tons per man per day are higher this year than last due to the large production we are receiving from the large sub stope in the Morris Mine, and also to an increase in tons per man received in the Lloyd East ore body.

MORRIS LLOYD MINES.

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				
	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922	1918	1919	1920	1921	1922
JAN.	17.09	17.66	18.53	22.64	14.37	4.20	4.28	4.19	4.04	4.71	3.37	3.44	3.42	3.43	3.55
FEB.	16.36	18.65	17.54	22.07	15.65	4.29	4.42	4.22	4.16	4.76	3.40	3.57	3.40	3.50	3.65
MAR.	19.80	19.61	19.58	23.72	16.52	4.63	4.31	4.43	4.10	5.11	3.75	3.54	3.61	3.49	3.90
APR.	19.60	16.65	15.85	22.12	14.04	4.71	3.89	4.03	4.08	4.35	3.80	3.16	3.22	3.45	3.32
MAY.	20.84	17.68	13.98	23.48	16.15	5.25	4.57	4.39	4.69	4.97	4.20	3.63	3.34	3.91	3.80
JUN.	25.18	20.40	16.71	13.02	19.13	5.42	4.64	4.40	3.57	5.40	4.46	3.78	3.48	2.80	4.21
JUL.	24.80	17.69	15.98	15.21	18.63	5.50	4.49	4.16	4.16	5.88	4.50	3.58	3.30	3.27	4.47
AUG.	22.37	18.63	18.54	13.73	18.78	5.56	4.39	4.77	3.93	5.90	4.45	3.55	3.73	3.05	4.49
SEP.	22.96	18.70	19.09	12.41	17.77	5.61	4.81	4.61	4.26	5.78	4.51	3.83	3.71	3.17	4.36
OCT.	25.35	20.31	19.45	15.07	18.13	6.23	4.93	4.88	4.70	5.52	5.00	3.97	3.90	3.58	4.23
NOV.	15.31	16.68	16.51	18.32	18.70	4.52	4.22	4.13	4.50	5.56	3.49	3.36	3.31	3.55	4.29
DEC.	15.81	17.29	20.27	15.60	18.17	4.53	4.38	3.95	4.51	5.08	3.52	3.49	3.30	3.50	3.97
AVG.	20.45	18.33	17.67	18.78	17.40	5.04	4.44	4.33	4.22	5.33	4.04	3.57	3.48	3.44	4.08

SHIPMENTS

Our shipments, while the largest since 1918, are still much lower than we are capable of forwarding.

The Charcoal Furnaces have resumed taking our grades of ore. All of this must be crushed and during the winter months, we have difficulty in supplying a sufficient tonnage, due to our having a crusher only at the Lloyd Shaft. We recommend that a crusher be installed at the Morris Shaft also.

The following statement shows shipments by grades for the past year and previous years for comparison, Viz:

MORRIS LLOYD MINES.

SHIPMENTS

YEAR	1917	1918	1919	1920	1921	1922
GRADES	TONS	TONS	TONS	TONS	TONS	TONS
Morris Bessemer,	59,620	23,785	5,000	7,789		
Lloyd Bessemer,	26,809	2,679				
TOTAL BESSEMER,	86,429	26,464	5,000	7,789		
Morris Ore,	14,050	13,576	3,613	37,402	7,868	118,858
Lloyd Ore,	126,753	155,166	121,198	111,922	38,582	96,571
Lloyddale Ore,	19,280	60,087	27,699	11,438		42,742
TOTAL NON BESSEMER,	160,083	228,829	152,510	160,762	46,450	258,171
Morrisville,	10,930	11,878	8,506	256	4,620	8,117
North Lake Silica,	45,813	48,369	24,541	31,581	14,780	27,627
TOTAL SILICA,	56,743	60,247	33,047	31,837	19,400	35,744
GRAND TOTAL,	303,255	315,540	190,557	200,388	65,850	293,915

Of the total shipments for 1922, 163,366 tons were shipped from stockpile and 130,549 tons from the pockets.

ORE IN STOCK

Last year we reported the largest balances in stockpile for any year in the history of the district. The balance this year is slightly less than last year, but are still far too large for comfort.

We must again call attention to the large balance of Silica ore being carried in stock and hope a good large tonnage will be moved during the coming season.

Our balances as of December 31, 1922 are as follows: Viz:

BALANCES IN STOCKPILES DECEMBER 31ST, 1922.

	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris, Lloyd,		65,658	59,651	96,674	31,250	125,309
			44,184			172,108
TOTAL, 1922		65,658	103,835	96,674	31,250	297,417
" 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 MINES.

COSTS OF PRODUCTION

Our costs of production show a material reduction over last year as we have had the full benefit of the wage decreases put into effect during 1921. Some items of supplies have also been reduced and our tons per man have increased over last year, all of which tends to a reduction in costs.

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.

1922	PRODUCT TONS	TONS PER MAN PER DAY	TOTAL COST OF PRODUCTION			COST PER TON		
			LABOR	SUPPLIES	TOTAL	LABOR	SUPP.	TOTAL
JAN.	12,736	3.55	15,830.70	10,508.26	26,338.96	1.243	.825	2.068
FEB.	11,826	3.65	14,311.41	9,301.25	23,612.66	1.210	.787	1.997
MAR.	14,046	3.90	15,698.59	10,874.69	26,573.28	1.117	.774	1.891
APR.	10,785	3.32	14,335.36	11,531.20	25,866.56	1.329	1.069	2.398
MAY.	14,159	3.80	16,000.28	11,125.33	27,125.61	1.130	.786	1.916
JUN.	21,800	4.21	20,039.26	12,224.22	32,263.48	.919	.561	1.480
JUL.	22,742	4.47	18,859.37	12,407.93	31,267.30	.829	.546	1.375
AUG.	25,584	4.49	20,832.59	14,618.58	35,451.17	.814	.571	1.385
SEP.	22,558	4.36	21,469.29	12,831.39	34,300.68	.952	.568	1.520
OCT.	22,943	4.23	23,182.69	15,627.35	38,810.04	1.011	.681	1.692
NOV.	22,135	4.29	22,511.55	14,268.83	36,780.38	1.017	.644	1.661
DEC.	20,665	3.97	23,146.14	19,804.00	42,950.14	1.120	.958	2.078
ADJUSTMENT								
TOTAL-1922	221,979	4.08	226,217.23	155,123.03	381,340.26	1.019	.699	1.718
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	282,483	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 MINES.

DWELLINGS

We have had to make a considerable number of repairs to our tenant houses during the current year and in addition we have had all of them, with the exception of the twelve new ones, repainted. This repainting was done by contract by the "spray method." It remains to be seen just how good this method is, compared with hand work.

The sills and underpinning in a great many of the older houses are badly decayed and must be renewed and we will have heavy expense on this work during the coming season, as well as the expense of reshingling a large number of the dwellings.

We want to strongly recommend that, hereafter, in building additional houses that concrete walls be placed underneath. This will prove a large saving over wood posts and sills, much better - have the entire house constructed of concrete or other fire proof material.

We have eleven empty houses at the end of the year. Have plenty jobs for men to fill these dwellings, but no men are in sight.

The question of building additional houses will come up when business improves and labor is available, and it is desired to increase our production.

No new buildings were erected during the year.

On December 5th, 1922, a fire was discovered about 6:00 o'clock P.M. in the attic of House No. 37, occupied by Gust Rock. The fire was put out within a short time after water was put to play upon it. Holes were burned through the roof and the house had to be resingled. The water damaged the walls and woodwork to such an extent that they had to be rekalsomined and repainted. The total cost of repairs was \$259.64.

MORRIS LLOYD MINES.

STORE BUILDING

Our store building was occupied all during the year by Mr. J. B. Casper, who has been the tenant since it was erected in January 1918.

The business has not been particularly profitable, due to our close proximity to the city of Ishpeming. The city stores operate delivery service to our location and every attempt is made to undersell the local merchant.

WELFARE WORK

Our welfare work has been conducted along the same lines as heretofore. We continue visiting nurse services and the practice of giving prizes for Best Kept Premises etc.

We have a large acreage of land adjacent to our location, which we allow our men access to to plant potatoes and other vegetables, in addition to the ground around their houses.

Our Club House has been open all the year and is put to good use by our men and their families. Moving pictures are shown twice weekly, Wednesdays and Saturdays. There is small attendance at these pictures and the receipts barely cover the cost of the films.

During the past twelve months, there were 6,946 paid admissions to moving pictures compared with 10,703 last year; 21,768 in 1920 and 23,822 in 1919. The attendance has fallen off due to the depression and also to the fact that most of the young men have left the location.

DOCKS, TRESTLES AND POCKETS

We have been to small expense account of our docks and trestles during the current year. During the last two months, we added six bents to the rock trestle at the Morris shaft, which will give us ample room for the next year.

MORRIS LLOYD MINES.

TOP TRAM ENGINE AND CARS

We have done considerable work on our top tram equipment, renewing drums etc., on the transfer engines and have also built one new top tram car and repaired the others.

The equipment is now in excellent shape.

TRACKS AND YARDS

The old launder running West along the Lake Superior and Ishpeming Railway tracks from North of the Lloyd Mine to the Carp River, and used to carry the drainage from the water shed, North and East of the mines had become badly decayed and had caved in many places. This was built of wood and we have replaced same with a line of 10" and 12" sewer tile carried beneath the surface of the ground. This should last for all time.

The ground around the Morris and Lloyd engine houses was graded and landscaped during the summer.

BARN

The horses in use in this district have been here for many years and in October month one of our black horses took sick and had to be shot.

We have sold two of the other old work horses and have replaced same with younger stock.

HOISTING MACHINERY

New Lilly Hoist Controls have been installed on our hoists and they are now in work. We have had only minor repairs to this hoist equipment during the year and no breakdowns causing delay have occurred.

The equipment for the Lilly Hoist Controls cost \$3,016.00

MORRIS LLOYD MINES.

PUMPS

We show a reduction in maintenance of this equipment during the current year.

The new plant on the 7th level of the Morris Mine, which was installed in 1921 is giving adequate service and no large flow of water has been encountered during the past year, in fact the amount of water has decreased on the bottom level to such an extent that we have taken off and dispensed with, the two pumpmen on these bottom pumps and one set of pumpmen now look after both pump stations. We can do this as we provided large water storage capacity on the bottom level.

The water pumped by our main pumps averaged 525 gallons per minute during the year. In addition to this we pumped, from underground, water for Domestic Purposes, amounting to approximately 50 gallons per minute.

MINE VENTILATION

We use artificial ventilation only on the 7th level of the Morris Mine in the long drift going West across the Chase Leases. The balance of the mines are kept clear by natural ventilation.

The motors and fans in use are in good condition and are ample for the work they are called upon to do.

ELECTRIC TRAM EQUIPMENT

The cost of maintaining this equipment, while lower than last year is still very high and we find it most difficult to keep it down. We operate seven electric locomotives and fifty-six four ton saddle back tram cars, and with our long trams the wear and tear on wheels, motors etc. is exceptionally heavy.

These old saddle back cars keep getting out of condition constantly, due to hard service and we find it costs approximately \$75.00 each to overhaul.

MORRIS LLOYD MINES.

CRUSHING PLANT

Our crushing plant consists of a No. 6 Crusher installed at the Lloyd Shaft. This has been at work as needed all the year and small expense has been necessary for its maintenance.

A total of 53,087 tons were crushed at this plant during the current year.

We should have a like crusher at our Morris Shaft in order to crush the ore for shipment as it comes from the mine and do away with the expense of switching same to the Maas Crusher.

WATER SUPPLY

The new plant, for supplying clean water for domestic use, installed on the 2nd level of the Lloyd Mine, the latter part of 1921, was placed in use and we now have an ample supply of excellent water.

The large storage tank was drained and cleaned during the summer and is now in first class condition.

MINE TIMBER AND LAGGING

No timber or lagging was purchased last season and the only stock taken in was that cut from the surface of the Chase Leases. Some additional timber will be received from this latter source during the balance of this season.

Orders have been placed with jobbers for our supply of timber and lagging.

PERSONAL INJURIES

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

We have had the usual number of minor accidents, but none of any great consequence.

MORRIS LLOYD MINES.

ACCIDENTS TO EQUIPMENT

We have had but few accidents to equipment during the year - none that interfered with production.

We have had a number of breakages to our Nordberg Compressor, which is continually giving us trouble.

STEAM SHOVEL LOADING

Our shipments from stockpile were somewhat larger than last year, but frequent movement of the shovel in making up the mixtures added to the cost of loading.

We loaded a total of 163,366 tons at a cost of .032 per ton.

ROCK DRIFTING

We drifted a total of 3,479 feet in rock during the past year, at a cost of \$35,351.96, or \$10.16 per foot.

The main rock work was the long drift West across the Chase Leases.

At the close of the year we have but one rock drift at work, this on the 7th level of the Morris Mine.

TAXES

The valuation placed on the Morris Mine was increased by \$182,504 over the year 1921. This due to the increased tonnage of ore in sight as compared with the previous year.

Our taxes in amount paid were only about \$800.00 in excess of 1921, due to a lower tax rate. Our taxes per ton produced are 1.27 cents lower than last year.

On account of the much larger tonnage shipped this year than last our taxes paid per ton shipped show a reduction of approximately 77% as compared with last year.

MORRIS LLOYD MINES.

TAXES

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

	1919		1920		1921		1922	
	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT
LLOYD MINE.								
Realty	1051450.00	28269.98	877064.00	29882.69	812850.00	26722.27	887662.00	27741.22
Personal	250524.00	6760.60	424884.00	14425.56	543544.00	17758.08	380274.00	11883.65
Coll. Fees								396.25
TOTAL LLOYD	1301974.00	35030.58	1301948.00	44308.25	1356394.00	44480.35	1267936.00	40021.12
MORRIS MINE.								
Realty	287540.00	6736.32	223590.00	5667.30	341940.00	8139.45	471884.00	11655.49
Personal	118321.00	2777.50	276410.00	6999.24	244000.00	5789.10	296560.00	7325.00
Coll. Fees								189.80
TOTAL MORRIS	405861.00	9513.82	500000.00	12666.54	585940.00	13928.55	768444.00	19170.29
GRAND TOTAL,	1707835.00	44544.40	1801948.00	56974.79	1942334.00	58408.90	2036380.00	59191.41
PRODUCT TONS		282,483		261,772		209,034		221,979
TAXES PER								
TONS PRODUCED		.1577		.2177		.2794		.2667
SHIPMENTS TONS		190,557		200,388		65,850		293,915
TAXES PER								
TON SHIPPED		.2338		.2845		.8870		.2014

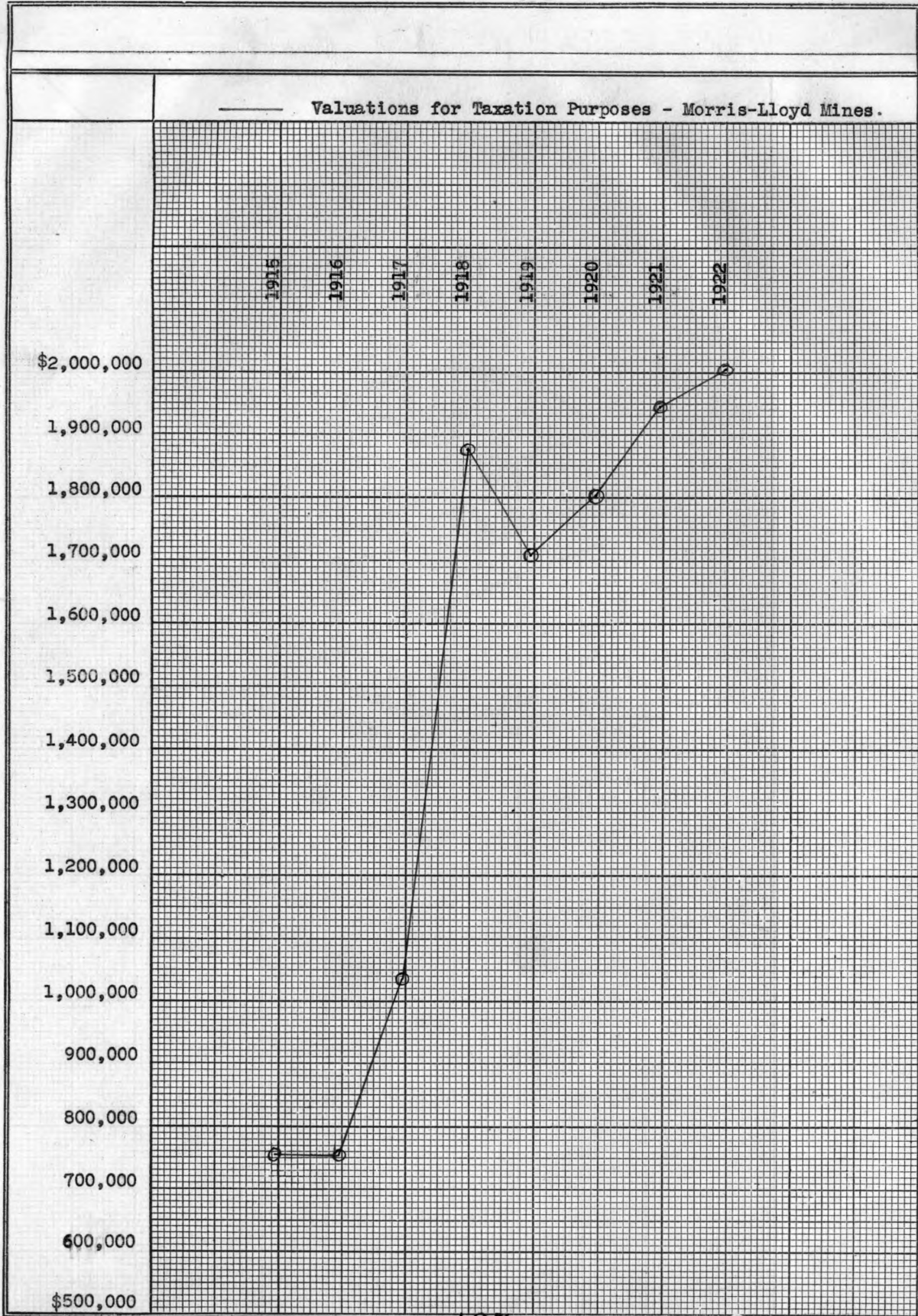
BOILERS

We have a fire box boiler for heating our change house and buildings at the Morris Mine. This is a heavy fuel user and it is apparent that it would insure economy to replace this boiler with one of return tubular type.

The boiler in use has been subject to numerous repairs during the past year.

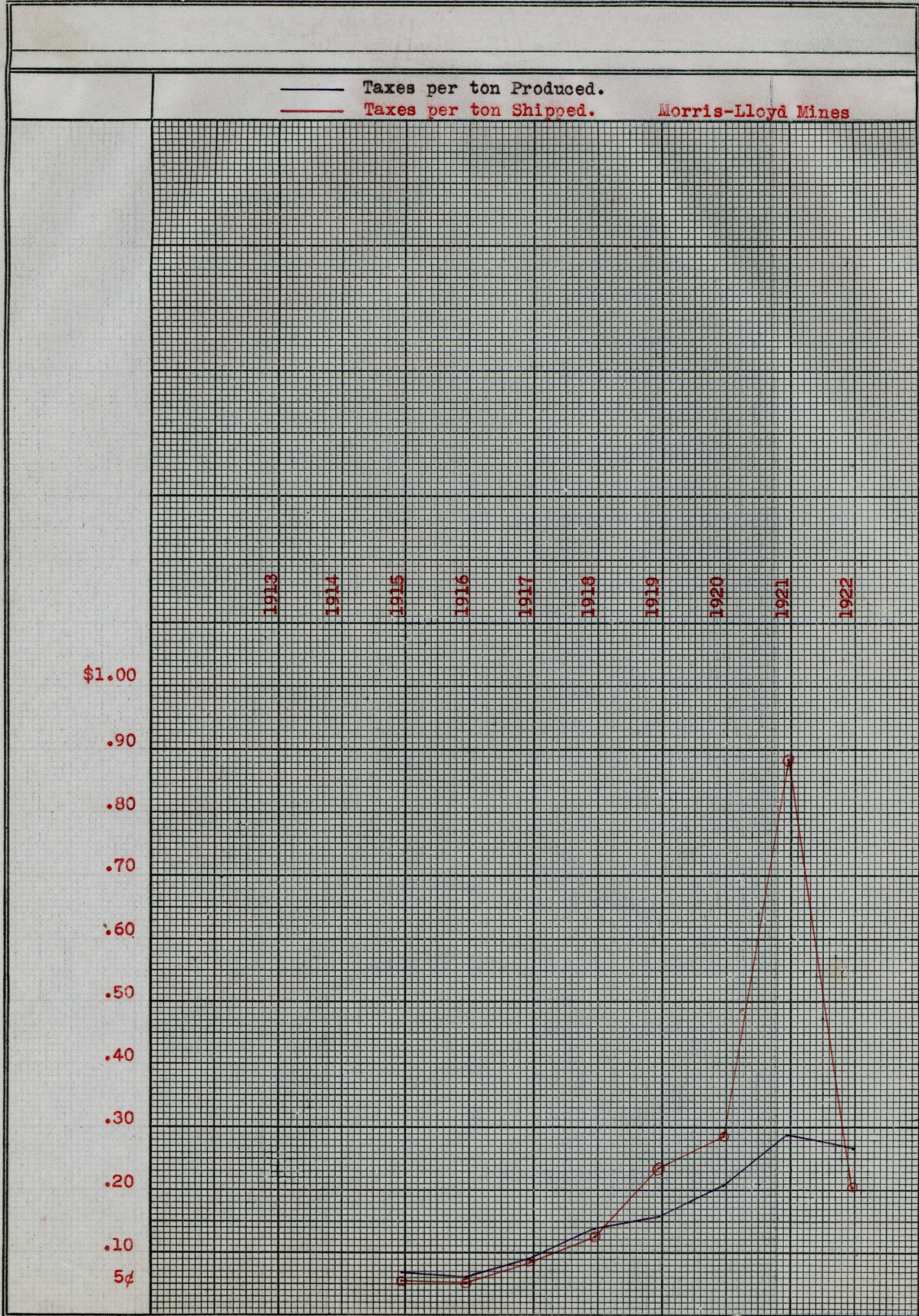
MORRIS LLOYD MINES.

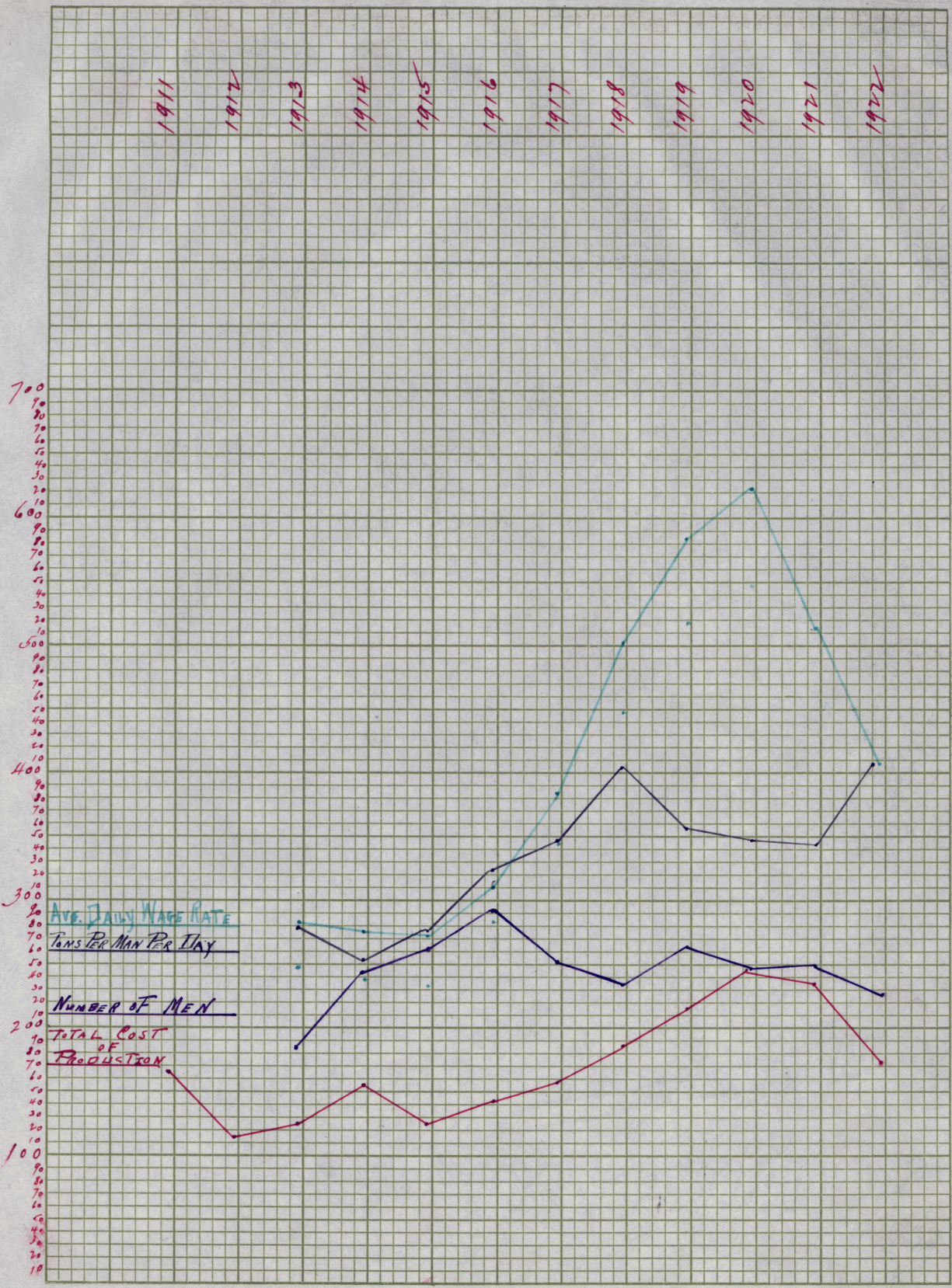
VALUATIONS FOR TAXATION PURPOSES



MORRIS LLOYD MINES

TAXES PER TON PRODUCED
TAXES PER TON SHIPPED





MORRIS LLOYD MINES.

UNDERGROUND
MORRIS MINE

FOURTH LEVEL:

Slicing and caving in the East ore lens above this elevation has been underway all the year.

Ore is being mined in this territory on both Fee Land and on Chase Lease No. 9.

Some Silica ore remains to be taken on the West end of this level, but as there is no demand for this grade, we are not mining a single ton that we are not compelled to mine in getting out the regular merchantable grades.

A total of 21,165 tons ore were mined from this level during the year.

SIXTH LEVEL:

No exploratory work was done on this level during the year and the operations have been confined to mining the ore already in sight.

No work has been done on fee land and all ore produced from this territory has come from leases.

During the early part of the year it was decided to develop the main ore lens on Chase Lease No. 9 into a sub stope and this was done and stoping commenced early in the summer. This method of mining has proved very successful and a large tonnage is being won from here at a low cost. The ore has been found to extend North for some distance from the supposed limits and this extension is now being developed. 42,051 tons were mined from this stope during the year.

We continue slicing and caving underneath the hanging West of the large sub stope on Lease No. 9 and a good product is being received from this territory.

One contract is at work on Lease No. 24 in a small shrinkage stope. A small tonnage, only, remains to be taken from here.

MORRIS LLOYD MINES.

UNDERGROUND
MORRIS MINE

SIXTH LEVEL: Continued-

One contract completed the stope on Lease No. 25 and no work is now being done in this territory. Several thousand tons ore remain broken in the stope on this lease and will be hoisted during the coming shipping season.

Contract No. 51 removed the balance of the ore in their place on Lease No. 24 during the year.

A total of 93,774 tons ore were mined from this level during the year.

SEVENTH LEVEL:

Active development work has been underway on this level all through the year.

The drift West across the Chase Leases has been driven a distance of 2800 feet and is now on Lease No. 25. Several small bunches of ore were encountered in the drift and a raise has been put up on Lease No. 24 and reached the top of the ore at an elevation of 115 feet above the level.

Drifting North and East from this raise is now underway in ore. It is supposed that this lens of ore will go through to the 6th level and is a downward extension of the ore body mined out on that level.

A raise was put up from this level from the North main drift on the 1900' coordinate and the width of the ore to the South determined at the 202' elevation, and a crosscut also was driven North to the footwall on the 238' elevation. The foot was found to have been faulted at this point and pushed South, at the elevation of the seventh level, whereas, on the elevation of this sub, it was found some 180 feet to the North. No work is being done here at the end of the year. There is no doubt but what the ore body at this point extends through to the 6th level.

MORRIS LLOYD MINES.

UNDERGROUND
MORRIS MINE

SEVENTH LEVEL: Continued-

The South main drift, started at the end of last year, was completed through the ore to the West limits and several raises put up. Two main raises have been put up to the top of the ore which extends 100 feet above the level in the West raise and 165 feet in the other raise to the East. The raise on the 1200' line was put up just above the level and a crosscut run South to test the ore at this point. The ore only was found to be 20 feet wide at the West end. Some exploratory work was done on the 165' sub and a connection made between the two raises on the 100' sub.

A raise was put up just above the level on the West end of this main South drift and a small ore lens followed to the West. Ore shows in the back of this drift, but the ore was only a drift wide. A short drift was turned South-west from this to test the ore and to determine the width.

The West raise is being continued above this elevation and will be put through to the sixth level. Ore should again be encountered before reaching the level above as ore shows in the floor of that level and should continue downward some distance.

The tonnage of "ore in sight" has been increased in this territory again this year, and while we have been somewhat disappointed in not finding new ore bodies to the West, we are assured of a large tonnage, both above and below this elevation.

DIAMOND DRILLING

No diamond drill work was undertaken during the year, but it is possible we may make recommendations for some drilling during the coming year.

MORRIS LLOYD MINES.

UNDERGROUND
LLOYD MINE

THIRD LEVEL:

We have nothing new to report from this central ore body for the current year. The ore limits have been definitely defined and slicing and caving have been underway. Six contracts are at work in this territory.

During the year we mined 28,696 tons from this ore body.

All ore mined from the Lloyd East territory as well as from this central ore body is trammed to shaft on this level.

FOURTH LEVEL:

No work was done on this elevation during the year.

LLOYD EAST

FIRST SUB (1455')

Operations in this territory were carried on on but four hours per day until June month and since then on day shift only.

No new developments have occurred in this territory during the year and we have now worked the ore body down to the first sub below this main sub, West of the line of main raises, excepting a small amount of ore which we are taking on the extreme West end of the level.

Contract No. 17 developed the lens of ore to the North of this sub and are now engaged in mining by a shrinkage stope. No large tonnage can be expected as the ore body is small.

SECOND SUB (1305')

The work of straightening this main sub, West of line of main raises, is now in progress. It is proposed to develop the block of ore between this level and the level above for encline stoping. Raises will be put up from this sub and all ore dropped to here and trammed to the main raises.

MORRIS LLOYD MINES.

UNDERGROUND
LLOYD EAST

SECOND SUB (1305') Continued-

Slicing and caving above this sub East of the line of main raises is in progress.

THIRD SUB:

This main sub was driven to the ore limits during the year and some development work done in preparation for mining the ore between this sub and the sub above, when the ore body has been worked down to the second sub.

During the year we mined 66,658 tons from this Lloyd East territory.

LEASES

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES

The following statement shows the condition of our royalty account on the different leases, as regards production, in the North Lake District.

It will be noted that during the year we have mined in excess of the total requirements on all the Chase Leases, but are still short on the Barnes-Hecker Lease No. 31.

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								
1909	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	236,954	15,000	12,075	142,984	15,000	4,843	174,764
1922	10,000	93,170	*320,124	15,000	6,752	151,232	15,000	2,052	187,712

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
1922	15,000	0	183,346	15,000	0	164,037	7,500		82,108

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
1922	70,000	20,313	679,474	1,667,493	539,708	1,127,785

* Tonnage Mined in Excess of Requirements.

MORRIS LLOYD MINES.

ORE IN SIGHT DECEMBER 31ST, 1922.

Following is an estimate of ore in sight as of December 31st, 1922,
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)		32,772	32,772
" " " (C.C.I.Co. Land)		105,729	105,729
" 6th " (Chase Lease #9)		239,191	239,191
" " " (Chase Lease #24)		5,634	5,634
" " " (Chase Lease #26)		2,309	2,309
" " " (C.C.I.Co. Land)		143,643	143,643
" 7th " (Chase Lease #9)	58,040	457,387	515,427
" " " (C.C.I.Co. Land)	39,577	118,730	158,307
Below " " (Chase Lease #9)	26,802	81,740	108,542
" " " (C.C.I.Co. Land)	14,702	44,106	58,808
<u>PROSPECTIVE ORE</u>			
Above 4th Lev. (C.C.I.Co. Land)		3,125	3,125
" 7th " (Chase Lease #9)		25,292	25,292
" " " (Chase Lease #24)		45,322	45,322
" " " (Chase Lease #25)		1,313	1,313
" " " (Chase Lease #26)		3,166	3,166
" " " (C.C.I.Co. Land)		72,534	72,534
TOTAL ORE, MORRIS MINE,	139,121	1,381,993	1,521,114

LLOYD MINE

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS
Above 3rd Level	131,114		131,114
PROSPECTIVE ORE			
Below 3rd Level	6,111		6,111
TOTAL ORE, LLOYD MINE,	137,225		137,225

1,658,339

MORRIS LLOYD MINES

ORE IN SIGHT DECEMBER 31ST, 1922
(CONTINUED)

LLOYD EAST

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS
Above 1st Main Sub	29,511		29,511
" 2nd " "	170,321	56,774	227,095
" 3rd " "	43,075	216,028	259,103
" 4th " "	10,752	94,864	105,616
Between 3rd Level and 4th Main Sub	27,826	117,306	145,132
Above and below 4th Level, <u>PROSPECTIVE ORE</u>	209,754	629,261	839,015
Above 2nd Main Sub	10,834		10,834
" 3rd " "	2,264	2,265	4,529
" 4th " "	9,000	21,000	30,000
TOTAL ORE, LLOYD EAST,	513,337	1,137,498	1,650,835

SUMMARY OF TOTAL ORE

MINE	BESSEMER	LLOYD & MORRIS	LLOYDDALE	TOTAL TONS
Morris, Lloyd, Lloyd East,	139,121	1,381,993		1,521,114
		137,225		137,225
		513,337	1,137,498	1,650,835
GRAND TOTAL,	139,121	2,032,555	1,137,498	3,309,174

	MORRIS MINE		TOTAL	LLOYD MINE		TOTAL	GRAND TOTAL TONS
	BESSEMER	MORRIS ORE	MORRIS MINE	LLOYD ORE	LLOYDDALE	LLOYD MINE	
Total ore Devel- oped,	139,121	1,231,241	1,370,362	622,353	1,114,233	1,736,586	3,106,948
Total Prospec- tive ore,		150,752	150,752	28,209	23,265	51,474	202,226
TOTAL,	139,121	1,381,993	1,521,114	650,562	1,137,498	1,788,060	3,309,174

Total ore on Chase Lease No. 9,	921,224 Tons
" " " " " No. 24	50,956 "
" " " " " No. 25	1,313 "
" " " " " No. 26	5,475 "
Total ore on all Chase Leases,	978,968 "
Total ore on Company Lands,	2,330,206 "
GRAND TOTAL,	3,309,174 Tons

BARNES HECKER MINE.

GENERAL

At the beginning of the year drifting had just been started again on the first level.

All work had been discontinued at this property, except pumping, between February and December 1921, when it was decided to do some work on the first level.

The work of pumping out the body of water known as North Lake commenced December 24th, 1921 and was completed during the early summer to a point where continuous pumping was unnecessary to keep the lake bottom clear. We have maintained a pumping plant here all the year and must continue to do so in order to care for the inflow of water from springs in bed and banks of the lake basin, together with the water from rainfalls and melting snows.

The flow of water in the mine has greatly decreased and is now less than 1000 gallons per minute, and no trouble from water is experienced in our development work.

In June month it was decided to go ahead with the development of this property, and drifting was started on the second level as well as the first level. We encountered ore in this second level drift in June month and continued in same for 480 feet. The ore body is about 30 feet wide.

Raising and drifting above the 3rd level was also started in June month.

We are handicapped in the opening of this property by the scarcity of men. We find it impossible to get good miners out this far from town.

The result of our development work thus far leads us to believe we have a large tonnage of low grade ore with areas containing lenses and bodies of merchantable ore. Just how large and how much tonnage of the latter will be available, must be determined by further development work.

BARNES HECKER MINE.

GENERAL
(CONTINUED)

During the year the following tonnage was taken from development work, Viz:

		AVERAGE ANALYSIS	
		IRON	PHOS
Non Bessemer Ore,	13,621 Tons	- 58.51	.092
Silica Ore,	<u>6,692</u> "	- 52.19	.090
Total,	20,313 Tons		

At the end of this year royalties accrued on ore amounting to 679,474 tons and every effort will be made from now on to mine as large a product as possible.

UNWATERING NORTH LAKE

This work was prosecuted without any great difficulty and but one accident occurred and that was when the scow holding the pump sunk to the bottom of the lake.

At first a pump was installed on the shore and a suction run down into the water. After the water was pumped part way down, it was decided to place the pump upon a scow and float it on the water over the deepest point in the lake. Spiles were driven to which the scow is now anchored.

The work of changing the discharge pipe to throw the water being pumped into the drainage ditch, in place of the present outlet, is now in progress.

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 SURFACE

No new work has been undertaken here during the year.

UNDERGROUND

FIRST LEVEL:

When operations were resumed on this level a large amount of water was making in the main level breast, and it was decided to start a new drift back in the footwall and drive East around this water area. This drift was driven East to the 8000' line, which was reached in August month. It was then turned South-east to enter the ore measures. A small dike was cut about 100 feet from the turn beyond which was about 20 feet of Jasper, after which excellent ore was encountered and the crosscut continued in same for 100 feet. A drift was turned East from this crosscut and two raises started in the ore, all of which have been disappointing. The drift East has been in mixed material for 200 feet and no clean ore has been cut. Several drill holes to the East show ore and this drift will be continued. Rich Jasper shows up in this territory and a good ore body should be found.

A raise started in the South end of the crosscut No. 4, shows about 40 feet of low grade ore, and a raise started in the drift East only shows 28 feet of merchantable ore. A sub cut just above the level followed the ore North-east for a distance of 160 feet.

Later on the water in the main South drift drained off to such an extent that operations were resumed here also, and the level extended to the East. This opening is in rock at the end of the year.

Three raises have been put up from this level. No. 3 on the West end went up a distance of 180 feet in ore. It has been decided to start mining at an elevation of 150 feet above this first main level and a sub has been cut at that elevation and drifting North and East is now underway to determine the shape of the ore body, when a study will be made as to the best system of mining to introduce.

BARNES HECKER MINE.

UNDERGROUND

FIRST LEVEL: Continued-

The second raise is up a distance of 100 feet in ore at the end of the year and no doubt will go as high as the first raise.

The raise on the East end of the level showed more or less mixed ore for about 60 feet and then was continued to 150 feet without finding any ore when it was stopped and exploring drifts driven. Ore to the West was encountered in two sub levels.

SECOND LEVEL:

The concrete dam on this level was blasted out and operations resumed in June month. Ore was entered, after passing the large water course, which had drained and the opening continued in ore for a distance of 480 feet. The ore is of good quality.

Development of this ore by raises was started and is being continued. The raise on the West end of this level was put through to the first level all in ore. The next raise East encountered the rock at a distance of 80 feet above the level, the third raise reached the rock at an elevation of 50 feet above the level. The fourth raise is still going up in ore at an elevation of 70 feet.

A raise was put up at the 8050' line, just above the level and a sub driven North which shows ore for 70 feet. A drift East has followed the contact with the Jasper for a distance of 100 feet.

The ore body here looks as though it takes the shape of two lenses going upwards to the East and West and converging into one ore body just above this main second level. More work will be necessary before we can fully determine the shape or extent of this ore area.

BARNES HECKER MINE.

UNDERGROUND

THIRD LEVEL:

A raise was put up 66 feet above this main 3rd level and a sub opened. A drift North from this raise, shows 70 feet of good ore. A drift South showed some mixed ore, which was followed West for about 100 feet.

A drift is now going East on this elevation and has followed the ore for a distance of 140 feet, where a large dike has just been encountered.

The raise is being continued above this sub and is now up a distance of 107 feet in ore and it looks as though it would continue through to the second level in good ore.

ORE IN SIGHT

An estimate of the tonnage in sight has been made, but additional development work will necessarily have to be made before we can get any accurate figures as to the tonnage that will be available.

From present development, we estimate 416,000 tons ore in sight, averaging Iron 58.50, Phosphorus .092.

MORRIS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA
Morris Bessemer,	(No Production)		
Morris,	58.97	.070	7.25
Morrisville,	52.05	.072	17.16

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	Mine			Lake Erie	
	IRON	PHOS.	SILICA	IRON	MOIST
Morris Bessemer,	(No Shipments)				
Morris,	58.70	.073	-	58.58	11.11
Morrisville,	(All Mixed)				

ORE STATEMENT - DECEMBER 31ST, 1922.

	MORRIS BESSEMER	MORRIS	MORRISVILLE	TOTAL	TOTAL LAST YEAR
On hand January 1, 1922,	0	87,371	74,849	162,220	79,431
Output for Year,	0	109,227	17,398	126,625	98,772
Transferred,	0	12,082	24,479	36,561	3,495
Total, Shipments,	0	184,516	67,768	252,284	174,708
Balance on Hand,		65,658	59,651	125,309	162,220
Decrease in Output,				5,213	
Decrease in Ore on Hand,				36,911	

1922 -- 1-4 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
 1-8 Hour Shift, 6 days per week, June 5th to Dec. 31st, 1922.

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.

MORRIS MINE

SHIPMENTS FOR YEAR 1922.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Morris Bessemer,	-	-	-	-
Morris,	52,335	66,523	118,858	7,868
Morrisville,	-	8,117	8,117	4,620
Total,	52,335	74,640	126,975	12,488
Total Last Year,	107	12,381	12,488	
Increase,	52,228	62,259	114,487	

Danbury
Stamford
 MADE IN U.S.A.

LLOYD MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA
Lloyd,	59.33	.124	5.91
Lloyddale,	(No Production)		
Lloyd Silica,	52.71	.082	15.23

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	Mine		Lake Erie	
	IRON	PHOS.	SILICA	IRON MOIST.
Lloyd,	57.98	.120	-	-
Lloyddale,	(All Mixed)			
Lloyd Silica,	50.37	.077	18.51	-

ORE STATEMENT - DECEMBER 31ST, 1922.

	LLOYD	LLOYDDALE	LLOYD SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1, 1922,	90,270	73,992	42,871	207,133	146,738
Output for Year,	89,902	-	5,452	95,354	110,262
Transferred,	13,073	-	23,488	36,561	3,495
Total,	193,245	73,992	71,811	339,048	260,495
Shipments,	96,571	42,742	27,627	166,940	53,362
Balance on Hand,	96,674	31,250	44,184	172,108	207,133
Increase in Output,				18,158	
Decrease in Ore on Hand,				35,025	

1922 -- 1-4 Hour Shifts, 6 days per week, Jan. 1st to June 4th, 1922.
 1-8 Hour Shift, 6 days per week, June 5th to Dec. 31st, 1922.

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.

LLOYD MINE

SHIPMENTS FOR YEAR 1922.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lloyd,	69,617	26,954	96,571	38,582
Lloyddale,	-	42,742	42,742	-
Lloyd Silica,	8,597	19,030	27,627	14,780
Total,	78,214	88,726	166,940	53,362
Total Last Year,	24,849	28,513	53,362	
Increase,	53,365	60,213	113,578	

BARNES-HECKER MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1922.

GRADE	IRON	PHOS.	SILICA
Barnes-Hecker,	58.51	.092	7.36
Barnes-Hecker Silica,	52.19	.090	16.18

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1922.

GRADE	IRON	Mine PHOS.	SILICA	Lake Erie IRON	MOIST.
Barnes-Hecker,		(No Shipments)			
Barnes-Hecker Silica,		(No Shipments)			

ORE STATEMENT - DECEMBER 31ST, 1922.

	BARNES-HECKER	BARNES-HECKER SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1, 1922,	213	-	213	-
Output for Year,	13,621	6,692	20,313	-
Total,	13,834	6,692	20,526	-
Shipments,	-	-	-	-
Balance on Hand,	13,834	6,692	20,526	-
Increase in Output,			20,313	
Increase in Ore on Hand,			20,526	

1922 -- 1-8 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
 2-8 Hour Shifts, 6 days per week, June 5th to Dec. 31st, 1922.

MORRIS-LLOYD MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	221,979	209,034	12,945	
Underground Costs	1.345	1.945		.600
Surface Costs	.230	.251		.021
General Mine Accounts	.143	.156		.013
Cost of Production	1.718	2.352		.634
Original Cost	.032	.039		.007
Plant Account	.262	.268		.006
Extraordinary Drifting		.094		.094
Taxes	.267	.279		.012
Central Office	.085	.094		.009
Contingent Expense	.041	.048		.007
Cost Adjustment	.017	.096		.079
Cost on Stockpile	2.422	3.270		.848
Loading & Shipping	.076	.013	.063	
Total Cost on Cars	2.498	3.283		.775
No. Days Operating	301	289	12	
No. Shifts & Hours	1-4-129 1-8-172	2-8;1-4		
Avg. Daily Product	737	723	14	
<u>COST OF PRODUCTION</u>				
Labor	1.019	1.482		.463
Supplies	.699	.870		.171
Total	1.718	2.352		.634

BARNES-HECKER MINE

COMPARATIVE MINING COST FOR YEAR

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	20,526	-		
Underground Costs	3.387			
Surface Costs	.136			
General Mine Accounts	.096			
Cost of Production	3.619			
Taxes	.018			
Central Office	.058			
Contingent Expense	.025			
Idle Expense				
Cost Adjustment	.010			
Cost on Stockpile	3.730			
Loading & Shipping				
Total Cost on Cars	3.730			
No. Days Operating	48			
No. Shifts & Hours	2-8hr			
Avg. Daily Product	428			
COST OF PRODUCTION				
Labor	.818			
Supplies	.728			
Ore produced in Development	2.073			
Total	3.619			

Mine started on operating basis Nov.1,1922. 2-8hr 6 days week.

BARNES-HECKER MINE

COMPARATIVE WAGES AND PRODUCT

	1922	1921		
Product	20,313	-		
No. Shifts & Hours	2-8hr			
AVG. NO. MEN WORKING				
Surface	20			
Underground	54			
Total	74			
AVG. WAGES PER DAY				
Surface	3.86			
Underground	4.46			
Total	4.29			
AVG. WAGES PER MO. OF 25 DAYS				
Surface	96.50			
Underground	111.50			
Total	107.50			
PRODUCT PER MEN PER DAY				
Surface	19.16			
Underground	7.65			
Total	5.46			
LABOR COST PER TON				
Surface	.202			
Underground	.584			
Total	.786			
TOTAL NO. OF DAYS				
Surface	1,060 $\frac{1}{4}$			
Underground	2,660 $\frac{1}{2}$			
Total	3,720-3/4			
AMOUNT FOR LABOR				
Surface	4094.02			
Underground	11868.35			
Total	15962.37			

Proportion Surface to Underground Men:

1922 - 1 to 2.7

Mine started on operating basis Nov. 1, 1922. 2-8hr 6 days a week.

MORRIS-LLOYD MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 2	1 9 2 1	INCREASE	DECREASE
PRODUCT	221,979	209,034	12,945	
No. Shifts & Hours	1-4;1-8	2-8;1-4		
AVG. NO. MEN WORKING				
Surface	47	47		
Underground	174	229		55
Total	221	276		55
AVG. WAGES PER DAY				
Surface	3.72	4.54		.82-18%
Underground	4.19	5.26		1.07-20%
Total	4.08	5.13		1.05-20.5
WAGES PER MO. OF 25 DAYS				
Surface	93.00	113.50		20.50
Underground	104.75	131.50		26.75
Total	102.00	128.25		26.25
PRODUCT PER MAN PER DAY				
Surface	17.40	18.78		1.38
Underground	5.33	4.22	1.11	
Total	4.08	3.44	.64	
LABOR COST PER TON				
Surface	.214	.242		.028
Underground	.786	1.248		.462
Total	1.000	1.490		.490
AVG. PRODUCT BRK'G & TRM'G	8.85	6.74	2.11	
" WAGES CONTRACT MINERS	4.41	5.64		1.23
" " "	4.41	5.64		1.23
TOTAL NO. OF DAYS				
Surface	12715 $\frac{1}{4}$	11130	1585 $\frac{1}{4}$	
Underground	41618 $\frac{3}{4}$	49595-3/4		8177 $\frac{1}{2}$
Total	54333 $\frac{1}{2}$	60725-3/4		6392 $\frac{1}{4}$
AMOUNT FOR LABOR				
Surface	47387.29	50516.44		3129.15
Underground	174481.44	260903.74		86422.30
Total	221868.73	311420.18		89551.45

Proportion Surface to Underground Men:

1922 - 1 to 3.7
 1921 - 1 to 4.9
 1920 - 1 to 4.4
 1919 - 1 to 4.4
 1918 - 1 to 4.24

1921
 2-8hr 6 days a week to Mar 5th;
 2-8hr 5 " Mar.5 to May 31;
 1-4hr 6 " June 1st to Dec.31st.

1922
 1-8hr basis June 5, 1922.

MORRIS-LLOYD MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1923.

KIND	LINEAL FEET	AVG PRICE PER FOOT	AMOUNT 1922	AMOUNT 1921
6" to 8" Timber	68,525	.0274	1,881.59	4,716.50
8 to 10 "	52,026	.0553	2,876.01	4,289.50
10 to 12 "	34,771	.0689	2,395.30	1,920.49
Total - 1922	155,222	.0461	7,152.90	
Total - 1921	136,239			10,926.49
5' Lagging	255,850	.65	1,663.51	3,062.00
8' "	99,338	.692	687.30	4,547.84
Total Lagging	355,188	.660	2,350.81	7,609.84
3" Poles	176,192	.976	1,720.15	812.45
5/8" Covering Boards	40,257		512.00	
Total - 1922	571,637	.766	4,582.96	
Total - 1921	746,698	1.128		8,422.29

Product	221,979	209,034
Feet timber per ton of ore	.699	.652
" lagging per ton of ore	1.60	3.34
" " per foot of timber	2.29	5.13
Cost per ton for timber	.0322	.0522
" covering boards	.002	
" lagging	.011	.0364
" poles	.008	.0039
" all timber	.0532	.0925
Equivalent of stull timber to Bd.measure	227,301	188,429
Ft.Bd.measure per ton of ore	1.02	.90

Total cost of timber, lagging & Poles	1922	11735.86
	1921	19348.78
	1920	19177.57
	1919	17277.93
	1918	15676.42
	1917	19623.30
	1916	20682.74

NOTE: 1922 Mine operated 4 hrs. per day, 1 shift, Jan, Feb, Mar, Apr, May; Balance of year 8 hrs per day, 1 shift. Development work carried on in Morris shaft through entire year on double shift.

BARNES-HECKER MINE

TIMBER STATEMENT FOR THE TWO MONTHS ENDING DECEMBER 31, 1922.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT	
			1 9 2 2	1 9 2 1
6" to 8" Timber	30,862	.0292	901.16	
8 to 10 "	2,496	.0442	110.38	
10 to 12 "	368	.0883	32.48	
12 to 14 "	1,552	.1361	221.31	
14 to 16 "	528	.1430	75.49	
16 to 18 "	112	.143	16.03	
Total - 1922	35,918	.0377	1,356.85	
5' Lagging	82,025	.780	647.50	
8' "	4,400	.77	33.88	
Total Lagging	86,425	.788	63.38	
Poles	3,200	1.31	41.92	
Total Lagging & Poles - 1922	89,625	.807	723.30	
Product for Two Months			7,016	
Feet Timber per ton of ore			5.119	
" Lagging "			12,318	
" " per foot of Timber			2.406	
Cost per ton for Timber			.193	
" Lagging			.097	
" Poles			.005	
" Timber, Lagging & Poles			.296	
Equivalent of stull timber to Bd.measure			57,047	
Ft.Bd.measure per ton of ore			8.130	
Total cost for Timber, Lagging & Poles 1922-2 months			2080.15	

Mine operating basis Nov.1, 1922.
Product for 2 months 7016 tons.

MORRIS-LLOYD MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY	AVERAGE PRICE	AMOUNT 1922.	AMOUNT 1921.
40% Powder	127,150	.1433	18,216.50	20,136.62
60% "	7,950	.1893	1,505.18	6,087.10
Total	135,100	.146	19,721.68	26,223.72
Fuse	359,500	6.86	2,465.24	3,012.31
Caps	61,500	11.57	711.54	968.14
Tamping Bags	20,100	2.15	43.21	29.79
Cap Crimpers	44	.61	26.77	24.71
Total Fuse, Etc.			3,246.76	4,034.95
Total Explosives			22,968.44	30,258.67
Product			221,979	209,034
Pounds Powder per ton of ore			.609	.709
Cost per ton for powder			.089	.125
" Fuse, Etc.			.014	.019
" All Explosives			.103	.144
Avg. price per pound for powder			.146	.177

NOTE:

1922 - Mine operated 4 hours per day, 1 shift, Jan. Feb., Mar., April, May.
 Balance of year 8 hours per day - 1 shift.
 Development work was carried on in Morris shaft through the entire
 year, 2 shifts.

BARNES-HECKER MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1922.
40% Powder	5,400	.1338	722.17
Total Powder	5,400	.1338	722.17
Fuse	22,200'	6.82	151.41
Caps	3,700	11.48	42.46
Cap Crimpers	3	.20	.60
Total Fuse, Etc.			194.47
Total All Explosives			916.64
Product			7,016
Lbs. Powder per Ton of Ore			.769
Cost per Ton for Powder			.103
" " Fuse, Etc.			.028
" " All Explosives			.131
Avg. Price per Lb. for Powder			.133

Mine on operating basis Nov. 1, 1922.
 " operated 2 - 8hr. shifts.
 Product - two months - 7,016 tons ore.

BARNES-HECKER MINE.

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, 1922.

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

GENERAL REMARKS

AUSTIN MINE

STEPHENSON MINE

FRANCIS MINE

GWINN MINE

PRINCETON MINE

GARDNER AND MACKINAW MINES.

GENERAL SURFACE.

GENERAL REMARKS:

The product of the Gwinn District Mines for the years 1922 and 1921 was as follows:

	<u>1922</u>	<u>1921</u>	<u>INCREASE</u>	<u>DECREASE</u>
Stephenson Mine,	* 213,223	196,539	16,684	
Austin "	50,905	0	50,905	
Francis "	98,049	71,075	26,974	
Gwinn "	** 20,085	63,501		43,416
Princeton "	*** 74	97,150		97,076
TOTAL,	382,336	428,265	94,563	140,492
DECREASE 1922,				45,929

* Includes 14,000 tons over-run in Stephenson stockpile.

** Made up of 14,064 tons Gwinn Silica in stock, 6,000 tons stockpile over-run Gwinport and 21 tons hoist from re-timbering work in mine.

*** Obtained from re-timbering.

The Stephenson and Francis Mines operated on half time basis until June 5th, when they started working full time. The Austin Mine re-opened on June 5th, after being idle for 2 years and 5 months; it was operated on double shift for the balance of the year.

The Stephenson Mine hoisted ore on day shift only until August 16th, since which time ore has been hoisted on both day and night shift. Hoisting on night shift started at the time the skip hoist was changed from steam to electric, due to trouble with the hoist, which rendered it impossible to hoist the product on one 8-hour shift. When the work on the hoist was finally completed, it was decided to continue to hoist on the night shift, as operating conditions were better due to emptying all the chutes each 24-hour period.

The Francis Mine hoisted ore on day shift during the entire year. At different times there has been a few men working at night in order to speed up development work.

The Princeton, Gwinn and Gardner-Mackinaw Mines were idle during the year 1922. Pumps have been operated at all of these mines and the main levels kept in repair. Owing to the nature of the ore and rock at the Gardner-Mackinaw Mine, no repair work has been necessary during the year. A recent examination of the entire mine found all levels and stopes in the same condition as when work ceased two years ago. Operations can be resumed at any of these mines on short notice.

The following table gives the ore in stock at the mines at the end of the years 1922-1921:

	<u>1922</u>	<u>1921</u>	<u>INCREASE</u>	<u>DECREASE</u>
Stephenson Mine,	240,365	229,664	10,701	
Princeton "	217,589	243,460		26,071
Gwinn "	8,649	15,000		6,351
Francis "	253,454	166,842	86,612	
Mackinaw "	6,125	24,408		18,283
Gardner "	54,701	76,598		21,897
Austin "	54,810	8,970	45,840	
TOTAL,	835,493	764,942		
INCREASE, 1922,			70,551	

There was a shortage of miners in the latter part of the summer; at all other times during the year there had been a surplus of both miners and other labor. During the winter there was a large number of idle men in the district, but when the mines went on full time basis in June and general surface work started, practically all labor was given employment. When shipping from stockpile ceased and the Crushing Plant went out of commission in October, there was again a surplus of surface labor. Due to the fact that there are no other local industries, surplus labor must either remain idle or leave the district to find employment.

On January 1st, 1922 there were 422 men employed in the district; on December 31st, 1922 there were 452, the increase for the year being 30 men.

The company houses at Gwinn Townsite, Gardner-Mackinaw, Austin and Princeton Locations were painted during the past summer by the spray system.

There has been a big improvement in the appearance of all the locations. Extensive repairs were necessary on account of painting, and a large crew of carpenters were employed until late in the fall.

Practically all company houses at Princeton, Austin and Gwinn are occupied, and about one-half of the houses at the Gardner-Mackinaw Location.

MADE IN U.S.A.

prop of ~~Smith~~
The Foundry Co.

AUSTIN MINE.

The mine re-opened on June 5th, having been idle since December 31st, 1919. The cage and skip roads were first repaired, then the level plats, after which the main level drifts were cleaned up and re-timbered. Places were gradually found for contracts, until by the end of the month there were thirteen gangs working.

The product by months for the year was as follows:

June,	3,996 tons	
July,	7,272 "	
August,	9,638 "	
September,	7,219 "	
October,	8,294 "	
November,	7,552 "	
December,	<u>6,934 "</u>	
Total Ore,		50,905 tons
Rock,		<u>5,524 "</u>
Total Ore and Rock,		56,429 "

The product showed a gradual increase for the first three months, the largest product being obtained in August. There was then a gradual decrease due to the completion of mining operations on the lower levels. In December, the product showed a considerable decrease from previous months due principally to the completion of mining of a number of the small pillars that had been found along the footwall in the old workings, near the Stephenson boundary, on the 2nd and 3rd levels. New places had to be found for a number of the contracts, and in nearly every case this necessitated work in rock before they could start producing ore again.

The ore statement showing the amount on hand January 1st, 1922, the output for the year, shipments for the year and the amount on hand December 31st, 1922, is as follows:

	<u>AUSTIN BESSEMER</u>	<u>AUSTIN</u>	<u>AUSTIN- PORT</u>	<u>TOTAL</u>
On Hand Jan. 1st, 1922,	0	0	8,970	8,970
Output for Year,	26,365	140	24,400	50,905
TOTAL,	26,365	140	33,370	59,875
Shipments,	2,211	140	2,714	5,065
In Stock Jan. 1st, 1923,	24,154	0	30,656	54,810

There were no shipments in 1921; in 1922, 5,065 tons were shipped. There were 8,970 tons in stock January 1st, 1922; on December 31st, 1922 there were 54,810 tons. The Bessemer ore in stock must be removed as early as possible in 1923, in order that the shaft pillar may be mined, as this stockpile is located directly over the ore body.

The ore in sight on December 31st, 1922, was as follows:

	<u>AUSTIN BESSEMER</u>	<u>AUSTIN</u>	<u>AUSTIN- PORT</u>	<u>TOTAL</u>
Ore above 1st Level,	11,038	2,680	17,679	31,397
" " 2nd "	33,940	4,848	19,394	58,182
" " 3rd "	21,017	3,002	16,012	40,031
" " 4th "	3,181	455	3,636	7,272
TOTAL TONS,	69,176	10,985	56,721	136,882

The estimate shows a decrease of 21,686 tons as compared with the estimate of the previous year. Mining has been completed on the 4th, 5th and 6th Levels. The greater portion of the ore in the shaft pillar just below the 3rd Level has also been mined, so that practically all of the remaining ore is in the shaft pillar above the 3rd Level. There is a slight increase in the estimated tonnage in the shaft pillar above the 1st Level, due to the development of some new ore on the footwall. If to the estimated tonnage remaining in the mine there be added the product for the year 1922, and from this amount the estimate of the previous year deducted, there is an indicated increase of 27,314 tons. This, in a large measure, represents ore that was produced during the year from territories outside of the shaft pillar, viz: by scrambling through the old workings.

Some slight changes have been made in the division of tonnage by grades, the Bessemer ore being decreased and the Austinport increased. The ore above the 1st level on the footwall has not been of Bessemer grade; also a larger proportion of the ore remaining below the 2nd level is considered Non-Bessemer grade.

It has been impossible to obtain the estimated production at this property. This was due to the peculiar situation existing here, viz: the fact that the only ore known to be in the property was in the shaft pillar from the 6th level to surface. On the three lower levels there was a small tonnage of ore in the shaft pillar which was soon removed, resulting in the concentration of operations on the three upper levels of the mine. The discovery of some ore pillars near the Stephenson boundary line, in the old workings, provided work for the contracts which had finished work on the 4th, 5th and 6th levels. These pillars were small and the contracts had to be moved frequently, resulting in lower outputs.

Due to the fact that practically no ore was shipped from pocket, it was necessary to stock the two grades of ore, i. e., the Austin Bessemer and Austinport. The Bessemer stocking ground was located directly over the ore body, the Austinport slightly to the South and East. The stocking of this ore therefore, rendered it impossible to start general mining at the top of the shaft pillar on the South-East side of the shaft. Some mining is being done on the North-West side of the shaft, but due to the fact that there is a barren area in this territory on the 1st level, it has not been possible to work as many contracts at the top of the ore body as could have been worked on the opposite, or South-East side of the shaft. Scramming operations have been conducted on the 2nd and 3rd levels, drifts being driven along the footwall to the Stephenson boundary line. The sand-run came in near the Stephenson boundary many years ago and in this territory several