

Tel. & Saf. Devices, (continued) The decrease is due to charge of \$333.50 in 1923 for Stephenson Mine proportion of cost of new oxygen, fire-fighting, helmets. The main increase in 1924, in account "Sign Boards, Signals, etc"., is due to purchase of metal signs and notices for fires, and general safety.

Local Gen'l. Welfare,	Year 1924	2,951.88	Cost per ton	.012
	Year 1923	<u>2,085.91</u>	" " "	<u>.008</u>
	INCREASE	865.97	INCREASE	.004

The total General Welfare for Gwinn District was \$8,461.28 in 1924 and \$10,078.55 in 1923, a decrease of \$1,617.27. The proportion charged to Stephenson Mine was 35% in 1924 and 20.7% in 1923. This increase is due to the Austin Mine not operating in 1924 and the Francis operating only four months. The charges to Austin decreased \$953.67 and to Francis - \$625.25.

Special Expense,	Year 1924	.00	Cost per ton	.000
	Year 1923	<u>240.06</u>	" " "	<u>.001</u>
	DECREASE	240.06	DECREASE	.001

The charge to this account, in 1923, was made direct at the General Office.

Mine Office,	Year 1924	5,517.41	Cost per ton	.022
	Year 1923	<u>6,057.08</u>	" " "	<u>.025</u>
	DECREASE	539.67	DECREASE	.003

The decrease is due principally to less cost for salaries of clerks in 1924. Printing and stationery decreased \$30.75, while Office Expense increased \$30.02. Telephone rental decreased \$4.74, Travel \$13.12, Stable Expense \$13.06 and Exchange \$5.50.

District Office,	Year 1924	9,210.90	Cost per ton	.037
	Year 1923	<u>5,647.12</u>	" " "	<u>.023</u>
	INCREASE	3,563.78	INCREASE	.014

The total charges to the District Office for 1924 were \$27,095.18 and for 1923, \$27,571.21, a decrease of \$476.03. The Stephenson proportion for 1924 was 34% and for 1923, 20½%. This increase is due to both the Francis and Austin operating in 1923, while in 1924 the Austin did not operate and the Francis operated only four months.

TOTAL GENERAL MINE ACCOUNTS

Year 1924	44,116.59	Cost per ton	.177
Year 1923	<u>40,886.05</u>	" " "	<u>.165</u>
INCREASE	3,230.54	INCREASE	.012

The increase is due to the Stephenson Mine being the only operating mine in the district since April 30th, 1924; it carries a larger proportion of the expense than in 1923.

COST OF PRODUCTION:

Year 1924	452,131.68	Cost per ton	1.813
Year 1923	<u>432,052.50</u>	" " "	<u>1.748</u>
INCREASE	20,079.18	INCREASE	.065
	<u>1924</u>	<u>1923</u>	<u>Increase</u>
Total Underground Costs,	352,134.73	335,672.75	16,461.98
" Surface "	55,880.36	55,493.70	386.66
" General Mine Accounts,	<u>44,116.59</u>	<u>40,886.05</u>	<u>3,230.54</u>
COST OF PRODUCTION,	452,131.68	432,052.50	20,079.18

The increase in "Underground Costs" is due to more expense for sinking "Auxiliary Shaft", equipment for new 7th and 8th Levels and to cave on South-west side of the mine in September; the increase in "General Mine Accounts" is due to the Stephenson being the only operating mine in the district since April 30th, it, therefore, carried a larger proportion of this expense.

FRANCIS MINE

The Francis Mine operated until April 30th, 1924, when it was abandoned and the lease surrendered. The decision to abandon the property was due to the high operating cost which did not permit of a profit. The cost of production was high on account of the decreased size of the ore body and increase in the mine water. Mining was being conducted near the bottom of the deposit where the area of the ore body was rapidly decreasing, causing a concentration of the contracts with resultant poor operating conditions. From the rate of increase in the mine water there was danger that the property might have to be hastily abandoned, with a probable loss of considerable equipment. The crushing of the 5th Level haulage drift in November, 1923, stopped tramping on this level from the South Footwall and the "New Find", and made it necessary to transfer the ore from this territory to a raise from the 6th Level, which more than doubled the tramping cost here.

It was planned to close the mine at the end of March, but consideration was given to the employees and it was continued in operation during April, by which time the conditions for moving the families of the men laid off were much better. All men given their time were sent to other mines of The Cleveland-Cliffs Iron Company at Negaunee, Ishpeming, North Lake and Barnes-Hecker, to fill vacancies at these properties. About one-half of the men reported for work, the balance left for the industrial centers.

The product by months was as follows:

January,	9,821 tons	
February,	9,691 "	
March,	9,432 "	
April,	<u>10,087</u> "	
Total Ore,		39,031 tons.
Rock,		<u>884</u> "
Total Hoist, Ore and Rock,		39,915 "

The mine was idle on February 22nd and 23rd, and on March 8th, 15th, 22nd, and 29th, due to shortage of water at the hydro-electric plants; this decreased the product in these two months.

The product, shipments and balance on hand for each year that the mine operated, is as follows:

<u>YEAR</u>	<u>PRODUCT - TONS</u>	<u>SHIPMENTS TONS</u>	<u>BALANCE ON HAND TONS</u>
1917	1,778	0	1,778
1918	41,535	30,775	12,538
1919	80,528	26,936	66,130
1920	80,056	34,199	111,987
1921	71,075	16,220	166,842
1922	98,049	11,437	253,454
1923	110,550		364,004
1924	<u>39,031</u>	<u>          </u>	<u>403,035</u>
Total,	522,602	119,567	
Balance on hand, December 31st, 1924,			403,035

The preliminary estimates on which the mine was opened showed 875,000 tons of ore, with some additional probable ore. At the time the mine closed it was estimated that there were about 115,000 tons of developed ore left in the mine. Adding this to the ore produced, viz: 522,602 tons, gives a total of 637,602 tons. The differences in the above figures of 238,000 tons represents ore originally estimated as available in the upper part of the mine, viz: above the 2nd Level, and in estimating more ore from the drill holes than was found when the mine was opened. In one case a drill hole followed a seam of ore for a long distance, indicating a large deposit, when actual development work showed the ore to be only drift-wide. The grade of the ore produced proved disappointing, due to bands of lean ore and slate in the ore body. It was evident that the ore concentration was not complete. Some areas in the mine were so lean that they could not be mined. The only extension of the ore not disclosed by drilling was found above the 4th Level on the South footwall. There was approximately 100,000 tons developed in this area, of which about 85,000 tons was mined.

Briefly, it may be stated that this property proved a disappointment due to the ore body being smaller than was estimated and the grade of the ore below expectations.

When the mine closed it was estimated that there was 15,000 tons of ore left on the South footwall in the "New Find", and 100,000 tons at the bottom of the deposit, between the 5th and 6th Level. If the increase in the mine water had not occurred and mining had been continued, it is not probable that over 50% of this ore could have been recovered at a profit. It is, therefore, evident that relatively only a small amount of available ore was left in the mine.

The cost of production for the four months the mine operated in 1924, compared as follows with the corresponding months of 1923:

	COST OF PRODUCTION	
	PER TON	COST PER TON
	<u>1924</u>	<u>1923</u>
January,	1.945	1.702
February,	1.95	1.795
March,	1.902	1.67
April,	1.716	2.25 *

\* High account of fatal accident, John Koski, April 10th, 1923.

The ventilation throughout the mine during the four months it operated in 1924 was good, excepting in one or two localities, for short periods of time, where conditions were such that it was impossible to force in fresh air. The ventilating fan was operated for only about four hours per day during the severa cold weather as it was not feasible to operate it for longer periods on account of ice forming in the Gwinn Mine shaft which was down-cast. Fresh air, however, continued to come from the Gwinn Mine after the fan was stopped, in sufficient quantities to maintain fairly good air in the working places.

Mining was continued during January and February along the same general plan as in previous years, but when it was decided to close down on April 30th, every effort was made to increase production and mine the ore easiest to obtain so as to lower production costs. As many as possible of

the night shift crew were put on day shift and in spite of increasing costs for pumping, the cost of production in April was the lowest for the year.

An additional plunger pump was installed on the 6th Level in February to pump from the 6th to the 5th Level. The capacity of this pumping plant was increased from 400 gallons to 700 gallons per minute. During the last few weeks the mine operated there were about 500 gallons coming in on the 6th Level, and as the sump here was of small capacity, it was necessary to pump two shifts every twenty-four hours. An increase of only a few hundred gallons per minute would have drowned out the 6th Level. The increase in the mine water in the last six months the mine operated was approximately 600% or from 95 gallons per minute to an average of 568 in the month of April. The last few days, the water averaged between 600 and 700 gallons per minute.

When the mine closed, the two cylinders in the concrete dam in the drift connecting the Gwinn and Francis Mines, were closed, the covers being bolted on each end of the cylinders. As a further safe-guard, a 3-ft. concrete dam was erected on the Francis side, against the main dam. The covers on the cylinders and the drain pipe through the dam were enclosed in concrete on the Francis side. With the 3-feet of concrete added to the original dam, it is now 15 feet in thickness, which gives a high factor of safety. The pressure on the dam since the Francis has filled with water is approximately 450 lbs. to the square inch.

The work of dismantling the underground equipment and bringing it to surface was started on April 1st. The ventilating fan, drill machines, air hose, drills and miners' tools were first brought to the shaft and sent to surface. The sub-level cars, tracks, air lines, main line tracks, trolley wire and hangers, main level haulage cars and motors were then hoisted. The 6th Level pumps were next dismantled, together with the plunger pump in the main pumping plant on the 5th Level. The 10" discharge column, 6" main air line and 12" counterbalance pipe between the 4th Level and the bottom of the shaft was removed while the pumps were being dismantled. After all this

equipment had been sent to surface, the centrifugal pump on the 5th Level was dismantled, after which the work of removing discharge column, main air line and counterbalance pipe from the 4th Level to surface, was started. While the centrifugal pump was being dismantled, the (pump, electric haulage and signal cables) in the shaft were lowered from surface to the 5th Level, put on reels and then hoisted. Considerable work was necessary in the ladder-road in order to get at the pipe and cables; this work was done at night so as not to interfere with the crew removing the equipment. The skips and cage, and the hoisting cables were then removed from the shaft, after which an 8" concrete seal was put on the top of the shaft. A 3" vent pipe through this seal allowed air to escape from the shaft as the mine filled with water. The mine filled with water in less than three weeks after pumping ceased.

As in previous years, the ore body is divided into three parts, viz: the "New Find", the South Footwall and the North Footwall. During the four months the mine operated, work was done in the following territories:

NORTH FOOTWALL - 6th Level to 5th Level

SOUTH FOOTWALL - 6th Level to 5th Level

"NEW FIND" - 2nd Sub below 4th Level to 3rd Sub  
above the 4th.

-----  
NORTH FOOTWALL

5TH LEVEL.

Mining of ore on the North Footwall above the 5th Level was completed in 1923, and by the end of the year the greater part of the ore on the 5th Level had been removed. In the four months that the mine operated in 1924, the balance of the ore on the 5th Level was removed. Fifteen small pillars were mined, together with an area approximately 120 ft. long by 25 ft. in width, at the East end of the level. Work was completed here early in April.

1ST SUB BELOW 5TH, OR 7TH SUB ABOVE 6TH LEVEL:

The work of opening this sub-level was started in November, 1923. At the end of the year three contracts were working here. These gangs continued to work here during January, February and March. In April, six contracts worked here, and at the time the mine closed, practically all the ore had been removed from the sub-level. An area 100 ft. x 60 ft. in size was mined; also a number of small pillars near the raises.

2ND SUB BELOW 5TH, OR 6TH SUB ABOVE 6TH LEVEL:

Some development work was done on this sub the latter part of 1923. Work was continued in 1924, the number of contracts employed was increased in February and again in April, when there were six working here. Considerable ore was left on this sub-level when the mine closed. An area approximately 160 ft. long by 40 ft. wide was mined.

3RD SUB BELOW 5TH, OR 5TH SUB ABOVE 6TH LEVEL:

This sub-level was opened in March, in which month several development drifts were driven, mining was started in April. An area approximately 50 ft. x 20 ft. in size was mined; also an ore drift 100 ft. in length was stripped on one side during the last two weeks that the mine operated. About 30 % of the ore on this sub-level was mined.

6TH LEVEL

Some ground was removed near the sump on the 6th Level to make room for another pump which was installed here in February. This work became necessary on account of the increase in the mine water.

The removal of the ground referred to in the previous paragraph for the pump made it necessary to provide for another motor haulage barn, as the incline leading to the sump had been formerly used for this purpose. The tail drift East of the shaft was extended 5 feet, and ground removed from the back, after which an eye-bolt was installed with chain blocks for handling



motor and cars.

The above description covers all the work done on the North Footwall in the main ore body, in 1924.

#### SOUTH FOOTWALL

No work was done on the South Footwall in 1924, above the 5th Level.

#### 5TH LEVEL

The South haulage drift on the 5th Level, through which the ore from the "New Find" was trammed to the shaft, crushed in November, 1923. It was not possible to keep this drift opened for motor haulage, but by building a number of wood pillars and constant repairs it was possible to keep it open so that supplies could be brought in to the contracts working in the "New Find". One gang worked here, retimbering, during January, February and March. It was also necessary that it be kept open so that fresh air could be forced in to the contracts working at the East end of the mine and in the "New Find". Early in April the drift crushed to such an extent that it was no longer possible to bring in supplies, and arrangements were made for hoisting supplies from the 6th Level.

#### 3RD SUB ABOVE 6TH LEVEL:

Shortly before the mine closed down, work was started on this sub-level, two areas being mined, one 40 ft. x 10 ft., the other 25 ft. x 25 ft., in size. The ore body was narrow and not high grade. About 40% of the available ore was mined.

#### 1ST SUB ABOVE 6TH LEVEL:

This sub-level was opened at the West end of the ore body in 1923. In March, work was started here and continued through April, some ore being robbed from the side of a drift, a section of the drift, 50 feet in length, was widened to 20 feet.

6TH LEVEL.

Some repair work was done in March and April in the South haulage drift on the 6th Level, in order to keep it in good operating condition.

The above several paragraphs cover the work done on the South Foot-wall in 1924. Ore was mined on only two subs, between the 5th and 6th Level.

"NEW FIND"

This ore body was mined on sub-levels extending from the 2nd sub below the 4th up to the 3rd sub above.

3RD SUB ABOVE 4TH LEVEL, 132' ABOVE THE 5TH:

During January, several contracts worked on this sub-level and completed mining a pillar 25 ft. x 20 ft., in size, and one 20 ft. x 100 ft., was mined.

2ND SUB ABOVE 4TH LEVEL, 121' ABOVE THE 5TH:

Mining was completed on this sub-level in February. During the two months a pillar 100 ft. x 15 ft., in size was mined.

1ST SUB ABOVE 4TH LEVEL, 110' ABOVE THE 5TH:

Mining was completed on this sub-level in March. It had been developed for mining in 1923.

4TH LEVEL  
100 FEET ABOVE THE 5TH LEVEL

Mining of the "New Find" was practically completed when the mine closed on April 30th. The only ore left consisted of two small pillars near one of the raises from the 5th Level.

7TH SUB ABOVE 5TH LEVEL, 70' ABOVE THE 5TH:

This sub-level was opened and developed in 1924, a drift being driven for the entire length of the ore body which was approximately 300 feet in length

Two contracts worked here during January and February; in March, four and in April, three. When the mine closed they were engaged in slicing the ore along the sides of the drift. Raises have been put up from this sub-level to the elevation of the 4th, 30 feet above, in preparation for stoping out the 20-ft. pillar here. Some mining was done from these raises just prior to the closing of the mine.

FRANCIS SURFACE

The removal of supplies was started on May 1st. The warehouse supplies were taken to the Stephenson Mine and also part of those in the storage shed; the balance was taken to the Gwinn Mine. The mine timber, of which there was only a small amount, was taken by team to the Gwinn Mine. The 5-ft., and 7-ft. lagging, amounting to 17 cars, was loaded on cars and shipped to the Stephenson Mine. The equipment in the dry-house and shops, top tram engine house and also the electric cables, trolley wire, etc., from underground, were taken to the Gwinn Mine and stored in the West end of the dry building. This end of the dry-house has never been used, and it makes an excellent place for storage of equipment as it is practically fire-proof. The portable trestles, and also the permanent trestles near the shaft, were dismantled and all usable material salvaged. The coal at the mine was loaded on cars and shipped to the Central Power Plant.

The following list gives the disposition of material and equipment:-

Ingersoll-Rand Co., air compressor, motor and electric circulating pump - shipped to the Spies Mine.

The 1000-gal. 1000-ft. head plunger pump, with motor, switchboards, etc., was sold to the Champion Copper Company.

The oil tanks and equipment in oil house was sent to the General Storehouse at Ishpeming.

A carload of 30-lb. rail was sold to the Spies Mine.

A carload of 3" and 2" pipe was loaned to the Barnes-Hecker Mine.

1106 Ft. 12" Counterbalance pipe was sold to the Monroe Mining Co.

113½ Ft. 12" " " " " " " Negaunee Mine.

420 Ft. cable was sold to the Morris-Lloyd Mine.

18 Steel Lockers, part of the dry equipment, was sold to Forsyth Township.

600 Ft. 6" air line was sold to the Republic Mine.

A carload of usable trestle timber from the stocking trestles was sent to the Morris-Lloyd Mine.

4 Underground haulage cars were sold and an underground haulage locomotive loaned to the Athens Mine.

The top tram cars and 2 underground haulage locomotives were sent to the Stephenson Mine.

All usable trestle timber and legs were loaded on cars and shipped to the Stephenson Mine; also several carloads of old plank from the trestles and coal dock, for use as collar plank.

The balance of the general equipment from surface and underground was stored at the Gwinn Mine.

At the present time the following equipment, buildings, etc., remain at the mine:-

The enclosed steel head-frame, steel pulley stands, the skip and cage hoists, heating plant boiler, air receiver, 12 underground haulage motor cars, 2 hand-tram cars, 1,000 ft. 10" pipe, together with the mine buildings, which are as follows:-

Office and Warehouse, Shops, Engine and Boiler Houses, Dry House and Storage Shed.

The mine buildings have been advertised for sale locally, and it is probable that they can be disposed of when general conditions improve.

During May, June and July a day watchman was employed on holidays. A night watchman was kept on duty until in September, by which time all valuable material had been removed and the buildings boarded up.

FRANCIS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

GRADE	IRON	PHOS.	SILICA	MANG.
Franport,	56.33	.197	5.91	.617

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

GRADE	IRON	Mine PHOS.	SILICA	MANG.
Franport,		(No Shipments)		

ORE STATEMENT - DECEMBER 31ST, 1924.

	FRANPORT	FRANWOOD	TOTAL	TOTAL LAST YEAR
On hand January 1, 1924,	364,004	-	364,004	253,454
Output for Year,	39,031	-	39,031	110,550
Total, Shipments,	403,035	-	403,035	364,004
Balance on Hand,	403,035	-	403,035	364,004
Decrease in Output,			71,519	
Increase in Ore on Hand,			39,031	

1924 -- Mine Idle during Year.

1923 -- 1-8 Hour Shift, Jan. 1st to Dec. 31st, 1923.

FRANCIS MINE  
SHIPMENTS FOR YEAR 1924.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Franport,	-	-	-	-
Total,	-	-	-	-
Total Last Year,			-	

FRANCIS MINE

COMPARATIVE MINING COST FOR YEAR

	1924	1923	INCREASE	DECREASE
<b>PRODUCT</b>	39,031	110,550		71,519
Underground Costs	1.490	1.382	.108	
Surface Costs	.243	.300		.057
General Mine Accounts	.254	.209	.045	
Cost of Production	1.987	1.891	.096	
Plant Account	.600	.600		
Taxes	.344	.102	.242	
Central Office	.139	.087	.052	
Contingent Expense	.015	.010	.005	
Cost Adjustment	.195	.022	.173	
Cost on Stockpile	3.280	2.712	.568	
Loading & Shipping	-			
Total Cost on Cars	3.280	2.712		
No. Days Operating	95	297		202
No. Shifts & Hours	1-8-4 2-8-91	1-8		
Avg. Daily Product	411	372	29	
<u>COST OF PRODUCTION</u>				
Labor	1.367	1.290	.077	
Supplies	.620	.601	.019	
Total	1.987	1.891	.096	

Mine abandoned April 30, 1924.



FRANCIS MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 4	1 9 2 3	INCREASE	DECREASE
PRODUCT	39,031	110,550		71,519
No.Shifts & Hours	1-8;2-8	1-8		
AVG.NO.MEN WORKING				
Surface	10	21		11
Underground	29	75		46
Total	39	96		57
AVG.WAGES PER DAY				
Surface	4.42	4.32	.10-2.31%	
Underground	4.94	4.81	.13-2.70%	
Total	4.81	4.70	.11-2.34%	
WAGES PER MO.OF 25 DAYS				
Surface	110.50	108.00	2.50	
Underground	123.50	120.25	3.25	
Total	120.25	117.50	2.75	
PRODUCT PER MAN PER DAY				
Surface	13.42	17.03		3.61
Underground	4.61	4.94		.33
Total	3.43	3.83		.40
LABOR COST PER TON				
Surface	.329	.254	.075	
Underground	1.073	.973	.100	
Total	1.402	1.227	.175	
AVG.PRODUCT BRK'G & TRM'G	7.72	7.92		.20
" WAGES CONTRACT MINERS	5.05	4.90	.15	
" " " LABOR	5.05	4.90	.15	
TOTAL NO.OF DAYS				
Surface	2909	6493-3/4		3584-3/4
Underground	8470 1/4	22372-1/2		13902-1/4
Total	11379 1/4	28866-1/4		16487
AMOUNT FOR LABOR				
Surface	12845.16	28032.84		15187.68
Underground	41878.69	107571.48		65692.79
Total	54723.85	135604.32		80880.47

Proportion Surface to Underground Men:

1924 - 1 to 2.9  
 1923 - 1 to 3.6  
 1922 - 1 to 2.54  
 1921 - 1 to 3.39  
 1920 - 1 to 2.56  
 1919 - 1 to 2.32

1924 - changed from 1-8hr to 2-8hr shift. Jan. 7th  
 Mine closed April 30, 1924.

FRANCIS MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1924.

KIND	LINEAL FEET	AVG.PRICE PER FOOT	AMOUNT 1924	AMOUNT 1923
4" to 6" Timber	924	.015	13.87	291.79
6" to 8" "	10,309	.0358	369.42	2,156.73
8" to 10" "	8,662	.0625	541.82	3,013.30
10" to 12" "	2,048	.0955	195.66	422.95
12" to 14" "	504	.1219	61.42	78.82
14" to 16" "				18.12
Total Timber - 1924	22,447	.0527	1,182.19	5,981.71
" " 1923	118,198	.0506	5,981.71	
	<b>LINEAL FEET</b>	<b>PER 100'</b>		
5' Lagging	23,800	.849	202.07	1,557.20
7' "	90,202	.6984	629.95	142.98
8' "	5,000	.6000	30.00	2,116.15
Total Lagging	119,002	.7243	862.02	3,816.33
Poles	1,688	1.065	17.98	67.39
Total Lagging & Poles, 1924	120,790	.7285	880.00	3,883.72
" " " 1923	518,670	.7497	3,883.72	
5/8" Covering Boards				202.07
1" " "	9,064	1.351	122.44	415.40
Total Covering Bds. 1924	9,064	1.351	122.44	617.47
" " " 1923	40,833	1,5122	617.47	
Product			39,031	110,550
Feet of timber per ton of ore			.575	1.069
" lagging "			3.050	4.630
" " per foot of timber			5.302	4.331
Cost per ton for timber			.03029	.05418
" " lagging			.02209	.03452
" " poles			.00046	.00061
" " Covering bds.			.00314	.00558
" " timber, lagging, poles & covering Bds.			.05598	.09489
Equivalent of stull timber to bd.measure			34,669	161,942
Feet bd.measure per ton of ore			.8881	1.465
Cost for timber, lagging & poles -1924				2,062.19
" " " 1923				9,865.43
Covering bds.used in place of lagging 1924				122.44
" " " 1923				617.47

Mine operated 1923 Jan.1 to Dec.1 - 1 shift; Dec 1 to Dec31st-2 shifts.  
 1924 " to Apr.30th-,2 shifts; abandoned lease May 1,1924.

FRANCIS MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

<u>KIND</u>	<u>QUANTITY</u>	<u>AVERAGE PRICE</u>	<u>AMOUNT 1924</u>	<u>AMOUNT 1923</u>
40% R.C.Powder	11,225	.135	1,515.38	3,294.71
40% " Gelatin				1,137.58
50% R.C. Powder				14.50
60% " Gelatin	225	.1675	37.69	300.25
Total Powder	11,450	.1358	1,553.07	4,747.04
Fuse	43,400	.692	300.33	927.93
Caps	8,100	1.1507	93.20	284.21
Cap Crimpers	10	.50	5.00	12.50
Tamping Bags	700	.22	1.50	10.74
Leading Wire				1.71
Total Fuse, Etc.			400.03	1,237.09
Total Explosives			1,953.10	5,984.13
Product			39,031	110,550
Pounds Powder per ton of ore			.2934	.3138
Cost per ton for powder			.0398	.04294
" Fuse, etc.			.0102	.01119
" all explosives			.0500	.05413
Avg. price per pound for powder			.1358	.1368

Mine operated -1923 Jan., 1st to Dec. 1st - 1 shift  
 Dec. 1st to Dec. 31st - 2 "  
 1924 Jan. 1st to Apr. 30th - 2 "  
 Abandoned and lease surrendered May 1, 1924.

GWINN MINE.

The Gwinn Mine closed down on May 31st, 1921, and has been idle since. During the past year, retimbering work has been continued, the mine pumps have operated, and ventilation has been provided so that the mine can be re-opened on short notice. It is hoped that work will be resumed in 1925.

Shipments were made during 1924 from the two low-grade Silica piles, the low Phosphorus Silica pile was all shipped, and only a small tonnage remains in the High-Phosphorus pile.

Shipments for the year and balance of ore in stock are as follows:-

	<u>SHIPMENTS</u>	<u>IN STOCK</u> <u>DEC. 31, 1924</u>
Gwinnport,		1,745 tons
Gwinn Silica,	<u>4,935 tons</u>	<u>774 "</u>
Total,	4,935 "	2,519 "

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

Non-Bessemer Ore:

Developed	1. Gwinnport,	585,571 tons
Prospective	1. Gwinnport,	80,159 "
	2. Gwinnwood,	<u>40,079 "</u>
Total Reserve,		705,809 "

UNDERGROUND:

During the first half of the year a small crew of timbermen worked in the mine, keeping the drifts, crosscuts and raises repaired. After the Francis Mine was abandoned on April 30th, and the drift to the Gwinn Mine sealed, the oxygen in the air started to decrease due to its being absorbed by the decomposition of the mine timber and from lack of circulation. The decrease was noticed by the men employed underground, and it became necessary to provide ventilation in order that work might be continued underground and also to prevent rapid rotting

of the mine timber. An E. & A. was prepared, which provided for guniting the cage compartment of the shaft, installing on the 11th Level the 40,000 cu. ft. fan, formerly located in the drift connecting the Gwinn and Francis Mine, and for building the necessary bulkheads, doors and brattices to control the air courses in the mine. This E. & A. (No. 461) was authorized in June, and the work started immediately. The work progressed slowly for some time, due to the poor air in the mine. The 40,000 cu. ft. fan was temporarily installed on the 11th Level, all the levels from the 5th to the 11th were bulkheaded near the shaft and the skip compartment sealed on the 5th Level. The fan on the 11th Level was then started and it was expected that air would be drawn from surface through the cage compartment, forced in on the 11th Level, from which point it would pass through the mine workings up to the 5th Level, and into the skip compartment on the 5th, and thence to surface. Unfortunately, this plan did not work, as the air leaked back into the cage compartment above the 5th Level, and there was merely a circulation of the "dead" air in the mine. A small fan was then placed on surface, near the skip compartment, and fresh air forced down to the 5th Level through a 12" ventube. This tube discharged the fresh air into the cage compartment on the 5th, from which point it was drawn to the 11th by the fan and forced through the mine workings back to the 5th. After this small fan had been in operation for a few days, the air became better throughout the mine and the work in preparation for guniting the cage compartment was started. The casing plank and back lath in the cage compartment were repaired, then thoroughly cleaned, after which the metal lath was installed. The work in the shaft was divided into two sections - the first section, extended from surface to the 7th Level - the second from the 7th to the 11th Level. When preparations for guniting were completed in the first section, the gunite was applied. The work in the lower section was then started and completed. Exceptionally good progress was made with this work, and the cost was kept below the estimate.

On completing the guniting of the cage compartment, the fan was again started up on the 11th Level, and a test made. The results, however, were again disappointing as the air merely circulated through the mine workings and there was no fresh air drawn in at surface. It was found that the air in the skip compartment above the 5th Level leaked back of the shaft timber and entered the cage compartment again on the levels. To overcome this unexpected development, 16-ft. entries were built on each level where there is ore to be mined. The other levels were sealed at the shaft. When this work was completed and the entries gunited, another test was made, which proved entirely successful. Fresh air entered the cage compartment and after circulating through the mine, was discharged to surface through the skip compartment.

By the time the above work was completed there was a great deal of repair work necessary throughout the mine. The timbermen have been busy on the various levels, putting in new sets to replace sets that had rotted and fallen, also putting in lining sets in other parts of the drifts. As soon as this work is completed, the balance of work necessary to complete E. & A. #461 will be taken up. This consists of cutting permanent station for the fan on the 11th Level, installing fan, putting up one or more raises between levels to provide air-ways, and opening a rock drift on the 9th Level, which has caved, for an air-way. It is expected that this work will be completed early in 1925.

Since the cold weather in December there has been natural ventilation in the mine, and it has not been necessary to operate the fan. This is due to the sealing of the cage compartment from surface to the 11th Level. There will, therefore, during severe cold weather, be no expense for ventilation.

To avoid ice forming in the cage compartment, due to the cold down-cast air during the winter, doors have been installed on the 11th Level to control the air going to the fan. By this control, the air current can be reversed, the skip compartment being made down-cast and the cage, up-cast. In this way any ice that may form in the down-cast compartment can be melted in a short time by the warm up-cast air. It will no longer be necessary to have

heaters in the shaft when the mine is operating, which will effect a material saving in the cost of operating the heating plant during severe cold weather.

The following is a report of the retimbering work done during the past year:-

4TH LEVEL.

Three new sets were installed near the shaft on the 4th Level plat.

5TH LEVEL.

Twenty-five lining sets were installed in the 5th Level haulage drift, near the shaft, and new cribbing was put in in a raise from the 6th to the 5th Level.

6TH LEVEL.

Eleven new sets of timber were installed in the 6th Level haulage drift a short distance West of the shaft.

7TH LEVEL.

There were two sets of timber installed in the stub-drift about 100 feet Northwest of the shaft, and five sets of timber in the main haulage drift, near the shaft. One cut was blasted in a new raise about 200 feet Northwest of the shaft, which will be put up for an air-way between the 7th and 6th Level.

7TH LEVEL SUMP

Ten sets of timber were replaced in the West incline leading to the sump.

SUB LEVELS ABOVE 8TH LEVEL.

Forty-two sets of timber were installed on the two sub-levels above the 8th, where there is some ore remaining to be mined.

8TH LEVEL.

Thirty-six new sets of timber were installed in the 8th Level haulage drift on the Southeast side of the shaft.

9TH LEVEL.

In the main haulage drift on the 9th Level there were 65 new sets of timber installed; at the winze from the 9th to the 10th Level, two sills were placed and two long sets erected at each end of the winze.

SUBS BELOW 9TH LEVEL

There were 44 new sets of timber installed in the subs below the 9th.

10TH LEVEL.

There were 26 new sets of timber installed in the main haulage drift. In the drift leading to the Francis Mine, a 12-ft. concrete dam was installed early in the year prior to the closing of the Francis Mine. This dam was built as a safeguard in case the dam on the Francis side allowed water to leak through under the heavy pressure that developed after the Francis filled with water.

SUBS BELOW 10TH LEVEL

There were 44 new sets of timber installed in the drifts on the sub-levels between the 10th and 11th Levels.

11TH LEVEL.

There were 70 new sets of timber placed in the main haulage drift to the ore body.

At the point where it is planned to make the permanent installation of the ventilating fan, two cuts were taken on the side of the haulage drift, but this work was abandoned on account of the poor air and a temporary installation made of the fan. It is planned to take up this work again early in 1925.

SURFACE:

The West end of the dry building, that was built for the Jopling Mine employees, and which was never used, was made into a general storage room. The ventilating hoods, steam and water lines were removed. The motors, switchboards, drill sharpener, blacksmith tools, electric cables and other supplies from the Francis Mine have been stored here.



GWINN MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

GRADE	IRON	PHOS.	SILICA	MANG.
Gwinnpport,		(No Production)		
Gwinn Silica,		(No Production)		

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

GRADE	IRON	Mine PHOS.	SILICA	MANG.
Gwinnpport,		(No Shipments)		
Gwinn Silica,		(All Mixed)		

ORE STATEMENT - DECEMBER 31ST, 1924.

	GWINNPORT	GWINN SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1, 1924,	1,745	5,709	7,454	8,649
Output for Year,	-	-	-	27,334
Stockpile Overrun,	-	-	-	-
Total,	1,745	5,709	7,454	35,983
Shipments,	-	4,935	4,935	28,529
Balance on Hand,	1,745	774	2,519	7,454
Decrease in Output,			27,334	
Decrease in Ore on Hand,			4,935	
1924 -- Mine Idle during Year.				
1923 -- Mine Idle during Year.				

GWINN MINE

SHIPMENTS FOR YEAR-1924

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Gwinport,	-	-	-	2,873
Gwin Silica,	-	4,935	4,935	25,656
Total,	-	4,935	4,935	28,529
Total Last Year,	-	28,529	28,529	
Decrease,			23,594	

GWINN MINE

COMPARATIVE WAGES AND PRODUCT

	1924	1923	INCREASE	DECREASE
PRODUCT	-	27,334		
No.Shifts & Hours				
AVG.NO.MEN WORKING				
Surface	5	4	1	
Underground	8	7	1	
Total	13	11	2	
AVG.WAGES PER DAY				
Surface	4.60	4.59	.01- .21%	
Underground	5.12	4.93	.19-3.85%	
Total	4.92	4.81	.11-2.28%	
WAGES PER MO.OF 25 DAYS				
Surface	115.00	114.75	.25	
Underground	128.00	123.25	4.75	
Total	123.00	120.25	4.75	
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG.PRODUCT BRK'G & TRM'G " WAGES CONTRACT MINERS				
TOTAL NO.OF DAYS				
Surface	1,446 $\frac{1}{2}$	1263- $\frac{3}{4}$	182- $\frac{3}{4}$	
Underground	2,360 $\frac{1}{4}$	2314	46- $\frac{1}{4}$	
Total	3,806- $\frac{3}{4}$	3577- $\frac{3}{4}$	229	
AMOUNT FOR LABOR				
Surface	6646.65	5797.75	848.90	
Underground	12085.18	11413.25	671.93	
Total	18731.83	17211.00	1520.83	

Propoetion Surface to Underground Men:

1924 - 1 to 1.6

1923 - 1 to 1.75

1922 - 1 to 1.6

1921 - 1 to 2.61

1920 - 1 to 2.6

1919 - 1 to 2.64

1918 - 1 to 3.57

1924 - Not operating.

PRINCETON MINE

The Princeton Mine closed down August 27th, 1921, and has been idle since. The mine pumps have continued to operate, and the main levels have been kept in repair. Operations can be resumed at this property on comparatively short notice. It should be borne in mind, however, that alterations to the head-frame should be made prior to re-opening. This involves raising it so that two skips can operate in balance, which will permit of an increased production at a lower cost.

The shipments for the year and balance of ore in stock are as follows:-

	<u>SHIPMENTS</u>	<u>IN STOCK DEC. 31, 1924</u>
Princeport,		9,160 tons
Sec. 19 Princeport,		1,313 "
Cambridge,	7,453 tons	153,842 "
Sec. 19 Cambridge,	<u>0</u>	<u>19,979 "</u>
Total,	7,453 "	184,294 "

A considerable quantity of the ore shipped was loaded one car at a time for all-rail shipments. A bucket and double-drum puffer was used for loading. In December, after the district crusher closed down for the season, several cars were loaded by hand over a grizzly, all chunks being broken to 2-1/2" size.

This year the estimated tonnage in the mine is again included, being sub-divided as required by the Tax Commission. (Includes ore on Sections 20 and 18, Princeton property and ore on C. & N. W. Ry. Co. Lease, Section 19).

Non-Bessemer Ore:

Developed.	1. Sec. 20 Princeport,	72,552 tons
	2. " " Cambridge,	562,161 "
	1. Sec. 18 Princeport,	10,318 "
	1. C&NW Lease Sec. 19 Princeport,	9,000 "
	2. " " " Cambridge,	<u>57,128 "</u>
	Total Developed,	711,159 tons.

Total Developed Ore, brought forward, 711,159 tons.

Non-Bessemer:

Prospective.	1. Sec. 20 Princeport,	20,000 tons
	2. " " Cambridge,	418,815 "
	1. C&NW Lease Sec.19 Princeport	5,000 "
	2. " " " Cambridge,	<u>46,921</u> "
	Total Prospective,	<u>490,736</u> "
	GRAND TOTAL,	1,201,895 "

The following is a detail of the repair work done on the main levels during 1924:

The first three months of 1924 were spent in repairing the first crosscut North of No. 3 Shaft, on the 6th Level. It was cleaned and the bottom lowered to grade; seventeed new sets of timber, fifteen sills and twenty-seven props installed. The arkose caved from the back and considerable rock had to be removed when the new sets were installed.

During the month of April the footwall drift Southwest of No. 3 Shaft on the 6th Level was repaired, fifteen new sets of timber being installed and lagging placed on the sides and back of old sets.

During the month of May the 6th Level haulage drift towards No. 1 Shaft, on Sections 19 and 20, was repaired, nine legs and sixteen sets of timber being installed.

In June and July, the 5th Level haulage and footwall drift, North and West of No. 3 Shaft, was repaired, thirty-seven new sets of timber being installed.

During August and September No. 3 crosscut West of No. 3 Shaft on the 5th Level was repaired. The bottom of the crosscut was lowered to grade and thirteen new sets of timber installed.

In October, repair work was continued on the 5th Level near No. 3 Shaft, nine lining sets, six new sets and one leg being installed.

During November, four new sets of timber were installed in the East haulage drift on the 5th Level near No. 3 Shaft and seven sets in the footwall

drift North of No. 3 Shaft on the 6th Level. Both of these drifts were also cleaned.

In December work was done at a number of points on the 5th and 6th Levels, where sets had broken down. During this month twenty new sets of timber were installed, eleven broken legs replaced, four props and one cap installed.

A summary of the work is shown by the following table:-

	<u>SETS OF TIMBER</u>	<u>LEGS</u>	<u>PROPS</u>	<u>CAPS</u>	<u>SILLS</u>
January, )					
February, )	17		27		15
March, )					
April,	15				
May,	16	9			
June, )					
July, )	37				
August,	10				
September,	3				
October,	15	1			
November,	11				
December,	20	11	4	1	
Total,	144	21	31	1	15

In addition to the mining captain there were four men employed underground on repair work from January 1st to October 1st; three men, October 1st to December 31st. One timberman was injured on October 1st, and has not yet returned to work.

PRINCETON MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

GRADE	IRON	PHOS.	SILICA	MANG.
Princeport,		(No Production)		
Cambridge,		(No Production)		

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

GRADE	IRON	Mine PHOS.	SILICA	MANG.
Princeport,		(No Shipments)		
Cambridge,		(All Mixed)		

ORE STATEMENT - DECEMBER 31ST, 1924.

	PRINCE- PORT	SEC. 19 PRINCE- PORT	CAMBRIDGE	SEC. 19 CAMBRIDGE	TOTAL	TOTAL LAST YEAR
On Hand Jan. 1, 1924,	9,160	1,313	160,438	20,836	191,747	217,389
Output for Year,	-	-	-	-	-	-
Transferred,	-	-	857	857	-	-
Total,	9,160	1,313	161,295	19,979	191,747	217,389
Shipments,	-	-	7,453	-	7,453	25,642
Balance on Hand,	9,160	1,313	153,842	19,979	184,294	191,747
Decrease in Ore on Hand,					7,453	

1924 -- Mine Idle during Year.

1923 -- Mine Idle during Year.

PRINCETON MINE

SHIPMENTS FOR YEAR-1924.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Princeport,	-	-	-	-
Sec. 19 Princeport,	-	-	-	-
Cambridge,	-	7,453	7,453	25,642
Sec. 19 Cambridge,	-	-	-	-
Total,	-	7,453	7,453	25,642
Total Last Year,	-	25,642	25,642	
Decrease,			18,189	



PRINCETON MINE  
COMPARATIVE WAGES AND PRODUCT

	1 9 2 4	1 9 2 3	INCREASE	DECREASE
PRODUCT	-	-		
No.Shifts & Hours				
AVG.NO.MEN WORKING				
Surface	3	3		
Underground	6	4	2	
Total	9	7	2	
AVG.WAGES PER DAY				
Surface	4.81	4.55	.26-5.71%	
Underground	4.98	4.83	.15-3.10%	
Total	4.91	4.70	.21-4.47%	
WAGES PER MO. of 25 DAYS				
Surface	120.25	118.75	6.50	
Underground	124.50	120.75	3.75	
Total	122.75	117.50	5.25	
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG.PRODUCT BRK'G & TRM'G " WAGES CONTRACT MINERS				
TOTAL NO.DAYS				
Surface	1,095	1,138½		43½
Underground	1,667½	1,400½	267	
Total	2762½	2,539	223½	
AMOUNT FOR LABOR				
Surface	5272.89	5185.02	87.87	
Underground	8307.04	6764.81	1542.23	
Total	13579.93	11949.83	1630.10	

Proportion Surface to Underground Men:

1924 - 1 to 2.  
 1923 - 1 to 1.33  
 1922 - 1 to 2.  
 1921 - 1 to 2.81  
 1920 - 1 to 3.1  
 1919 - 1 to 4.69  
 1918 - 1 to 3.48

AUSTIN MINE

The Austin Mine was idle during 1924. No ore was shipped, the statement of ore on hand, is as follows:

Austin Bessemer,	356 tons
Austinport,	40,205 "
Austinwood,	<u>2,672</u> "
Total,	43,233 "

The ore in sight on December 31st, 1924 (same as on December 31st, 1923) is as follows:-

	<u>AUSTIN BESSEMER</u>	<u>AUSTIN</u>	<u>AUSTIN- PORT</u>	<u>TOTAL</u>
Ore above 1st Level,	6,356	1,590	7,946	15,892
" " 2nd "	24,227	6,056	15,142	45,425
" " 3rd "	<u>11,429</u>	<u>2,857</u>	<u>14,285</u>	<u>28,571</u>
Totals,	42,012	10,503	37,373	89,888

Regular inspections of the mine have been made to see that sub-levels and levels were in good condition. A few broken sets in a drift on the 3rd Level were replaced, and the mine is in condition for re-opening on short notice.

The wooden head-frame at No. 1 Shaft was blasted down in the summer and removed. It had stood for over twenty years and was in a dangerous condition due to rotting of timbers.

AUSTIN MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

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

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

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

ORE STATEMENT - DECEMBER 31ST, 1924.

	AUSTIN BESEMER	AUSTIN	AUSTIN- PORT	AUSTIN- WOOD	TOTAL	TOTAL LAST YEAR
On hand January 1, 1924,	356	-	40,205	2,672	43,233	54,810
Output for Year,	-	-	-	-	-	82,438
Stockpile Overrun,	-	-	-	-	-	538
Total,	356	-	40,205	2,672	43,233	137,786
Shipments,	-	-	-	-	-	94,553
Balance on Hand,	356	-	40,205	2,672	43,233	43,233
Decrease in Output,					82,976	

1924 -- Mine Idle during Year.

1923 -- 2-8 Hour Shifts, Jan. 1st to July 1, 1923.

1-8 Hour Shift, July 2nd to Nov. 19th, 1923.

Mine Idle Nov. 19th, 1923 to Dec. 31st, 1923.

AUSTIN MINE  
SHIPMENTS FOR YEAR-1924.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Austin Bessemer,	-	-	-	30,937
Austin,	-	-	-	14,814
Austinport,	-	-	-	48,801
Austinwood,	-	-	-	-
Total,	-	-	-	94,552
Total Last Year,	35,135	59,417	94,552	
Decrease,			94,552	

AUSTIN MINE  
COMPARATIVE MINING COST FOR YEAR

	1924	1923	INCREASE	DECREASE
PRODUCT		82,976		
Underground Costs		1.443		
Surface Costs		.405		
General Mine Accounts		.188		
Cost of Production		2.036		
Plant Account				
Equipment		.009		
Taxes		.077		
Central Office		.108		
Contingent Expense		.012		
Cost Adjustment		.015		
Cost on Stockpile		2.257		
Loading & Shipping		.119		
Total Cost on Cars		2.376		
No. Days Operating		258		
No. Shifts & Hours		2-8 1-8		
Avg. Daily Product		322		
<u>COST OF PRODUCTION</u>				
Labor		1.405		
Supplies		.631		
Total		2.036		

Closed Nov. 19, 1923. No production during 1924.

AUSTIN MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 4	1 9 2 3	INCREASE	DECREASE
PRODUCT		82,976		
No.Shifts and Hours		2-8;1-8		
AVG.NO.MEN WORKING				
Surface	2	23		21
Underground	0	58		58
Total	2	81		79
AVG.WAGES PER DAY				
Surface	4.21	4.15	.06-1.44%	
Underground	7.23	4.79	2.44-50.93	
Total	4.63	4.60	.03-.65%	
WAGES PER MO. OF 25 DAYS				
Surface	105.25	103.75	1.50	
Underground	180.75	119.75	61.00	
Total	115.75	115.00	.75	
PRODUCT PER MAN PER DAY				
Surface		11.71		
Underground		4.72		
Total		3.36		
LABOR COST PER TON				
Surface		.354		
Underground		1.015		
Total		1.369		
AVG.PRODUCT BRK'G & TRM'G		7.53		
" WAGES CONTRACT MINERS		4.88		
" " " TRAMMERS		5.14		
" " " LABOR		4.89		
TOTAL NO. DAYS				
Surface	525-1/4	7,085 $\frac{1}{2}$		6560-1/4
Underground	83-1/2	17,589		17505-1/2
Total	608-3/4	24,674 $\frac{1}{2}$		24065-3/4
AMOUNT FOR LABOR				
Surface	2213.33	29429.37		27216.04
Underground	603.90	84234.74		83630.84
Total	2817.23	113664.11		110846.88

Proportion Surface to Underground Men:

1924-1-0

1923-1 to 2.52

1922-1 to 3.3

1921-1 to 2.1

1920-1 to 3.2

1924 - Not operating.

GARDNER-MACKINAW MINE.

No ore was shipped from this property during 1924.

The statement showing ore on hand is as follows:-

Gardner,	1,557 tons
" High Sulphur,	42,880 "
Mackinaw,	<u>6,125 "</u>
Total,	50,562 tons.

The pumps were removed from the mine in November, 1923, and by May 1st, 1924, the mine had filled with water. A day and night watchman have been employed during the past year, this has been the only expense at this property. Four families lived at the location during the winter of 1923-1924. They moved to Gwinn in the summer in order to be nearer the schools. When the houses were all vacated it was decided to board up the windows, to prevent damage. This entailed some expense for the lumber for the covers, in addition to the labor expense for making them and putting them up. It is not assumed that operations will be resumed at this property for a number of years.

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

Non-Bessemer:

Developed,	1. Mackinaw,	10,000 tons
	2. " High Sulphur,	60,285 "
	3. Gardner,	80,000 "
	4. " High Sulphur,	<u>106,348 "</u>
	Total Developed,	256,633 tons.

Prospective:

	1. Mackinaw,	92,198 "
	2. " High Sulphur,	<u>276,594 "</u>
	Total Prospective,	<u>368,792 "</u>
	Grand Total,	625,425 "

GARDNER-MACKINAW MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

GRADE	IRON	PHOS.	SILICA	MANG.	SULPH.
Gardner,					(No Production)
Gardner High Sulphur,					(No Production)
Mackinaw,					(No Production)
Mackinaw High Sulphur,					(No Production)

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

GRADE	IRON	PHOS.	Mine SILICA	MANG.	SULPH.
Gardner,					(No Shipments)
Gardner High Sulphur,					(No Shipments)
Mackinaw,					(No Shipments)
Mackinaw High Sulphur,					(No Shipments)

ORE STATEMENT - DECEMBER 31ST, 1924.

	GARDNER	GARDNER HIGH SULPHUR	MACKINAW MACKINAW	MACKINAW HIGH SULPHUR	TOTAL	TOTAL LAST YEAR
On hand Jan. 1, 1924,	1,557	42,880	-	6,125	50,562	60,826
Output for Year,	-	-	-	-	-	-
Total,	1,557	42,880	-	6,125	50,562	60,826
Shipments,	-	-	-	-	-	10,264
Balance on Hand,	1,557	42,880	-	6,125	50,562	50,562

1924 -- Mine Idle during Year.

1923 -- Mine Idle during Year.



GARDNER-MACKINAW MINE

SHIPMENTS FOR YEAR-1924.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Gardner,	-	-	-	5,370
Gardner High Sulphur,	-	-	-	4,894
Mackinaw,	-	-	-	-
Mackinaw High Sulphur,	-	-	-	-
Total,	-	-	-	10,264
Total Last Year,	-	10,264	10,264	
Decrease,			10,264	

GARDNER-MACKINAW MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 4	1 9 2 3	INCREASE	DECREASE
PRODUCT	-	-		
No.Shifts & Hours				
Avg.NO.MEN WORKING				
Surface	2	3		1
Underground	0	2		2
Total	2	5		3
AVG.WAGES PER DAY				
Surface	4.13	4.10	.03-73%	
Underground		4.23		
Total	4.13	4.12	.01-.24%	
WAGES PER MO.OF 25 DAYS				
Surface	103.25	102.50	.75	
Underground		105.75		
Total	103.25	103.00	.25	
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG.PRODUCT BRK'G & TRM'G				
" WAGES CONTRACT MINERS				
" " " TRAMMERS				
TOTAL NO.OF DAYS				
Surface	733½	1081-1/4		347-3/4
Underground		788-1/2		788-1/2
Total	733½	1869-3/4		1136-1/4
AMOUNT FOR LABOR				
Surface	3030.67	4435.06		1404.39
Underground		3335.23		3335.23
Total	3030.67	7770.29		4739.62

Proportion Surface to Underground Men:

- 1924 - 1 to 0
- 1923 - 1 to .67
- 1922 - 1 to 1
- 1921 - 1 to 2
- 1920 - 1 to 3.3
- 1919 - 1 to 3.

Mine idle since Nov.30,1920.

GENERAL SURFACE

GWINN DISTRICT CRUSHING PLANT:

The following statement gives a summary of the crusher operations in 1924 and 1923:-

	1924		1923		INCREASE		DECREASE	
	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General Expense,	5082.63	.027	1742.89	.013	3339.74	.014		
Maintenance,	2518.34	.013	1641.43	.013	876.91			
Operating,	<u>5054.84</u>	<u>.027</u>	<u>5448.86</u>	<u>.043</u>			393.96	.016
Total Operating Cost,	12655.81	.067	8833.12	.069	3822.69			.002
Switching,	<u>2288.00</u>	<u>.012</u>	<u>1718.00</u>	<u>.013</u>	570.00			.001
GRAND TOTAL,	\$ 14943.81	.079	10551.12	.082	4392.69			.003

<u>DISTRIBUTION</u>	<u>TONS</u>	<u>TONS</u>	<u>TONS</u>	<u>TONS</u>
Stephenson Mine,	182,159	36,863	145,296	
Austin "	0	48,759		48,759
Gwinn "	4,935	28,529		23,594
Gardner-Mackinaw,	0	10,264		10,264
Princeton Mine,	2,947	3,127		180
Francis "	<u>0</u>	<u>0</u>		
GRAND TOTAL,	190,041	127,542	62,499	

General Expense: The increase is due to higher cost for Personal Injury Expense account of final settlement of \$3,155.87 made to Philip Nault, injured at the crusher in 1920. Central Office showed a small increase account fewer mines operating in 1924. District Office expense showed small increase account closing Francis Mine April 30th.

Maintenance: A Head Shaft, Key and Sprocket, costing \$1183.00 was installed in April on the steel belt conveyor. In 1923, main repairs were a 22 x 33 Mantle, \$416.50, and upper and lower concaves, \$437.30, for the gyratory crusher.

Operating: The decrease in expenditures is due to payment made in 1923 to M. M. & S. E. Ry. Co., covering an accumulated charge for track work on that portion of the tracks owned by the company.

The total cost in 1924 shows a small decrease in cost per ton in spite of a fairly large increase in expenditures, due to more ore crushed. The crusher was operated 134 days in 1924, as compared with 90-3/4 days in 1923. There were a few days in 1924 and a number in 1923, when there was not sufficient ore to keep the crusher operating to capacity.

GWINN TOWNSITE:

A number of trees were removed from the park and streets to make room for more desirable trees to grow and spread out. The maple trees in parkway between roadways on Pine Street were transplanted to side of the roadways and Norway pine trees, 5' to 10' size, set in the parkway. This has improved the appearance of this, the main highway through the town.

GWINN ASSOCIATION:

The company is particularly fortunate in having such an able man as Mr. E. L. Miller as manager of the Gwinn Association. The following report, compiled by Mr. Miller, gives a record of the activities of the Association during the past year. It is gratifying to note that, in spite of the material decrease in population, the club house has been used more than in previous years.

ATTENDANCE:

As in other years an effort was made to estimate the number of persons making use of the Association building. A check was made at different times and it was found that our estimate was very conservative. The high attendance month was January, the lowest - July.

Total attendance at building, .....	64660
Average monthly attendance, .....	5388

Total estimated attendance for all outdoor recreations conducted by the Association - including, Ice Skating Rink, Tennis Court, Playground, Swimming Pool, Baseball Games and Bass Lake Camp.

Attendance, .....	10565
-------------------	-------

MEMBERSHIP:

The membership is divided in three groups:-

- First: Members paying on Mine Payroll
  - Second: Special members residing in the Gwinn District
  - Third: Members residing out of the Gwinn District.
- The first group make up about 60% of the total membership; the second 25% and the third 15%.

Membership January 1st, 1924.....	348
Membership January 1st, 1925.....	264
Low membership for year ( June ).....	246
High membership for year ( February ).....	358
Average monthly membership, .....	293

\*\*\*\*\*

RECEIPTS AND EXPENDITURES.

RECEIPTS:

Total receipts including 1923 balance, .....	\$ 6325.23
Total expenditures for year, .....	<u>6212.44</u>
Balance, .....	\$ 112.79

THEATRE:

Receipts for year 1924, .....	4044.65
Expenditures, .....	<u>3719.41</u>
Profit, .....	325.24
Deposited on future pictures, .....	72.25

BUFFET:

Receipts for 1924, .....	610.30
Expenditures, .....	<u>395.98</u>
Profit, .....	214.32
Inventory buffet stock Jan. 1st....	18.00

BOWLING and BILLIARDS:

Receipts for 1924, .....	511.60
Expenditures, .....	<u>205.23</u>
Profit, .....	306.37

---

GENERAL ACTIVITIES AND ORGANIZATIONS  
USING BUILDING.

---

- 9 - Meetings and rehearsals by Musical Organizations.
- 16 - Rehearsals by Glee Club.
- 4 - Sales of Fancy Work Articles and Luncheons by church organizations.
- 14 - Meetings by Episcopal Ladies Guild.
- 7 - Meetings by St. Anthony's Ladies Guild.
- 2 - Meetings by other church organizations.
- 25 - Meetings - 6 by Directors of the Association; 5 by Sportsmen's Association; 3 by American Legion and 11 by other organizations.

GENERAL ACTIVITIES AND ORGANIZATIONS  
USING BUILDING.  
(Continued)

- 8 - Weekly Matches played in inter-club Cribbage League
- 1 - Card party by Ladies
- 3 - Dancing Classes under supervision of School.
- 3 - Parties by High School (Dancing)
- 3 - Social Parties by High School (No dancing)
- 57 - Lunches served at different functions during the year.
- 3 - Suppers by church organizations.
- 23 - Dances held during year - including ordinary and those covering some special event.
- 300 - Visitors were shown through the building during the year.

---

EVENTS OF SPECIAL INTEREST.

---

- |   |    |                            |
|---|----|----------------------------|
| Annual New Years Ball   | by | Firemen.                   |
| Card Party  | by | Local Council Girl Scouts. |
| Leap Year Dance   | by | Association.               |
| Annual Sportsmen's Roundup  | by | Sportsmen's Club.          |
| Chicken Supper  | by | St. Anthony's Guild        |
| Carnival,   | by | High School                |
| Annual Junior Prom  | by | High School                |
| Annual Easter Ball  | by | Basketball Team            |
| Banquet Sportsmen's   | by | Sportsmen's Club           |
| Banquet in honor of<br>Glee Club                                  | by | Association                |
| Annual Parent-Teachers Reception and Dance                        | by | Association and School.    |
| Annual Dance  | by | American Legion            |
| Banquet   | by | Masonic Club               |
| Hallow'een Party  | by | High School                |
| Chicken Supper  | by | Ladies Aid                 |
| Rummage Sale  | by | Girl Scouts                |
| Annual Ball: Proceeds for Fund for Children's<br>Christmas Treat. |    |                            |
| Community Christmas Tree and Treat for children                   |    |                            |
|   | by | entire community.          |

---

RADIO RECEIVING SET:

The Radio-Phone proved one of the best attractions of the Association during the past year. Very good results have been obtained, not only in the evening but also during the day. It was especially appreciated by all lovers of baseball during the World's Series, when every game was received play by play. The football games in the fall were also received very clearly. During the year classes in radio operation and construction were conducted, the entire expense being paid by the Association.

- |   |    |                  |      |
|---|----|------------------|------|
| No. Classes held                                | 10 | Attendance.....  | 160  |
| 1 Radio Party November Election, with Lunch     |    |                  |      |
| 1 Radio Party New Years Eve, with lunch.        |    |                  |      |
| No. Hours Radio-Phone was used during year..... |    |                  | 597  |
|   |    | Attendance,..... | 3020 |



INTER-CLUB CRIBBAGE LEAGUE: (Continued)

The gathering was a fine social event for the men and during the evening Radio programs were received.

\*\*\*\*\*

ASSOCIATION GLEE CLUB

The Glee Club continued to make it's name stand out as an organization of merit, not only by their concert work, but by conducting the Lyceum Bureau Entertainment Course which is held at the High School Auditorium.

The course arranged last year proved so popular that, despite the fact that many former patrons have moved away, it was decided to contract Four high-class numbers for the winter months.

Two of these programs were given in the fall and the remaining two will be given early in 1925. The standard of the programs secured is above the average chosen by small towns, and the community as a whole have entered into the spirit of the thing and the course for this year is an assured financial success through the sale of season tickets. The two numbers that have been given were attended by large and appreciative audiences.

The Glee Club also gave their annual concert and it was, as before, a highly entertaining event. This same concert was repeated for organizations in Ishpeming and Munising.

The club consisted of 26 members, and during the past year they held 18 rehearsals and meetings.

Attendance at 4 Lyceum Entertainment Numbers.....	1550
"    "    Concert held March 6th, .....	<u>350</u>

Total attendance,..... 1900

The Association, in honor of the fine work done by the Glee Club, tendered the entire organization a Turkey Banquet at which time the leader of the Club was presented with a check for his services in directing the members to a successful season.

\*\*\*\*\*

BOWLING LEAGUES.

MEN:

As in other years the Bowling alleys proved one of the Association's most popular features. The alleys were in fine shape during the entire season which came to a close in April.

The league, conducted for the men, opened January 28th and closed during the latter part of March. Six teams of four men each made up the league and the teams were so arranged that the race was close during the entire season, the champion not being decided until the last round had been rolled.



BOWLING LEAGUES, (Cont'd.)

LADIES:

The ladies also continued their league - as before, six teams with three members to a team completed the season. Many who had bowled the previous season were again in line and some fine scores were made. They were permitted to use the alleys one night each week.

\*\*\*\*\*

PHYSICAL AND ATHLETIC DEPARTMENT.

Includes all work conducted in the Gymnasium, Swimming Pool and all Outdoor recreations; such as Baseball, Track, Tennis and Playground Courts, Ice Skating Rink and Outdoor Swimming Pool.

All physical activities of the Local High School were conducted through the Association and by Association employees. The High School work began in January and was held indoors until spring, after which the work was conducted at the High School playground.

Senior club members used the gymnasium during the winter for Basketball, Handball, Volley-Ball, Cage Ball and regular class work.

-----  
SUMMARY OF ACTIVITIES OF THE  
PHYSICAL DEPARTMENT.  
-----

	Periods	Attendance
Boys High School		
Physical Training Classes.....	65	1853
Girls High School		
Physical Training Classes.....	87	1909
Boys and Girls Basketball		
Practice Periods, .....	64	660
Business Men's Classes.....	8	104
Boy Scouts supervised		
Training Classes, .....	11	192
Young Ladies Classes, .....	9	67
Supervised Swimming (Girls).....	19	254
Supervised Swimming (Boys ).....	25	607
Seniors using Gym for		
Basketball, Cage Ball, Hand-Ball,		
Volley-Ball, Class work and other		
recreative games, .....	65	370
	-----	-----
Total attendance of those taking part, .....		6016
Number of baths taken (estimated) .....		5600

SUMMARY OF ACTIVITIES OF THE  
PHYSICAL DEPARTMENT.

(Continued)

-----  
Basketball games during year - 8 games between local teams - 11 games at home with visiting teams and 7 games away from home.

The Gwinn High School Team made a very creditable showing at the District Tournament held at the end of the season in the Mather Gymnasium, Munising. They won their first game from Baraga High, lost the second to Munising and won their last game from Newberry, which gave them third place. Eight teams were entered.

The outdoor Skating Rink was as popular as in other years. The number of actual skating days when the ice was in good shape, was 42. The regular schedule was again in effect; this gave all who cared to enjoy the sport a fine chance to show their ability.

Attendance, ..... 4445

The Tennis Court was opened for play June 11th. The first part of the season was rather discouraging for the players as they encountered bad weather. September and October were fine and play did not stop until November 3rd.

Attendance on Playground and Tennis Court..... 1315

\*\*\*\*\*

BASEBALL:

No attempt was made to conduct the Mine League on account of not having the fast time. The regular Association Team playing a good brand, completed the schedule as arranged. The team played 11 games during the season; 6 away from home and 5 at home.

They also held 18 practice periods.

High School Inter-Class Games..... 18

Attendance at games and practice periods..... 1040

TRACK:

The Gwinn High School Track Team, under the direction of the Association, made their first appearance in this sport by entering the Track and Field meet held at Negaunee. Eight men were entered and they all made a creditable showing. No doubt they will show more interest the coming year.

OUT-DOOR SWIMMING POOL.

The swimming pool, located on the East Branch of the Escanaba River and used by the Association since 1921, was included in the ground deeded by the Company to Marquette County for park purposes. However, it was decided that it was advisable for the Association to continue the work of safe-guarding the small children and an attendant was at the pool 28 days during July and August. The cool weather during these months cut the attendance.

Attendance, ..... 1540

BASS LAKE CAMP GROUNDS AND COTTAGE.

Camp opened June 4th: Closed October 15th.

Estimated attendance for season, .....	2225
Number of families using Cottage for entire week, .....	8
Parties using camp week-ends, .....	6
Parties using camp over-night, .....	2
All day picnics, .....	10
Basket picnics, .....	71
Girl Scouts had use of camp ( days ).....	10
Boy Scouts over night hike to camp, .....	2
Receipts for Boat Hire for season, .....	\$ 79.00

The past season was the best that the camp has experienced, as to attendance and also as to the work done on the grounds. The entire space in front of the Cottage was cleared and ground leveled. All boats were re-painted. Roof on cottage was repaired and tarred. Slide for children's pool shellaced and erected. Eight new outside tables for basket picnics placed about the grounds. One more outside stove was added. The attendance became so large on Sunday during August, that the rule limiting the use of the camp grounds to company employees was strictly enforced. The Bass fishing was excellent, many fine catches were made by local sportsmen.

\*\*\*\*\*

SCOUT ACTIVITIES.

GIRLS:

The Girl Scout organization in Gwinn continues to be popular. During the past year arrangements were made to have one of the Association employees act as Supervisor over both troops, and also continue with her duties as Captain of the older troop. This brings the work much closer to the Association, although the Ladies comprising the Scout Council continue to advise. Their work is very much appreciated by the entire community.

Two Troops are being instructed and they meet weekly in the Gymnasium.

The following report covers the work of both troops:

Class meetings, ..... 86 Attendance, ..... 1706

- 10 - Social events and parties - including entertainments for mothers of scouts.
- 4 - Hikes and outdoor picnics.
- 1 - Ceremonial Night and presentation of merit badges.
- 2 - Addresses were given to the scouts by outside parties.

During the Christmas season the Scouts visited the sick and presented flowers, also at this time they gave six baskets of food to the needy.

SCOUT ACTIVITIES (Continued)

Special events by the scouts themselves and by the Local Council were held to raise the necessary funds to carry on the work. The annual Rummage Sale for this purpose was very successful.

\*\*\*\*\*

BUILDING MAINTENANCE:

The usual supply of material and equipment necessary to have all departments in good working condition was purchased by the Association. This covers bowling supplies, cloth for pool and billiard tables, cues, athletic supplies, paints and varnished, janitor supplies, library supplies, including new books, office and theatre supplies.

CONSTRUCTION AND REPAIR WORK:

- 8 - New tables at Bass Lake Camp
- Roof of cottage repaired and tarred.
- All boats at camp painted.
- Tennis Court and wire netting put in first-class condition.
- Moving picture machines overhauled.
- Tin gutters on roof re-painted.
- Part of roof tarred.
- Floors throughout building oiled
- Bowling alleys sand-papered and shellaced
- Men's locker room repainted.
- Ladies toilet re-painted.
- Living quarters of secretary re-decorated throughout.
- Gymnasium thoroughly cleaned and floor repaired
- Much time was spent on the lawn and shrubbery; fence about the grounds repaired.

\*\*\*\*\*

---

REPUBLIC MINE.

The production for the year 1924 shows a decrease compared with last year, the daily average hoist being the least for a number of years. The mine worked but four days a week for a portion of the year but the small product was largely due to the unfavorable results secured from our development work, as no new stopes of any consequence were found during the year, and the principal ore body that has been our main stay for the last five or six years split on the new 2670' Level into three separate fingers or lenses, two of which were so close to the Pascoe Shaft that they could not be mined. Under the conditions, it was absolutely impossible to bring our product up to what we would consider normal for this mine, namely: two tons per man per day. One finds on looking over the records for the first six years the Company operated this mine, i.e., from 1914 to 1920, inclusive, that the product was 963,450 tons for a total of 446,580 days worked, or 2.16 tons per man per day. This period covers that phase when conditions underground from the standpoint of ore reserves were very favorable.

The tonnage produced for the year was as follows:-

Basic Run-of-Mine,	689 tons,
Basic Lump Ore,	44,200 "
Basic Crushed Ore,	28,986 "
Pascoe Crushed Ore,	<u>1,666</u> "
Total,	75,541 "

ESTIMATE OF ORE IN SIGHT DECEMBER 31, 1924.				
NO. 9 SHAFT.				
LEVEL	DEVELOPED ORE		PROSPECTIVE ORE	TOTAL ORE
	AVAILABLE ORE	SHAFT PILLARS		
911				
1153		14,720		14,720
2170	25,040			25,040
2270	16,100			16,100
2370	6,780			6,780
TOTAL,	47,920	14,720		62,640
PASCOE SHAFT.				
1570	29,170			29,170
1640		2,700		2,700
1710	4,180	31,700		35,880
1780		42,940		42,940
1850	10,490	13,200		23,690
1950	10,860	58,570		69,430
2050	610	18,960		19,570
2570		9,660		9,660
2670		52,200		52,200
2770	31,700	15,800	31,700	79,200
2870			46,000	46,000
TOTAL,	87,010	245,730	77,700	410,440
GRAND TOTAL,	134,930	260,450	77,700	473,080

The ore reserves including shaft pillars subdivided into grades are as follows:-

	AVAILABLE	NOT AVAILABLE	TOTAL
Bessemer Ore Developed,	53,660	92,380	146,040
" " Prospective,	77,700		77,700
Non-Bessemer Ore Developed,	33,350	168,070	201,420
" " " Prospective,			
Siliceous or Pascoe Ore Developed	47,920		47,920
" " " " Prospective			
TOTAL,	212,630	260,450	473,080

The ore reserves exclusive of shaft pillars subdivided into grades follow:-

GRADE	DEVELOPED ORE	PROSPECTIVE ORE	TOTAL ORE
Bessemer Ore,	53,660	77,700	131,360
Basic Ore,	33,350		33,350
Pascoe Ore,	47,920		47,920
Total,	134,930	77,700	212,630

The following table shows the ore in sight, product and ore developed during the past four years:-

	1921	1922	1923	1924
Ore in Sight January 1st,	381,712	398,608	391,073	485,650
Prospective Ore, " "	39,660	109,260	106,776	67,800
Total,	421,372	507,868	497,849	553,450
Product,	73,014	98,588	105,864	75,511
Balance,	348,358	409,280	391,985	477,939
Ore in Sight December 31,	398,608	391,073	485,650	395,380
Prospective Ore, " "	109,260	106,776	67,800	77,700
Total,	507,868	497,849	553,450	473,080
Developed during year,	159,510	88,569	161,465	4,859

This table gives the reason for our small product in 1924. You will note that not enough new ore was developed to off-set even the small production and that actually we had less ore in sight at the end of the year than we started with on January 1st. This is due to the pinching out of the main ore body on the 2670' Level and also due to the fact that the ore estimate made on December 31st, 1923, was too optimistic relative to the downward extension of the main stope on the 2570' Level. This stope had gradually increased in size from the 2170' Level down and we assumed naturally that it at least would be as large on the 2670' Level as at the 2570' elevation. Its area, however, decreased in size so that the prospective ore figures for December 31st, 1923, were too large. We actually did develop a new ore body on the 1950' Level and proved the downward extension of the ore to the 2770' Level during the year 1924.

#### SHIPMENTS.

Less ore was shipped in 1924 than during the previous year, the bulk of the ore going forward being Lump.

The total forwarded was as follows:-

Bessemer Lump,	144 tons,
Basic Lump,	49,100 "
Basic Crushed,	4,333 "
Pascoe Crushed,	241 "
Total,	53,818 "

We had a little trouble with one cargo of the Basic Lump grade, as was also true of several gondola shipments made to the American Steel Foundries. This occurred in the middle of the summer when because of sickness or injuries to the regular men, we put miners from underground on the Picking Belt and apparently the ore was not picked clean, as we found considerable banded material in some of the cars ready for shipment. We over-came this by closer supervision and by insisting that the pocket-men wash off the lumps with a hose provided for that purpose.

The following table shows comparative mine office and lower lake analysis on the ore shipped to the Docks:-

	MINE ANALYSIS			LOWER LAKE ANALYSIS		
	IRON	PHOS.	SILICA	IRON	PHOS.	SILICA
Basic Lump,	64.32	.040	6.08	64.15	.043	7.42
Basic Crushed,	64.75	.032	5.02	63.90		

There was only one cargo of Basic Crushed ore shipped out but the Lump shipments were split into twenty-two separate consignments. The average Iron analysis on the Lump cargoes showed only a variation of 0.17 between the mine sampling and that at Lake Erie Ports.

#### 1925 PROBABLE PRODUCTION.

At the present time, it is impossible to forecast accurately what we will be able to produce in 1925. We have so little definite knowledge of the probable shape and size of the ore on the 2770' Level that the out-put figures are necessarily guess-work. Furthermore, we are driving a drift on the 2570' Level in search of ore but what the future holds for us here can not be ascertained at the present time.



We know pretty well what the top levels in the Pascoe Shaft will produce, as the ore here is blocked out. These levels contain about 55,000 tons of available ore, practically all of which can be mined during the year. It would seem reasonable to assume that the new 2770' Level will produce at least 40,000 to 45,000 tons in 1925, so that our probable production would be in the neighborhood of 100,000 tons, or 25,000 tons more than last year, based on a full time schedule.

DELAYS.

Production was interrupted several times during the year, the longest delay occurring in October when hoisting had to be suspended to repair the main No. 9 Shaft timbers. The following table shows the various delays:-

DELAYS			
DATE	DURATION	CAUSE	TONNAGE LOST
Jan. 8,	3 hr.	Main #9 Shaft hoist drum shifted,	50
Feb. 13,	2 "	Bell signal system out of order,	50
May 18,	10 "	Transmission Line out of order,	185
Jun. 10,	10 "	Skip-road runners broken,	225
Oct. 17-			
Nov. 10,	12 da.	Repairing timber, No. 9 Shaft,	3300

The most serious interruption in hoisting was during the period when No. 9 Shaft was being repaired. This shaft is inspected once a week by the timber boss, and about the middle of September, he noticed a slight settlement of the timbers on the North side of the shaft, near the top of the so-called: "Wide Shaft", where it is approximately 20 feet square. This wide shaft is approximately three times the width of the shaft above and below this point, and is due to an error made in surveying years ago when the shaft was sunk and raised at the same time. The raise was put up in the hanging of the shaft and the pillar of rock between the raise and the main shaft was stripped down for a distance of approximately 250 feet, making a large opening to timber up.

As the main wall plates on the North side had a long span, the timber boss decided to put in studdles right down through to the bottom of the wide shaft to a point where he could transfer the pressure to the solid rock. After two or three rows of studdles were in position, the wall plates were prevented from settling any further, and it was thought that the shaft was secure. On Friday, October 17th, when the timber gang was making the usual inspection, they noticed that the wall plates on the North side of the shaft at a point about 550 feet below surface, were crowded in and settled down about 8" more, and 100 feet further down, one set was broken behind the cage runner and projected out into the shaft over a foot. It was the crowding out of this set that allowed the sets above to settle down and the studdles that had been put in below this point prevented the wall plates from settling down and the pressure therefore broke the set and pushed it out into the shaft. After the shaft was retimbered and it was possible to make a careful examination, it was apparent that a large slab of loose rock behind the timber had started to move, due no doubt to the rotting of the packing and lagging that formerly held it tightly wedged between the ground and the shaft sets.

Lining sets were placed between the old sets which were spaced approximately 8 foot centres. It was difficult to get these in position, as the cage runners interfered with the work and the cage was necessary to transport the men and materials. New wall and end plates were made of 12" x 16" trestle stringers, and large dividings also run across the shaft. Diagonals running from the end plates to the centre of the dividings on the set below, transferred some of the side pressure to the centre of the dividings, where studdles in turn carried it down to a truss put in 75 feet below the point where the sets were damaged.

Retimbering was finished on November 6th but it required two days more to repair the ladder sollars, put in ladders, remove the sollar plank and repair the cage guides. Hoisting was resumed on Monday, November 10th.

LABOR.

Plenty of skilled miners were available but as usual during the summer months, we were short of trammers. Conditions at the Republic Mine are not favorable for using scrapers mainly because the ore is always badly mixed with Soaprock and it would never be possible to get the ore clean if it was loaded into cars with scrapers, as frequently two car-pickers are kept busy picking out the rock from the ore loaded by one trammer.

EXPLORING.

The Diamond Drill was kept busy the entire year testing the foot-wall and trying to locate the downward extension of known ore bodies. The holes drilled for the year follow:-

NO. OF HOLE	LOCATION	DEPTH	FOOTAGE OF ORE.
540	1710' Level	284	No ore
541	1850' "	153	4 feet
542	2670' "	165	No ore
543	1335' "	62	12 feet
544	1335' "	88	No ore
545	1570' "	25	10 feet
546	1570' "	20	14 feet
547	2670' "	296	No ore
548	2670' "	326	No ore
549	2570' "	189	No ore
550	2570' "	11	No ore
551	2570' "	35	No ore
552	1710' "	115	3 feet
553	1335' "	128	No ore
554	2770' "	80	22 feet
555	2770' "	105	40 feet
556	1950' "	105	No ore
557	1950' "	102	No ore
558	1950' "	70	No ore

The total footage drilled for the year was 2,414 feet at a total cost of \$7,400.51 or \$3.066 per foot.

YEAR	FEET DRILLED	COST PER FOOT
1920	3621	\$4.963
1921	2531	4.11
1922	2367	3.57
1923	4325	3.196
1924	2414	3.066

You will note that the cost per foot was lower in 1924 than in the previous four years, notwithstanding the fact that the wage schedule prevailing in 1924 was higher than that in 1921 and 1922. We made a change some time ago that has decreased our cost per foot considerably. In view of the fact that we have little trouble with the holes caving so that it is never necessary to case, we decided to drill with a smaller bit. Our core is now only 5/8" diameter and by reducing the size of the bit, we have cut down our carbon loss.

#### SHAFT SINKING.

The Pascoe Shaft was bottomed at the 2770' elevation during the latter part of the year. At the 2670' Level, the shaft itself, was bottomed in Jasper. A short distance below that level, the ore came in on the foot-wall and all of the shaft area was in ore down to the 2770' elevation, where we encountered Soaprock which changed again to Jasper in the skip-pit. We now believe the shaft is bottomed in the main foot which has gradually been approaching the line of the shaft below the 2050' Level, and the logical thing to do is to keep our development work going by again sinking the Pascoe Shaft to the 2870' Level.

A long as the shaft remains in the foot which it probably will from now on, we will not tie up any additional ore in shaft pillars.

From the 1640' to the 2050' Levels, there are 168,070 tons unavailable until the Pascoe Shaft is abandoned. Below the 2570' Level, there is an additional tonnage of 88,000 tons that can not be mined at present, which if it had been available, would have enabled us to get out as good a daily production last year as normal or namely, 110,000 tons, based on two tons per man per day.

The Pascoe Shaft lies very close to the plane of the syncline at the bottom of the Republic trough, and naturally considerable of the ore lies in the same basin.

The main No. 9 Shaft is in the foot but is situated from 500' to 600' away from the ore bodies developed near the Pascoe Shaft. As it would take two years to sink the vertical shaft and drift to the ore on each level, we have always continued to sink the inclined shaft, as from the latter we could develop a new level every year. Unfortunately, the bulk of the ore on the 2670' Level was too close to the shaft to permit mining, but we are confident that as the shaft drops back into the foot, all of the ore developed on the levels below the 2870' elevation can be mined.

#### ROCK DRIFTING.

Rock drifts were driven on five different levels, some of these in search of ore bodies and some necessary because of certain operating conditions.

On the 1850' Level, a rock drift was driven from the stub end of the old workings at the collar of Diamond Drill hole No. 423 to the West to open up the upward extension of an ore body found on the 1950' Level. The ore was cut early in the Spring.

On the 1950' Level in the latter part of the year, a drift was started at the collar of Diamond Drill hole No. 501 to look for the ore encountered in Diamond Drill hole No. 469.

On the 2050' Level, we were dubious about the hanging wall drift near No. 7 stope remaining open to permit passage of the motor trains. Below this point the ore in #7 stope opened up and formed the main ore body mined on all the levels down to the 2670' elevation. As the floors collapsed on the 2370' and 2470' Levels, the broken rock in the stope slid down leaving the stope open from the motor haulage level to the 2270' elevation. We immediately started dumping all the waste rock secured from the shaft sinking, drifting and that picked out of the ore into the top of the stope, but it would have taken three or four years to fill the hole. In the meantime, the hanging started to break off in large masses at the 2170' elevation, the breaks extending up to within 25' or 30' of the motor haulage level. We were in danger of losing our main drift if the sluffing off process continued upward, so we thought it advisable to run a new drift around the danger zone, which was finished and put into commission in the fall of the year.

On the 2570' elevation, we drove a drift North along the main hanging to explore the ground towards the No. 9 Winze territory. This is by all odds the most likely place to develop new ore bodies, with the exception of the lower levels in the mine. This main hanging had not been explored below the motor haulage level, and finding an ore body here would open up big possibilities, as we are 500 feet below the main level going to No. 9 Shaft and 200 feet above the bottom level in the Pascoe Shaft. We found a little ore at the start near the shaft, but could not mine it as it was only 50 feet across to the main shaft. The drift was extended North and about 50 feet away from the end of the main hanging wall stope, we encountered a leader of Magnetite that looked favorable and finally spanned the whole drift. This went on only a short distance, however, and then pinched out again. The drift then entered Soaprock and during the balance of the year, we discovered nothing worth while.

The drift occasionally would cut a small leader. It is more than probable that we are now cutting across the barren zone that exists in the mine from the surface down to the 2070' Level, extending along the hanging for 600 to 800 feet. When we have passed through that, we ought to find ore along the hanging if the past history of the mine repeats itself.

On the 2670' Level we drifted out to the West a short distance along the hanging, but encountered nothing but Jasper. Another drift was started in the main foot towards No. 9 Shaft, but after driving this a short distance in the Jasper, the drift was stopped because due to low air pressure, we were making very slow progress. After the booster air compressor is in commission, we expect to resume drifting.

We did far more drifting in 1924 than during the previous year at a considerable less cost per foot, the details of which will be explained under the Analysis of the Cost Sheets for the two years.

#### STOPEs.

Our ore stopes for the year had a very small area. We had only five stopes, and all but two of these were very small. These stopes can be listed as follows:-

1570' Level,	Average Ore Area,	1.70 sq. inches	or	4250	Sq. ft.
1710' "	" " "	0.24 " "	" "	600	" "
1850' "	" " "	0.90 " "	" "	2250	" "
1950' "	" " "	0.25 " "	" "	610	" "
2670' "	" " "	1.25 " "	" "	3125	" "
		4.34		1082.5	" "

You will note that the largest ore area that we mined during the year only contained 4250 sq. ft., which would be represented on our standard 50' to the inch maps by a square only 1-1/3 inches in size, which is exceedingly small for an ore body. All of the stopes put together only equal in area the size of the main hanging wall stope on the 2570' Level, or the old #1 Hanging Stope on the 1815' Level, No. 9 Shaft.

Because of the restricted ore areas, we found it impossible to break enough ore to keep more than four gangs of trammers busy most of the year. As a result of the smaller ore areas, we also find more powder used per ton of ore broken, and the unit cost will show an increase compared with last year.

#### COMPRESSORS & AIR PIPES.

The development work in the Republic Mine has always been way behind and so as a result, there come periods like that of last year when there are not enough stopes available to maintain a normal product. The problem is to speed up the shaft sinking and drifting in rock. Our Jasper is exceedingly hard being uniformly the hardest in the Lake Superior region. Other mines have certain areas where the country rock is hard, but the foot-wall in the Republic trough is all very hard. When the Diamond Drill only averages from 6' to 8' a shift, one can't expect much progress with the air drills.

The air in this mine for years has been furnished by the water driven air compressors installed in 1904. These compressors are only designed to deliver air at 65 lbs. pressure. When the water is low, the old steam compressor at the Allis or Central Plant keeps the pressure up. In the last eight years, we have boosted the air pressure to 75 lbs. even against the advice of the manufacturers who built the air compressors, but no harm has resulted. In the last few years, the modern hammer air drill has been developed, which now depends for its efficiency on a rapid number of strokes per minute. A test conducted by the Ingersoll-Rand Company shows how the average drilling speed increases at various air pressures based upon operation at 60 lbs. as unity:-

60 lbs.	-	1.00
70 "		1.32
80 "		1.55
90 "		1.82



You will note that the drill is nearly twice as efficient by raising the initial air pressure only one-half.

Upon reading our air pressures underground in the various contracts with a gauge, we discovered that we had only about an average of 60 lbs. of air at the throttle of the machines. There are two things necessary to do to remedy this; first, to increase the size of the underground pipe lines, and second, to boost the pressure with an auxiliary compressor.

We therefore laid another 4" line from the main 6" line at the bottom of No. 9 Shaft over to the Pascoe Shaft on the main motor haulage level.

We also commenced installing a booster compressor using the old Spies Mine compressor for that purpose. Although this Imperial Type 10 machine will only deliver 900 cu. ft. of free air per minute when it is operated as an ordinary compressor, its capacity is multiplied over four times when the inlet pressure is 70 lbs. We plan on discharging air at 100 lbs.

By making this change, we ought to be able to speed up the drilling in the rock drifts considerably, and as it takes the miners 80% of their time to drill the holes, we expect to show a much lower cost per foot in our rock work.

#### HOISTS.

We made no change in the hoisting equipment except to move the No. 9 Winze electric hoist over to the Pascoe Shaft to be used in shaft sinking operations. There is no question but what that speeded up the sinking in the last lift, because we sunk 40 feet in one month, which is by far the best footage attained in this mine. That will also be reflected in the cost per foot for 1924, which shows a decrease compared with last year.

DRY.

The Dry which was practically completed in 1923 was not entirely equipped until the early part of 1924. The shower baths and toilets were put in and we believe we have one of the best Drys at the Company's properties, and the cost of rebuilding was only approximately one-third that of a new building.

UNDERGROUND OPERATIONS.

1335' LEVEL:-

There was a little work done on this level after a lapse of three or four years since drifting was discontinued at the extreme West end near the fault line. After finding the ore at the 1570' elevation about 250' South-East of the shaft plat, we tried to trace the upward extension of this ore body to the 1335' Level and so drilled three holes back into the foot 50 feet apart. We did find some ore in the hole nearest the shaft and only about 20 feet from the South side of the main drift, but upon drifting in there, it turned out to be but a small pocket. We then mined out two old pillars left in the stopes near the shaft, after which, all the men were moved down from this level.

Sometime the main drift going West should be extended over underneath the old West Republic workings. This level is 500 feet below the bottom level of the West Republic Mine, and I believe our chances are good to develop sufficient ore in that territory to warrant driving the 1335' Level drift.

1570' LEVEL:-

The stope that was being opened up the latter part of 1923 was extended further South for an additional 60 feet, the best part of the ore lying in this end of the stope. The ore in the back extended up approximately 100 feet and then pinched out.

We then followed up the ore at the North end of this lens and although it opened up in good shape for a while, at the end of the year it was beginning to pinch out again. This particular stope has been one of our consistent producers. It was first discovered in 1918 on the 1850' Level, where work had been discontinued in 1915. From here we traced it up and down until the limits of this lens seem to be pretty well defined from the 1950' to the 1470' elevation. This particular ore body turned out 205,000 tons exclusive of three floor pillars that still remain. There are probably 50,000 tons in the pillars.

In order to make the floor pillar available, we sunk a winze on the foot 40 feet from the South end of the stope. This winze was down about 30 feet at the end of the year, and in order to hasten the holing through, we started to raise from the breast of the stope above the 1710' Level. We supposed we had a floor pillar here 20 feet thick, but on measuring the distance between the two old levels, we found them to be 217 feet apart instead of 200 feet as the nomenclature would indicate, so that there is considerably more ore in the floor pillar than was first estimated.

1710' LEVEL:-

About 300 feet South-West of the shaft, just beyond Diamond Drill hole #452, we opened up a small stope three or four years ago. The ore on the sill floor was 25' to 30' in width, but the dip of the hanging seemed to indicate that the stope would pinch out above the level. The South half of the stope showed up considerable Jasper and later, we found the ore to extend above the level still further to the South-West in another stope 100 feet away. We never attempted to mine the ore in the back of the first stope, because it seemed too narrow, but during the past year when our production was poor, we put in timber and started stoping.

We were in hopes that the ore would widen out again and after mining up for 35' or 40', we had to abandon the stope. We trammed 1465 tons from here.

1850' LEVEL:-

At this elevation, we opened up the same ore body that we had on the level below, 300 feet South-West of the shaft. There were two drill holes here put in a few years ago; in fact, one of them was drilled before the Cleveland-Cliffs Iron Company acquired the mine. Although neither of these holes showed much ore, we actually followed the Soaprock which lay against the ore and found a lens about 15 feet wide, where the drill holes showed only a few feet of ore. This fact shows that we can't place much reliance on the data shown on the old maps. Although the stope did not show any great width, the ore was approximately 150 feet long 50 feet above the sill floor, the stope turning out 11,160 tons of ore during the year.

We had hoped that this ore might extend upwards to the 1710' elevation, and for that reason drilled two holes at the latter elevation but found the ore to be very narrow. At the East end of the stope the Jasper came in and cut off the ore 50 feet above the level, but at the South-West end, we are still following the ore up 100 feet above the level. The ore here runs about 14 feet wide and 35 feet long.

1950' LEVEL:-

Very little mining was done on this level as the stope at the end of the hanging drift, South of the shaft, was pretty well mined out in 1923. We did take out part of the floor pillar underneath No. 4 stope on the level above and at the end of the year were starting to mine the floor pillar underneath the West end of the stope where a winze had been sunk from the 1850' Level. There is a back here about 30 feet thick.

After we had followed the outlines of the ore on the sill floor and in stoping upwards, had found the ore body to split into three parts, we then knew that there was a probability that the ore found in Diamond Drill hole #469 lay to the South-West of the stope mined out. We found two other holes drilled at the same time had deflected to the West, and acting on the same theory, the ore in hole #469 should be close to Diamond Drill hole #501. We tested the hole and found it to be dipping up at an angle of  $11^{\circ}$ . We then repaired the old stull in the stope on the West side of the main drift and started a rock drift at the collar of hole #501, and after drifting in about 20 feet, encountered the ore. At this writing the ore lens seems to be only 40 feet long and about 20 feet wide, which is pretty small and will not turn out much ore. It is possible it may increase in area as we mine upwards.

#### 2050' LEVEL:-

As mentioned previously in this report, a rock drift was driven in the hanging around #7 stope to provide a passage-way and a safe place to operate the motor trains through, as there was danger that the old drift at the contact between the ore and the hanging Quartzite might collapse, due to the sluffing off of the hanging in the stope below. This drift, approximately 300 feet long, is 110 feet back in the hanging. We thought at first of driving it in the foot, but in order to do that, it would have been necessary to go at least 400 feet, and most of the material encountered would have been Jasper. As the hanging drift was all in Quartzite, we made better progress.

#### 2570' LEVEL:-

No ore was mined on this level during the year 1924, but approximately 8900 tons were trammed from the foot-wall cross-cuts leading to the main stope. There is a large pillar of ore left about 60 feet East of the line of the Pascoe Shaft and if that

could be taken out without disturbing the shaft, it would help our production appreciably. However, it is pretty hard to judge from the nature of the ground just what would occur if this pillar was mined.

The rock drift being driven to the North-West along the hanging, did not develop any new ore bodies of any size. The drift did encounter a seam 8 feet wide which went but a short distance, and farther on in we cut small leaders. The drift was stopped for six weeks while miners were stoping in the main stope 25 feet away from the side of the drift, as we feared the floor pillar underneath the 2570' Level might collapse and cause a fall of ground in the rock drift. When that danger was over, we resumed drifting. We also drilled two Diamond Drill holes back into the foot from the East side of this drift but did not cut any ore. We may not get any ore in this drift, however, until we pass through the same barren zone that has persisted all the way from Surface down through the mine between the Pascoe and No. 9 Shaft workings.

2670' LEVEL:-

This level was expected to be the main producer during the year, but only turned out 25,775 tons or only one-third of our product. We developed 52,000 tons additional, none of which can be mined for the present, being tied up in shaft pillars. It may seem strange that although but little ore was left underneath the shaft on the 2570' Level, that the bulk of the ore developed 100 feet below is unavailable. That is due to the erratic dip and strike the ore bodies take in this mine, as there is no regularity about them. An inspection of the maps shows that the axis of the main ore body on the 2370' Level was 150 feet from the shaft and nowhere was the ore closer than 110 feet. On the 2470' Level, the axis was 110 feet from the near side of the shaft and the strike had carried it 110 feet farther North along the hanging, the ore at the extreme South-West end being within 70' of the shaft.

In each case while the ore body was being developed, Pascoe Shaft sinking was being carried on, as we could not wait and prove the limits of the ore before sinking another lift. When the 2570' Level ore body was proven up, a change occurred and instead of the ore projecting further North along the hanging, as we naturally expected from the position of the ore on the four levels above, a tongue projected back under the Pascoe Shaft for distance of 120 feet from the main ore body. As we were following this ore back of the shaft, we were sinking at the same time and the shaft was bottomed on the 2670' Level and we were cutting the plat three months before the extent of the ore underneath the shaft was known on the 2570' elevation. When the ore areas on the 2670' Level were mapped out, the shaft plat was found almost surrounded by ore and the main ore area had shifted over from the East to the West side of the shaft. It is pretty hard to forecast just what position the ore lenses will take on the 2770' Level, but the present indications are that they will lie mostly West of the Shaft plat. Between the 2370' and 2570' Levels, the main ore body only moved 40 feet nearer the shaft, but between the 2570' and 2670' levels, the ore North of the plat crossed the line of the shaft and gained 130 feet to the West.

The ore to the East of the shaft was stoped from the sill floor up to within 20 feet of the level above at the North end, leaving a pillar 30 feet thick at the South end. This ore was narrow running not over 15 feet wide until we came close to the 2570' Level, where the foot became very flat, giving the ore a chance to widen out. As there was broken rock resting on the 2570' floor pillar clear up to the 2070' Level, we thought it advisable to leave enough ore pillars on the foot to keep the floor from caving down and permitting all that rock to mix with the broken ore in the stope.

After the ore is all drawn off, I don't believe any great harm would result to the shaft if the floor pillar caved down.

To the North-West of the plat, we extended the rock drift along the hanging a short distance and then explored the foot and hanging by Diamond Drilling, but found no ore in this portion of the mine.

It was decided during the past year that it would be advisable to drive a drift over to No. 9 Shaft on this level. In the first place, we have no second outlet from the lower levels in the Pascoe Shaft and furthermore we are tying up considerable ore in shaft pillars. Furthermore, the transfer hoist located on the motor haulage level is reaching the limits of its capacity. As the shaft becomes deeper, we will find this hoist unable to handle the product fast enough. We have speeded it up twice by putting on a larger pinion, but it is now up to the limit, as the starting torque is 50% in excess of the H.P. of the motor. We are overlapping the rope three times but can use the hoist for one more lift by lagging the drum with wooden sections. If the lower levels in the Pascoe Shaft become large producers, it will be necessary to have a new connecting level with No. 9 Shaft. The difficulty in the Republic Mine is to judge what is best to do, as we are always uncertain as to the future of the mine. We have not enough ore in sight to justify driving this drift and raising and stripping the main shaft, but if we continue to have a large proportion of our ore reserves tied up in shaft pillars, we will be unable to produce enough ore to make the mine profitable. However, there is no question but what we should have a second outlet from the lower levels for the safety of the men.

The drift was driven North-East for a short distance through Soaprock and then entered the Jasper. This Jasper which is probably 400 feet thick is exceedingly hard and so progress was only at the rate of 25' to 30' a month.



As the air pressure in this portion of the mine ran only about 55 to 60 lbs., and as we expected to boost this to 90 lbs., we thought it wise to stop the drift until the booster compressor was in operation, which will enable us to drill the holes faster.

2770' LEVEL:-

The Pascoe Shaft was bottomed 25 feet below this level at the end of the year, and drifting for the ore commenced. The plat was finished and the drift on the West side of the shaft cut the ore 15 feet from the West skip-road.

Two Diamond Drill holes drilled on the West side of the plat, proved that there was ore on both sides of the Jasper horse of rock similar to the level above. There is one lens next to the hanging and another along the main foot. We can not at this time forecast what this level will develop, but because of the position of the Magnetite ore area discovered on the 2570' Level, near the hanging West of the shaft, we are hoping this to be the top of a large ore body at the 2770' elevation.

PASCOE SHAFT SINKING:-

Sinking has been resumed below the bottom of the skip-pit. It is not possible to wait for definite information regarding the shape and size of ore bodies on the 2770' Level before resuming sinking, as that would retard the development work that must be kept going if the mine is to operate at its maximum capacity. It takes about a year to sink the shaft, timber it up, cut the plat, put in the storage pockets and start mining on the new level. As the levels have been showing up only an average of approximately 10,000 sq. ft. of ore area, or 1420 tons per foot, which makes approximately 115,000 tons per level after deducting 10% for rock and 10% for loss in mining, it is necessary to keep the shaft going down and opening up a new level each year to keep the product near normal.

DEVELOPMENT WORK.

There is one ore horizon that we have done no work in since the Cleveland-Cliffs Iron Company acquired this mine and that is below the West Republic workings. A few years back we drilled from surface but due to the holes deflecting, we were not able to explore this area satisfactorily. The 1335' Level drift going West should be extended 600' to 800' to get on the other side of the big fault. This level is down 500 feet below the bottom or 8th level in the West Republic Mine, and although the lenses in the West Republic territory were small, there is a promising stretch of ground here that should be explored.

The question also rises as to whether we are going to be successful in finding new ore bodies on the bottom levels in the Pascoe Shaft. As far as the Geological conditions are concerned, there is no change from the top levels and prospects of finding ore lenses ought to be as good below the 2670' Level as in the levels above. One finds on examining the ore areas from the 1335' Level down that the ore areas in square feet at the different elevations are as follows:-

1335' Level,	2,225 sq. ft.
1500' "	24,375 " "
1570' "	25,475 " "
1710' "	28,975 " "
1780' "	30,350 " "
1815'-1850'	51,595 " "
1935'-1950'	33,420 " "
2050'-2070'	23,565 " "
2170' Level,	14,610 " "
2270' "	14,945 " "
2370' "	9,825 " " *
2470' "	9,250 " " *
2570' "	11,150 " " *
2670' "	10,700 " " *

\* Ore areas incomplete as development work has not reached No. 9 Winze territory.

You will note that the size and number of ore lenses kept increasing from the 1335' to the 1850' elevation, and then they gradually pinched out until the minimum was reached again on the 2470' Level, after which they were on the increase again.

Subsequent development work may show additional ore bodies on the 2370' and 2670' Levels inclusive.

The mine in the past has had its ups and downs as on two or three different occasions, the out-put took a large slump, due to the pinching out of the known ore bodies, but in each case development work and opening up new levels put the production back to normal.

The encouraging feature on the 2670' Level was that the ore body was still hugging the hanging wall. It is a proven fact that from surface down as long as the ore lay up against the Quartzite, there was a good chance of developing good sized lenses at depth. Just as soon as the ore leaves the hanging and drops back into the foot, then that particular lens or stope invariably pinches out, but so long as the ore follows the hanging, it persists to great depths.

#### ORE TRAMMED TO SHAFT.

The following table shows the various levels from which we trammed ore in 1924.

LEVEL	TONNAGE	PERCENT OF PRODUCT
1335'	1,279	1.7%
1570'	17,190	22.9%
1710'	1,355	1.8%
1850'	10,229	13.5%
1935'	638	.8%
1950'	10,272	13.6%
2070'	188	.2%
2470'	155	.2%
2570'	8,180	10.8%
2670'	23,725	31.5%
2770'	2,300	3.0%
TOTAL,	75,511	100.0%

The bottom levels only produced 45% of the ore during the past year compared with 57% in 1923 and 68% in 1922. The falling off from the bottom is due to the ore tied up in shaft pillars and was directly responsible for the small product and low tons per man per day.

## SUPPLIES.

### GENERAL:-

The total amount of General Supplies used was much less than last year and the unit cost per ton also shows a decrease. The difference is partially due to the fact that the mine operated full time in 1923 and only part time in 1924. A large decrease in the amount of diamonds ground up by the drill is shown in 1924 where the diamond loss was only \$1865.04, compared with \$4722.84 in the previous year. The rebuilding of No. 9 Dry in 1923 also increased the normal consumption of cement, expanded metal lath, roofing, etc., all of which come under the general heading of General Supplies.

### IRON & STEEL.

#### IRON & STEEL:-

The amount of iron and steel used was more than double that of the previous year. Our records show that practically no new drill steel was made up and sent out in 1923, whereas, in 1924, we made up \$1400.00 of 1-1/8" drill steel and sent it underground. The same is true of steel rails as no rails were purchased in 1923. As a result, it was necessary to send underground 160 - 20 ft. rails at a cost of approximately \$790.00. Then the perforated plate segments on the No. 9 Shaft revolving screen became worn and had to be replaced in 1924 at a cost of \$222.00 for plates alone. These three items account for the large increase.

### OIL & GREASE.

The consumption of oil and grease shows a decrease for the past year compared with the previous one, due in part to the fact that we operated only 255 days in 1924, thereby using less engine distillate, which is one of the largest items, the consumption running approximately 50 gallons per shift.

MACHINERY SUPPLIES.

The total amount for Machinery Supplies shows a small decrease for 1924, the unit cost showing an increase because of the smaller product in the past year. We had to purchase several items last year that were unusual. For instance, the 2 - 10 ft. sheave wheels at the top of No. 9 Shaft House had to be replaced at a cost of \$835.00. The old ones had run over twelve years. Then a new storage battery for the underground haulage locomotives was necessary. The large motor on the main Pascoe Shaft pump burned out and had to be re-wound at a cost of \$350.00. All of the motor cars on the haulage level was fitted with new wheels, the old ones having been in service four years, all required replacing just about the same time. The balance of the machinery supplies is largely repair parts for drilling machines and air pipes and fittings.

EXPLOSIVES.				
KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1924	AMOUNT 1923
50% Powder	96,880	.154	14,872.00	18,680.97
Total Powder	96,880	.171	14,872.50	18,680.97
Fuse	112,450	6.338	712.80	957.93
Caps	22,200	11.115	246.97	417.92
Tamping Bags,	9,870	2.133	21.06	53.07
Cap Crimpers,	3	1.00	3.00	3.32
Cap Sealer				.40
Fuse Lighters	450	9.99	44.96	
Total Fuse, Etc.			1,028.79	1,432.64
Total All Explosives			15,901.29	20,113.61
Product			75,511	119,190
Pounds Powder per ton of ore			1.28	1.02
Cost per ton for Powder			.1969	.1567
" " " " Fuse, Caps, Etc.			.0136	.0121
" " " " All Explosives			.2105	.1688
Average price per pound for Powder			.154	.155
Republic Mine on 6 double shifts basis	Jan. 1st to Aug. 1st,	/24.		
" " " 4 " "	Aug. 1st to Oct.17th,	/24.		
" " " idle from	Oct.17th to Nov.10th,	/24.		
" " " 6 double shifts basis	Nov.10th to Dec.31st,	/24.		

The explosives used in driving 1161 feet of rock drifts in 1924 were 22,080 lbs. or 19 lbs. per foot. Shaft sinking required 9150 lbs. or at the rate of 69.2 lbs. per foot of shaft.

#### LUMBER & TIMBER.

The amount of timber used for the past year is just about double the consumption of the previous year. That is due to a change in the shape and dip of the ore bodies. During the period from 1918 to 1923, the ore in the main stope opened up on the main levels in the Pascoe Shaft from the 2272' to the 2570' Level, was mined without the use of stull timber. The ore was so wide that it would have been impossible to support its weight on timber, and so the ore was trammed out by means of cross-cuts driven in foot-wall rock, and the miners entered the stope by means of a raise connecting with the level above. Last year this same ore body split into three sections and was of such a shape that it was necessary to put stull timber in to enable us to mine the Ore. The ore lens from which we have mined considerable tonnage on the top levels required but little timber at the 1710' elevation, but at the 1570' elevation, we found it necessary to put in timber cribs. In fact, every ore body mined during the past year, required more or less timber for stulls and cribs, and the 1850' stope could not be mined without the use of cribbing for the mills.

#### FUEL.

The amount expended for fuel will show a decrease because less coal was burned to produce steam for the Central Plant Air Compressor. The mine only worked four shifts a week during part of the summer and the fall months, which permitted us to store the water in the intake basin at the water power plant when the mine was idle, which made it possible to secure a larger proportion of the compressed air from the water driven compressors.

### ELECTRIC POWER.

The electric power consumption should and did show a decrease because of a smaller out-put handled by the main electric hoist, top tram motors, underground haulage motors, etc. The unit cost, however, shows an increase due to smaller daily average hoist, as the over-head expense went on just the same on the days the mine was idle.

### FARM.

The Company's farm near the Water Power Plant did not turn out as good a crop as normally, due to the unusually cold spring and summer. We gathered 18 tons of hay and 162 bushels of oats.

### FIRE PREVENTION.

A survey of the various levels in the mine showed that the main air current came down the Pascoe Shaft to the motor haulage level where it split, a portion going over to No. 9 Shaft and the balance, down the shaft to the bottom level and then up through the main stope to the raise back of the Pascoe Shaft on the 2050' Level where the air current flows out through the haulage drift and joins the main stream going to No. 9 Shaft. We installed a galvanized iron fire door close to the Pascoe Shaft and also put a trap door across the skip-road, half way between the 1950' and 2050' Levels. We are also going to make a room on the West side of the shaft at the 2470' Level, where the men could remain in case of fire and be supplied with plenty of fresh air.

REPUBLIC MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1924.

GRADE	IRON	PHOS.
Republic Bessemer Lump,	62.77	.031
Republic Bessemer Crushed,	(No Production)	
Republic Basic, Run-of-Mine,	61.60	.041
Republic Basic Lump,	64.78	.041
Republic Basic Crushed,	62.36	.042
Republic Pascoe Lump,	(No Production)	
Republic Pascoe Crushed,	56.59	.047

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1924.

GRADE	Mine			Lake Erie	
	IRON	PHOS.	SILICA	IRON	MOIST.
Republic Bessemer Lump,	(No Shipments)				
Republic Bessemer Crushed,	(No Shipments)				
Republic Basic, Run-of-Mine,	(No Shipments)				
Republic Basic Lump,	64.32	.040	6.08	64.11	.12
Republic Basic Crushed,	64.75	.032	5.02	63.90	1.04
Republic Pascoe Lump,	(No Shipments)				
Republic Pascoe Crushed,	(No Shipments)				



REPUBLIC MINE

ORE STATEMENT - DECEMBER 31ST, 1924.

	RUN-OF-MINE			BESS. LUMP	BASIC LUMP	PASCOE LUMP	BESS. CRUSHED	BESS. CRUSHED	PASCOE CRUSHED	TOTAL	TOTAL LAST YEAR
	BESS.	BASIC	PASCOE								
On hand Jan. 1, 1924,	-	-	4,381	-	5,537	-	12,150	69,255	2,511	93,834	156,985
Output for Year,	-	689	-	-	44,201	-	-	28,955	1,666	75,511	118,980
Transferred,	-	34	-	144	4,647	-	-	4,998	241	-	-
Stockpile Shortage,	-	-	-	-	-	-	-	-	-	-	13,117
Total,	-	655	4,381	144	54,385	-	12,150	93,212	4,418	169,345	262,848
Shipments,	-	-	-	144	49,100	-	-	4,333	241	53,818	169,014
Balance on Hand,	-	655	4,381	-	5,285	-	12,150	88,879	4,177	115,527	93,834
Decrease in Output,										30,352	
Increase in Ore on Hand,										21,693	

1924 -- 2-8 Hour Shifts, 6 days per week, Jan. 1st to July 26th, 1924.  
 2-8 Hour Shifts, 4 days per week, July 26th to Nov. 30th, 1924.  
 2-8 Hour Shifts, 5 days per week, Dec. 1st to Dec. 31st, 1924.

1923 -- 2-8 Hour Shifts, Jan. 1st to Dec. 31st, 1923.

REPUBLIC MINE  
SHIPMENTS FOR YEAR-1924.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Republic Bessemer Lump,	144	-	144	245
Republic Basic Lump,	18,301	30,799	49,100	66,041
Republic Pascoe Lump,	-	-	-	-
Republic Bessemer Crushed,	-	-	-	335
Republic Basic Crushed,	1,117	3,216	4,333	94,306
Republic Pascoe Crushed,	-	241	241	8,087
Total,	19,562	34,256	53,818	169,014
Total Last Year,			169,014	
Decrease,			115,196	

REPUBLIC MINE

COMPARATIVE MINING COST FOR YEAR

	1924	1923	INCREASE	DECREASE
PRODUCT	75,511	105,863		30,352
Underground Costs	3.526	2.794	.732	
Surface Costs	1.013	.749	.264	
General Mine Accounts	.305	.223	.082	
Cost of Production	4.844	3.766	1.078	
Plant Account	.032	.091		.059
Taxes	.340	.273	.067	
Central Office	.256	.171	.085	
Contingent Expense	.161	.111	.050	
Cost Adjustment	.022	.024		.002
Cost on Stockpile	5.655	4.436	1.219	
Loading & Shipping	.057	.083		.026
Total Cost on Cars	5.712	4.519	1.193	
No. Days Operating	258	297		39
No. Shifts & Hours	2-8	2-8		
Avg. Daily Product	293	356		63
<u>COST OF PRODUCTION</u>				
Labor	3.538	2.776	.762	
Supplies	1.306	.990	.316	
Total	4.844	3.766	1.078	

REPUBLIC MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 4	1 9 2 3	INCREASE	DECREASE
PRODUCT	75,511	105,863		30,352
No.Shifts & Hours	2-8hr	2-8hr		
AVG.NO.MEN WORKING				
Surface	56	62		6
Underground	157	154	3	
Total	213	216		3
AVG.WAGES PER DAY				
Surface	4.63	4.44	.1904.28%	
Underground	4.76	4.63	.13-2.80%	
Total	4.73	4.58	.15-3.27%	
WAGES PER MO.OF 25 DAYS				
Surface	115.75	111.00	4.75	
Underground	119.00	115.75	3.25	
Total	118.25	114.50	3.75	
PRODUCT PER MAN PER DAY				
Surface	4.97	5.74		.77
Underground	1.85	2.32		.47
Total	1.35	1.65		.30
LABOR COST PER TON				
Surface	.933	.773	.160	
Underground	2.569	1.997	.572	
Total	3.502	2.770	.732	
AVG.PRODUCT BRK'G & TRM'G	4.51	5.14		.63
" WAGES CONTRACT MINERS	4.85	4.67	.18	.63
" " " TRAMMERS	6.21	6.34	.13	.13
" " " LABOR	5.14	5.01	.13	
TOTAL NO. OF DAYS				
Surface	15207-1/4	18425		3217-3/4
Underground	40733-3/4	45632 1/4		4898-1/2
Total	55941	64057 1/4		8116-1/4
AMOUNT FOR LABOR				
Surface	70440.77	81812.36		11471.59
Underground	194071.12	211441.94		17370.82
Total	264511.89	293254.30		28742.41

Proportion Surface to Underground Men:

1924 - 1 to 2.8  
 1923 - 1 to 2.48  
 1922 - 1 to 2.30  
 1921 - 1 to 2.51  
 1920 - 1 to 2.67  
 1919 - 1 to 2.81

REPUBLIC MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

<u>KIND</u>	<u>QUANTITY</u>	<u>AVERAGE PRICE</u>	<u>AMOUNT 1924</u>	<u>AMOUNT 1923</u>
50% Powder	96,880	.154	14,872.50	18,680.97
Total Powder	96,880	.154	14,872.50	18,680.97
Fuse	112,450	6,338	712.80	957.93
Caps	22,200	11.115	246.97	417.92
Tamping Bags	9,870	2.133	21.06	53.07
Cap Crimpers	3	1.00	3.00	3.32
Cap Sealer				.40
Fuse Lighters	450	9.99	44.96	
Total Fuse, Etc.			1,028.79	1,432.64
Total Explosives			15,901.29	20,113.61
Product			75,511	119,190
Pounds Powder per ton of ore			1.28	1.02
Cost per ton for powder			.1969	.1567
" fuse, caps, etc.			.0136	.0121
" all explosives			.2106	.1688
Avg. price per pound for powder			.154	.155

Republic Mine on 6 double shifts basis Jan.1st to July 31st,1924.  
 " 4 " Aug.1st to Oct. 17th,1924.  
 " idle from Oct. 17th to Nov.10th,1924.  
 " on 6 double shifts basis Nov.10th to Dec.31st,1924.

REPUBLIC MINE.

ANALYSIS OF COST SHEETS FOR THE YEARS 1923 & 1924.

UNDERGROUND COSTS.

EXPLORING IN MINE.

Year	1923	\$15,182.42
"	1924	8,154.25
<u>Decrease for 1924</u>		<u>7,028.17</u>

Decrease due to operating Diamond Drill only one shift since December 20th, 1923. Previous to that date the drill was run both day and night.

Another reason for decreased costs was the fact that we reduced the size of the bit, so that the diamonds travelled on the circumference of a smaller circle, reducing the carbon loss. As a result the cost per foot drilled shows a decrease from last year. The last five years have shown a steady decrease, the cost per foot being reduced from \$4.963 to \$4.11; thence to \$3.57; thence \$3.196 and finally \$3.066 for last year.

SHAFT SINKING.

Year	1923	\$18,208.96
"	1924	21,262.78
<u>Increase for 1924</u>		<u>3,053.82</u>

The total cost shows an increase, but the unit cost per foot sunk shows a decrease from \$224.80 to \$161.10. In 1924 we sunk an entire lift, finished a plat and started drifting for ore. The previous year we only sunk 81 feet.

The cost per foot was lowered as shown above by installing an electric hoist for handling the broken dirt from the shaft.

ROCK DRIFTING.

Year	1923	\$22,843.44
"	1924	25,247.63
<u>Increase for 1924</u>		<u>2,404.19</u>

Although the expense for driving rock drifts shows an increase for the past year, the cost per foot was considerably less than the year before, being reduced from \$27.00 to \$21.75. We did a third more rock work in 1924, the footage being 1161 for the year compared with 846 for 1923. The unit cost shows a decrease due to the use of scrapers and slides in mucking the rock on the levels where the air pressure was good. We hope to make a considerably better showing in the coming year after the booster compressor is installed.

DEVELOPMENT IN ORE.

Year	1923	\$27,152.59
"	1924	18,937.38
<u>Decrease for 1924</u>		<u>8,215.21</u>

This account shows a decrease for the past year and the tons broken in development work dropped from 21,128 to 10,456, due to the fact that new ore was not found and opened up at the same rate as the year before. We had as a result fewer feet of ore drifting and raising. The total footage driven in ore in 1923 amounted to 2110, whereas in 1924, we had only 698 feet of ore drifts and 256 feet of raises put up in ore.

STOPING.

Year	1923	\$115,951.72
"	1924	95,074.21
<u>Decrease for 1924</u>		<u>20,877.51</u>

Decreased due to the fact that the mine worked but 255 days in the year 1924 compared with 297 the year before. The unit cost shows an increase due to the restricted stoping areas, as it takes more labor, more holes have to be drilled and more powder used per ton to break the ore in the narrow stopes.

We had but one stope on the 1570' Level, Pascoe Shaft, that was of any size; the combined area of all the five stopes in which ore was broken last year, hardly equalling in size the old #1 stope on the 1815' Level or the main hanging stope on the 2570' Level.

TIMBERING.

Year	1923	\$9,214.98
"	1924	15,422.07
<u>Increase for 1924</u>		<u>6,207.09</u>

As mentioned before in this report more timber was required due to the shape of the ore bodies. When the ore lenses are vertical, much more stull timber is required than if the ore stopes lie at an angle. Also when it is possible to put our trammings drifts along the hanging, or back a short distance in the foot, not much timber is used. Furthermore, when access to the stopes can be provided by means of raises driven in the ore to the upper level, less timber is required than if we need timbered mills in the ore stopes for ladder-ways.

TRAMMING.

Year	1923	\$51,169.17
"	1924	44,125.09
<u>Decrease for 1924</u>		<u>7,044.08</u>

Decreased due to smaller product handled by contract trammers. Unit cost shows an increase due to smaller daily average hoist, as wages for pocket-men, skip-tenders, motor-men, brakemen, etc., are charged to trammings, and a certain number of these men are required regardless of the size of the daily output.

PUMPING.

Year	1923	\$7,063.13
"	1924	6,874.81
<u>Decrease for 1924</u>		<u>188.32</u>



Small decrease due to less consumption of electric power as the amount of water pumped decreased about 10%.

COMPRESSORS & AIR PIPES.

Year	1923	\$12,468.93
"	1924	14,286.60
<u>Increase for 1924</u>		<u>1,817.67</u>

The cost of making compressed air increased in 1924 due to shortage of water at the Water Power Plant, which made it necessary to operate the steam compressor more often. We burned 591 tons of coal in 1923 for the steam air compressor, but this jumped to 881 tons in 1924, the price of the coal remaining the same for the two years.

UNDERGROUND SUPERINTENDENTS.

Year	1923	\$6,176.03
"	1924	6,056.57
<u>Decrease for 1924</u>		<u>119.44</u>

Decrease due to fewer shifts operated in 1924 compared with 1923.

MAINTENANCE ACCOUNTS.

COMPRESSORS & POWER DRILLS.

Year	1923	\$2,495.56
"	1924	2,054.41
<u>Decrease for 1924</u>		<u>441.15</u>

Decreased because no new drilling machines were purchased in 1924. In 1923 we purchased four new #248 drills and the maintenance cost for 1924 would have been considerably lower but for the necessity of buying a new piston for one of the low pressure cylinders on the compressors at the Water Power Plant.

HAND TRAMMING EQUIPMENT.

Year	1923	\$5118.37
"	1924	5333.02
<u>Increase for 1924</u>		<u>214.65</u>

We found it necessary to purchase new wheels for all the cars on the 2070' Level. Twenty-seven of our standard 1 $\frac{1}{4}$  ton cars were placed in commission on this level five years ago, and as it happened, all of the wheels became unfit for use just about the same time. We also sent 160 new 20 foot rails underground.

ELECTRIC TRAM EQUIPMENT.

Year	1923	\$1419.80
"	1924	2427.32
<u>Increase for 1924</u>		<u>1007.52</u>

New storage battery for underground haulage locomotive purchased in 1924.

PUMPING MACHINERY.

Year	1923	\$1335.16
"	1924	1048.86
<u>Decrease for 1924</u>		<u>286.30</u>

The only unusual item of expense in the past year was the cost of re-winding the main Pascoe Shaft pump motor. In the previous year, we put in a new water discharge line in the Pascoe Shaft, from the 2470' to the 2070' Levels, and also bought a new belt for the main No. 9 Shaft pump. These latter two items exceeded the cost of the repairs on the motor, and as the balance of the expense keeping the pumping equipment in shape was about the same for the two years, the year 1924 shows a decrease.

SURFACE COSTS.

HOISTING.

Year	1923	\$33,006.72
"	1924	32,756.99
<u>Decrease for 1924</u>		<u>249.73</u>

The operating expense for hoisting shows but little change for the two years. The unit cost per ton of ore produced shows an increase, and this is partially due to the fact that a larger percentage of our product came from the top levels, Pascoe Shaft, and had to be handled by the steam hoist in the Central Engine House.