66. It was started on March 30th, and finished April 20th, at a depth of 152 ft. This hole struck ledge at 104 ft., and was drilled 48 ft. further in ore and dike. It was in high grade ore from 104 to 128 ft., which averaged over 60% iron, .058 phosphorous, then in lean ore from 128 to 142 ft., and was stopped in dike.

Hole No. 70 was next drilled, being located about 100 ft. South of hole No. 66, to strike the ore found in No. 68, at greater depth. It was started April 21st, and completed May 29th at a depth of 243 ft. in quartzite, slate, jasper and was stopped in dike.

Hole No. 71 was located about 500 ft. West of No. 66, in order to prove up the contact further West across the S.W.¼ of the N.W.¼. This hole was started on May 21st, and completed on June 26th at a depth of 400 ft. It struck ledge at 79 ft., and was drilled 321 ft. through quartzite, and stopped in dike.

Hole No. 72 was located Southeast of hole No. 66, nearer the Dexter Mine. It was started on June 1st, and completed August 2nd at a depth of 562 ft. It struck ledge at 129 ft., and was drilled 433 ft., passing through graywhacke, quartzite, ore, jasper and dike, being stopped in soft ore jasper. Analyses is given below.

DEPTH.		IRON	PHOS.
360 ft.	to 365 ft.	59.10	.133
365	380	61.60	.089
425	430	53.30	.060

One other hole, No. 73, was drilled near the West side of Section 3. It was started June 28th, and finished on July 30th at a depth of 271 ft. It struck ledge at 91 ft., and was drilled 180 ft. through quartzite, dike, and was stopped in quartzite and jasper. Following is a summary of the standpiping and drilling done on this part of the Barnes Lease.

NO. OF HOLES DRILLED,	(7)
FEET STANDPIPING,	704
FEET DRILLING,	1361
TOTAL,	2065 ft.

Although some ore was found in three of these holes, there was not enough to warrant further explorations, and shortly after the Chase Mine closed down, Lease No. 32 from the Barnes Land Company on the North half of Section 3 was surrendered.

CHASE MINE.

The hoist for the year ending Dec. 31st, 1915, was as follows:

CHASE ORE,	35,044 Tons.
Rock,	1,110 "
TOTAL HOIST,	36,154 "

All the ore was removed from the mine on July 7th, and the work of dismantling was started immediately. The total output of the mine was 168,616 tons. The work of opening the mine was started on Dec. 5th, 1909, and the first ore was hoisted in August 1911. The mine was closed down for eleven months during 1911 and 1912. Ore was actually hoisted for thirty three full months during the life of the mine. The mine was on an operating basis for two and one half years.

ORE ESTIMATE.

Total ore left in mine to support capping, 7,500 tons.

The developed ore including that which was mined, totaled 176,116 tons. The estimate of the Geological Department made in January 1911, showed 350,000 tons of first class ore; the actual ore hoisted from the mine was 168,616 tons, or 48% of the amount estimated. This difference was due entirely to dikes and horses of jasper, which ran parallel to the ore chutes, materially reducing the ore areas, and of which no idea was gained by diamond drilling from surface.

The grade of the product shipped during 1915 is above the average of the balance of ore in stock. Some of the ore shipped, was hoisted in 1915, but fully sixty percent of it was hoisted in 1914. The grade of the balance of the ore in stock is lower on account of the 2nd class ore. It is hoped that the 2nd class ore can be mixed in the shipments of the better grade of ore, in order to dispose of it. It is probable that the average of all the ore in stock is about 56.50 iron, .375

phosphorous. Some cargoes can be shipped which will average 57.50 iron, but it will not be possible to send forward much ore of this grade if the 2nd class ore is to be mixed with the good ore.

It was hoped that surface diamond drilling on the hard ore contact South of the mine would show up sufficient ore to warrant opening this territory. Some ore was encountered near surface on the contact in several of the drill holes, but deeper holes failed to show that the ore continued downward. Several holes were drilled underground at the West end of the 2nd level in an effort to find a Westward extension of the Chase ore body, but these holes were also blank. Early in 1915 it was evident that the mine would permanently close, as soon as the developed ore bodies were mined out. Some additional ore was found when the territory between the 2nd and 3rd levels were explored by raises and drifts. This ore permitted the mine to operate fully two months longer than was expected the first of the year.

The cost of the ore produced in 1915 is lower than for any other year that the mine was operated. This was due principally to a decrease in the working force, less ore being broken and more hoisted which had been broken in previous years in the shrinkage stopes.

1st LEVEL.

Several thousand tons of ore were obtained from the 1st level during the past year; part of it came from the back of one of the old stopes East of the crosscut to the shaft, the balance from the old first level floors and from the sides of a few large pillars. The greater part of this ore was high grade, and of the 1289 tons shipped from pocket, the greater part came from this territory.

In February a contract started mining the 1st level floors at a point 50 ft. West of the crosscut to the shaft. After working here ten days, it was decided to stop work temporarily, as it was feared that the jar from blasting would loosen the ground in the back of the main shrinkage

stope some 25 ft. North of this point, so that it would not be safe for the men scramming ore in the bottom of the shrinkage stope. The balance of these floors in this territory which were available for mining, were removed in May and June. The last of March a contract blasted off the side of a large pillar East of the crosscut to the shaft. In addition to furnishing some ore, this work provided a traveling road to the 2nd outlet, and made it possible to take out the floors of the original traveling road to the second outlet. After completing the work on this pillar, this contract took the ore out of the back of the old drift to the 2nd outlet to a height of 20 ft., where the ore pinched out. They then blasted down the floor into the shrinkage stope which had been opened beneath this territory.

In June when mining was practically completed everywhere in the mine, several holes were blasted in the floor of the drift which had been driven on the side of the pillar to provide a traveling road to the second outlet. These holes were about 15 ft. deep, and broke a large amount of ore, which fell into the main stope, and was trammed out on the 2nd level, this being the last ore which was obtained from the mine.

2ND LEVEL.

At the close of 1914 it was estimated that there was about 8,000 tons of ore remaining in the large shrinkage stope, also a few thousand tons in the small stope lying between the main shrinkage stope and the S.W. shrinkage stope. In addition to this, it was estimated that there was about 3,000 tons of ore in what was termed the small West shrinkage stope, also several thousand tons in the small East shrinkage stope. This ore constituted a reserve, which was being drawn out with the ore which was being obtained from mining operations.

Two contracts worked steadily in the main stope, cleaning the ore down which had lodged on the footwall, also blasting out the arches which had been left between the raises to form a support for the chutes. They also mined some ore in the bottom of the West end of the stope,

where they found the ore to extend about 25 ft. further to the West. These two contracts continued working here until they had finished mining all the ore to the West, after which they blasted down the back of the 2nd level drift. Near the center of the main stope one of the large pillars which had been left to support the capping, cracked up, and fully two thirds of it was removed before solid ground was found. Later on two other small pillars slid off the paint rock footwall, and these were blockholed and the ore trammed out on the 2nd level. Taking out these pillars did not decrease the value of the upper portion of the pillar as far as its being a support for the capping was concerned. The ground in this stope was very firm and solid, so that it was possible for the men to work here cleaning down the ore and breaking up the pillars without danger. They continued to obtain ore from these stopes until the latter part of June, when all of the available ore was trammed out.

One contract worked during January and February mining the ore in the back of the 2nd level drift beyond the West end of the main shrinkage stope. This ore did not seem to be a separate body, but merely a narrow seam extending beyond the main ore lense. They also blasted out some ore from the floor of the 2nd level into a raise which had been put up from the 3rd level. All of the available ore here was mined out, it not being necessary to leave any ore in this territory to support the capping.

One contract worked up to the time that the mine closed in the subs which had been opened at the East end of the mine in the territory between the 2nd and 1st levels. This was the East end of the ore body which lay on the jasper footwall. This territory had been opened up by the room and pillar system, similar to the method of mining pursued at the Cliffs Shaft Mine, and as it was known that the ore would soon be exhausted in the mine, it was decided to cut down the pillars as much as possible. The large pillars were cut in two above the jasper, leaving two legs supporting the main pillar; also all the ore floors were mined out down to the jasper. For a time this ore was trammed and dumped

into the main shrinkage stope, but later on it became necessary to put up a raise in jasper from the 2nd level, which holed to this territory, and to which the balance of the ore was trammed. All the ore was taken out here which it was considered safe to remove, and it is probable that of the 35,000 tons hoisted in 1915, fully twenty five percent came from this territory.

Some ore was obtained from the small shrinkage stopes which had been opened in the lense of ore which lay parallel with the main stope. One of these stopes had been stopped at a point just below the 1st level. It was extended on through to the 1st level, and all the ore mined which was available at this point.

During the last months that the mine was operated, a gang of miners cleaned down all available ore on the footwall of these small stopes, and in this way several hundred cars of ore was obtained.

After all the ore had been broken in the small stopes between the 2nd and 3rd levels, the available ore in the floor of the 2nd level was mined out into this stope. It was necessary to tram part of this ore and dump in into the stope, as it lay on the jasper and could not be blasted directly into the stope.

When the mine closed down, all the ore had been mined on the 2nd level. Some pillars had been left between the 1st and 2nd level to support the capping, but these pillars had been reduced to a size as small as it was considered safe for the men to work in the mine.

3RD LEVEL.

At the close of 1914 the 3rd level had been opened by drifts, and the territory between the 2nd and 3rd levels developed by raises and sub levels. Two small ore bodies had been found, one near the West end of the mine, which had a width of 12 ft., and a length of 65 ft., at a point midway between the two levels. A shrinkage stope was being opened here and mining was in progress. The other ore body found above the 3rd

level, was the downward extension of the narrow seam in which the main 2nd level drift had been driven beneath the main shrinkage stope. A shrinkage stope had also been started in this ore, and mining was in progress here on the 1st of the year. Two other raises had been put through from the 3rd to the 2nd levels, neither of which showed up sufficient ore to warrant mining operations. It was evident that the ore which would be obtained in this territory, would come from these two small shrinkage stopes.

One contract worked in the small stope at the West end during January and February. The ore was found to extend to a point about 65 ft. above the 3rd level, where it pinched down to less than 4 ft. in width. This ore body never exceeded 12 ft. in width, and averaged for the greater part of its height about 8 ft. in width. Later this ore was drawn off and when the stope had been emptied, a gang of miners worked here about two weeks cleaning out the ore from the stope. It is estimated that there were about 1500 tons of ore obtained from this stope.

The first of the year two contracts were working in the other small stope on the 3rd level, which was opened above the crosscut which had been driven to the North of the 3rd level haulage drift. As stated before, this ore body was the downward extension of the main ore body on the 2nd level. At the East end of the stope the ore body was of fair size and of good grade, while at the West end it was narrow and mixed with rock. When they had reached a point 55 ft. above the 3rd level, the ore pinched out at the West end of the stope, and one contract continued working at the East end, following the ore back to the East above the jasper footwall. They continued working here following the ore upward until they reached the 2nd level. By this time all the ore had been mined out in this territory above the 2nd level, so they removed the chutes and timber from the 2nd level, and blasted the 2nd level

floor into this stope. They also followed the ore to the East above the jasper, taking out the timber on the 2nd level until the ore pinched out. The last ore going into this stope came from the small covering which had been left above the 2nd level in the floor of the main shrinkage stope. This ore was from 3 to 6 ft. in thickness, and about 9 ft. wide. It was drilled and all blasted at once after all the ore had been cleaned down out of the stope below the 2nd level. This ore fell directly into the stope, and was trammed out on the 3rd level. All work was completed on the 3rd level the last of June, when the work of dismantling the mine was started, and cars, rails and ties were all removed.

UNDERGROUND DRILLING.

On January 19th a drill was brought to the West end of the 2nd level to the end of the South drift, and number 16 hole drilled. It was started on Jan. 20th, and completed on Jan. 25th at a depth of 92 ft., being in soft ore jasper, and was stopped because it was thought that it had crossed into the territory to the South of the main Chase-Dexter fault.

Hole No. 17 was started on Jan. 26th, and completed on the 29th at a depth of 58 ft. This hole was located at the West end of the drift which had been driven to the S.W. towards the old Dexter Mine, being drilled to the N.W. It passed through 43 ft. of soft ore jasper, the last 15 ft. being in slate.

Hole No. 18 was drilled from the same station, and was started on Jan. 29th, and was drilled to a depth of 54 ft., being stopped in jasper, having been in this material the entire distance.

Hole No. 19 was drilled to the N.W. from a point beneath the S.W. shrinkage stope. This hole was located so as to pass about 60 ft. West of the main East-West drift, and was completed on Feb. 9th at a depth of 65 ft. It showed some lean ore at a depth of 52 ft., the balance of the hole being in dike and jasper.

CHASE MINE.

These four holes were drilled in an endeavor to prove up the ground West of the end of the 2nd level. This was in the territory near the Chase-Dexter fault, where there was a probability of enrichment. They proved that there was no ore here, although in some holes a rich jasper formation was shown up. They did not indicate that it would be possible to start drifts in this territory, and accordingly it was decided not to carry on any further explorations to the West of the mine.

SURFACE.

In May about 8,000 feet of 3 in. hemlock plank were purchased, and the stockpile grounds extended to the West. Some plank were also obtained for this work from the sollar under the coal pile, and some from the floor of the permanent trestle which was torn down.

Shipping by steam shovel was started in June, so that it was not necessary to prepare any additional stocking grounds. All the ore shipped during 1915 was crushed at the South Jackson crusher. Shovel loading was started on June 30th, and completed in October. One cargo was loaded by the shovel on each trip to the mine.

DISMANTLING MINE.

Hoisting of ore was completed on July 7th, and dismantling was started at once. Cars, rails, ties, air and water lines were removed as rapidly as possible. The underground pumps were kept operating until the 9th of July, at which time the only material remaining in the mine, was the discharge line and other pipe and electric lines in the shaft. All the material was removed from underground and shaft on July 15th, and the shaft was then sealed over on surface, as also the second outlet.

While the work of dismantling the underground equipment and hoisting it to surface was under way, the work of dismantling the surface equipment was being pushed, using as large a crew as it was possible to work to advantage. Both the ore and rock permanent trestles were

torn down, as also the chutes and pockets in the shaft house. As soon as the work of dismantling was finished, cars were obtained, and the material loaded and shipped. One carload containing the heating boiler, stack, water heater from the heating plant, drill sharpener and drill forge, also the air receiver, were sent to the Hard Ore, where it has been stored in the yards. The brick building containing the heating boiler was torn down, the brick cleaned and shipped to North Lake, where they were used later in the year in the new engine house for Section 6.

The hoist and compressor were also dismantled in July, the hoist being shipped to North Lake, and the compressor to the Cliffs Shaft Mine. All material in the dry was taken out and shipped to North Lake, where it has been stored.

The various frame buildings at the Mine were all sold on the ground, and by the end of October all these buildings has been removed from the mine. The small electric pump which supplied water for the compressor and dry, from a well near the mine, was left in commission until October, in order to provide water for the steam shovel when loading ore, and also for the firm which dismantled the steel shaft house. This pump was removed and taken to North Lake in November, at which time the storage tank was also taken down, loaded and shipped to the Lake Mine.

A contract was given to the Worden-Allen Co. of Milwaukee, who erected the shaft house, to take it down again, this work being completed in November. The steam shovel from North Lake was sent to the Chase and loaded the shaft house on railroad cars. The shaft house has all been loaded and transferred to the Morris-Lloyd Mine, where it is now stored.

A contract was let for tearing down the Chase houses and moving them to the North Lake location. This work was started the last of July, and the houses were all re-erected and ready to be occupied at North Lake on the 1st of December.

The transmission line from the Morris-Lloyd to the Chase was dismantled, and all this material has been shipped to the Hard Ore and

Maas Mine.

All Company property on Section 3, has been removed, with the exception of the 56,000 tons of ore now in stock, and the stock-pile plank, together with the railroad equipment, which belongs to the L. S. & I. Ry.

WWG:FJN.

CHASE MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	IRON	PHOS.	SILICA
Chase	56.61	.385	6.99

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

	Mine		Lake Erie	
GRADE	IRON	PHOS.	IRON	MOIST.
Chase	57.50	.339	57.61	6.94

ORE STATEMENT - DECEMBER 31ST, 1915

	CHASE No. 1	CHASE No. 2	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	52,736	8,198	60,934	8,237
Output for Year,	35,044	0	35,044	72,405
Total,	87,780	8,198	95,978	80,642
Shipments,	39,059	0	39,059	19,708
Balance on Hand,	48,721	8,198	56,919	60,934
Decrease in Output,			37,361	
Decrease in Ore on Hand,			4,015	

Mine closed July 7th, 1915.

SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL TOST YEAR
Chase No. 1,	1,289	37,770	39,059	19,708
Chase No. 2,				0
Total,	1,289	37,770	39,059	19,708
Total Last Year,	19,708	0	19,708	
Increase - 98%			19,351	

CHASE MINE.

CHASE MINE.

COMPARATIVE MINING COST FOR YEAR.

	1915.	1914.	INCREASE.	DECREASE.
PRODUCT	35,044	72,405		37,361
General Expense	.059	.060		.001
Maintenance	.014	.044		.030
Mining Expense	.666	1.016		.350
Cost of Production	.739	1.120		.381
Exploratory	.111	.075	.036	
DEPRECIATIONS.				
Plant Account	.113	1.229		1.116
Equipment	.006		.006	
Total Depreciation	.119	1.229		1.110
Taxes	.074	.008	.066	
Central Office	.058	.068		.010
Miscellaneous	.080		.080	
Sundry Expense	.029	.041		.012
COST ON STOCKPILE	1.210	2.541		1.331
Loading & Shipping	.132	.036	.096	
Total Cost on Cars	1.342	2.577		1.235
Number Days Operating	154	299		145
Number Hours and Shifts	2-8hr	2-8hr		
Average Daily Product	228	242		14
COST ON STOCKPILE.				
Labor	.540	.773		.233
Supplies	.199	.347		.148
Total	.739	1.120		.381

Mine Closed permanently July 7, 1915.

CHASE MINE.

CHASE MINE.

COMPARATIVE WAGES AND PRODUCT.

	1915.	1914.	INCREASE.	DECREASE.
PRODUCT	35,044	72,405		37,361
No.Shifts and Hours	2-8hr	2-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	14	17		3
Underground	29	50		21
Total	43	67		24
AVERAGE WAGES PER DAY				
Surface	2.31	2.40		.09(3.75%)
Underground	2.74	2.83		.09(3.18%)
Total	2.59	2.72		.13(4.78%)
WAGES PER MONTH OF 25 DAYS				
Surface	57.75	60.00		2.25
Underground	68.50	70.75		2.25
Total	64.75	68.00		3.25
PRODUCT PER MAN PER DAY				
Surface	13.16	13.39		.23
Underground	6.78	4.62	2.16(4.68%)	
Total	4.48	3.43	1.05(30.%)	
LABOR COST PER TON				
Surface	.175	.180		.005
Underground	.404	.614		.210
Total	.579	.794		.215
Avg.product Breaking & Trm'g	9.63	6.33	.30	
" Wages Contract Miners	2.65	2.85		.20
" " , " Labor	2.65	2.85		.20
TOTAL NUMBER OF DAYS				
Surface	2,662½	5,408¼		2,745¾
Underground	5,167	15,688½		10,521½
Total	7,829½	21,096¾		13,267¼
AMOUNT FOR LABOR				
Surface	6,148.54	13,000.34		6,851.80
Underground	14,156.54	44,463.16		30,306.62
Total	20,305.08	57,463.50		37,158.42

Prop. Surface to Underground Men-
1915 - 1 to 2.01
1914 - 1 to 2.89
1913 - 1 to 3.59

Mine closed permanently Julym7, 1915.

NOTE:

Oct.1,1914 Wage rates reduced 10% from schedule adopted February 1, 1913.

Aug.1,1915 Wages restored to scale in effect prior to October 1, 1914.

Avg.wages 9 mos. Jan.1 to Sept. 30,1914 ..... 2.78
" 10 " Oct.1,1914, to Aug.1,1915 ... 2.57
Decrease during 10 mo.period ..... .21
Percent " " " 7.55

CHASE MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31,1915.

KIND.	LINEAL FEET.	AVG.PRICE PER FOOT.	AMOUNT 1915.	AMOUNT 1914.
6" to 8" Timber				25.87
8" to 10" "				52.08
10"to 12" "	364	.06½	23.03	144.43
12"to 14" "				31.36
Total 1915	364	.06½	23.03	
Total 1914	5,310	.048		253.74
5' Lagging				8.00
7' "				16.94
8' "				8.80
Total Lagging				33.74
Poles				37.63
Total 1915	0			
Total 1914	10,342			71.37

	1915.	1914.
Product	35,044	72,405
Feet Timber per ton of ore	.0104	.073
Feet of Lagging " "		.088
Feet of Lagging per foot of Timber		1.2
Cost per ton for Timber	.0007	
Cost per ton for Timber, Lagging & Poles	.0007	.0122
Equivalent of stull timber to Board Measure	739	12,385
Feet of Board Measure per ton of ore	.0211	.639
Total cost for Timber, Lagging & Poles 1915		23.03
" 1914		325.11
" 1913		669.49

Mine Closed permanently July 7, 1915.

CHASE MINE.

CHASE MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICES.	AMOUNT 1915.	AMOUNT 1914.
40% Powder Gelatin	200	.10	20.00	
40% " RedCross	50	.09½	4.75	70.00
50% " "	15,250	.10½	1,601.25	4,957.50
80% " Giant	1,950	.14	273.00	1,885.55
Total Powder	17,450	.11	1,899.00	6,913.05
Fuse	37,800	4.01	152.57	510.77
Caps	6,500	6.78	44.12	126.61
Cap Crimpers	6	.25	1.50	5.25
Total Fuse,Etc.			198.19	
Total Explosives			2,097.19	7,555.68
Product			35,044	724.05
Pounds Powder per ton of ore			.4979	.8492
Cost per ton for Powder			.0542	.0955
" Fuse,Caps,Etc.			.0056	.009
" All Explosives			.0598	.0954
Avg. Price per lb. for Powder			.11	.11¼

UNWATERING AND EXPLORING OLD DEXTER MINE.

At the close of 1914 there was one drill operating underground on the 8th level of the old Dexter Mine. Hole No. 8, a vertical hole, located at the end of the crosscut North of the main ore stope, had already been drilled to a depth of 138 ft., when drilling was resumed on Dec. 21st, 1914. Drilling was continued until Dec. 23rd, at which time the hole was 254 ft. deep, when it was necessary to stop drilling to ream and case the hole down to a depth of 106 ft. where it was caving. Drilling was again resumed on Jan. 5th, and was continued until January 14th, when the hole was stopped at a depth of 319 ft. The first of the year the hole was in quartzite, and continued in this material to a depth of 294 ft., where it struck the hard ore jasper, in which the hole was continued for 23 ft. The hard ore jasper was cherty and very hard, the average progress being about two feet per shift. It was originally planned to continue this hole to a depth of 500 ft., but owing to the fact that the material encountered here was not encouraging, together with the expense of drilling this hard material, rendered it advisable to abandon work here.

This completed all exploring work which had been planned, and as this hole failed to show any ore, it was decided to remove the equipment from the mine. The work of dismantling the pumps was started on Jan. 15th, and all this material was removed from the shaft by Jan. 21st, but owing to severe winter weather, it was decided to dismantle the surface equipment in the summer, when this work would be done more cheaply.

The new pump which was purchased for this work, has been sold to the Francis Mine. All pipe used for air lines and discharge lines, was purchased by the Morris-Lloyd Mine. The temporary engine house was sold on the ground, and the head frame was dismantled and sold to the Morris-Lloyd. All surface equipment, etc., was cleaned up in the summer at the time that the Chase Mine was being dismantled.

I beg to submit my report on the work done in the Gwinn District for the year ending December 31st, 1915:

I have taken up the various subjects under the following heads, viz:

GENERAL REMARKS

AUSTIN MINE

STEPHENSON MINE

PRINCETON MINE

GWINN MINE

JOPLING MINE

FRANCIS MINE

MACKINAW MINE

GARDNER MINE

GENERAL SURFACE

ACCIDENTS

ANALYSIS OF COST SHEETS

*** *** ***

GENERAL REMARKS

The principal work in the district has been that of the mines.

There was no work done at the Austin Mine during the year.

The Stephenson Mine worked four eight hour shifts per week from January 1st to August 1st, at which time the mine was put back on six eight hour shifts per week and so continued the balance of the year.

The work at the Princeton was confined to repairing the main level drifts and sinking No. 2 Shaft.

The Gwinn Mine worked two eight hour shifts throughout the year.

Work was resumed at the Francis Mine January 25th and was continued throughout the balance of the year. The work being confined to surface improvements and sinking the Francis Shaft.

There was no work done at the Jopling Mine during the year.

There was no work done at the Mackinaw Mine during the year.

There was no work done at the Gardner Mine during the year.

The product for the different mines for the year was as follows:

Stephenson Mine,	207,724	tons,
Gwinn "	127,300	"
Princeton "	122	"
The total product for the year was	335,146	"

Conditions in the district were very much improved as the season advanced. At the beginning of the year the only operating mines were the Gwinn and Stephenson. The opening of the Francis gave work to a considerable number and the force at the Gwinn Mine increased steadily during the year. On August 1st the Stephenson ruming full time helped.very materially. The total number of men employed by the Company in the district December 31st being 524 as against 382 a year ago.

Practically all of the available houses in the district are now occupied.

Very few changes occurred in the Gwinn Townsite during the year.

AUSTIN MINE

There was no work done at the Austin Mine during the year.

AUSTIN MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	
Austin Bessemer,	No Shipments
Austin,	" "
Austin No. 2,	" "

ORE STATEMENT - DECEMBER 31ST, 1915

	AUSTIN BESSEMER	AUSTIN	AUSTIN No.2	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	542		48,011	48,553	79,044
Output for Year,	0	0	0	0	0
Total	542	0	48,011	48,553	79,044
Shipments,	0	0	0	0	30,491
Balance on Hand,	542	0	48,011	48,553	48,553

Mine idle during 1914 & 1915.

SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Austin Bessemer,				13,202
Austin,				440
Austin No. 2,				16,849
Total,	0	0	0	30,491
Total Last Year,				30,491

STEPHENSON MINE

The product for December was as follows:

Stephenson Bessemer,	6,361	tons,
Stephenson,	224	"
Stephenson No. 2,	18,570	"
Total,	25,155	"

The product for the year was as follows:

Stephenson Bessemer,	66,600	"
Stephenson,	224	"
Stephenson No. 2,	140,900	"
Total Ore,	207,724	"
Rock,	27,246	"
Total Ore and Rock,	234,970	"

60,831 tons were shipped from Stephenson Bessemer Stockpile,

15,770 " " transferred to Stephenson from Stockpile,

129,597 " " shipped from Stephenson No. 2 stockpile,

28,830 " " " " " Bessemer Pocket,

8,130 " from Stephenson Bessemer pocket were transferred to Stephenson.

75 " " " " " " " " Stephenson No. 2.

224 tons were shipped from Stephenson pocket.

THE MINE

The work for the year consisted in developing sub. levels above the 5th level, extending the 4th level drift on Southwest side of the deposit to the boundary, thence West along the boundary, extending the rock tramming drift on Southwest side of the 5th level and the 5th level foot wall drift on the Southeast side of the deposit. A hanging wall drift was also started on the West side of the 5th level.

On the 6th level the plat and pockets were completed and main 6th level cross-cut extended to the Southeast.

The mining was principally confined to the main 4th level and 1st and 2nd sub. levels below the 4th level.

The estimated ore in sight December 31st, 1915, was 1,044,429 tons as against 899,872 tons a year ago.

THIRD LEVEL

WORK FOR THE YEAR

Late in the year a raise was put up from the Southeast side of the 4th level by No. 41 Contract and from the top of this raise No. 49 contract cut out at the elevation of the 3rd level and drifted Northeast 15 feet to foot, this cross-cut being about 30 feet Southeast of the extreme Southeast end of the 3rd level. No. 49 then came back to its raise and drifted Southeast 78 feet.

WORK FOR DECEMBER

No. 49 Contract,

No. 49 extended its drift Northeast 56 feet.

THIRD SUB. BELOW THIRD LEVEL

WORK FOR THE YEAR

There is no work being done on this sub. level at the present time. In the early part of the year Contract No's 15 and 10 removed the balance of the ore left on this sub. level North and East of the limit of mining.

FOURTH LEVEL

WORK FOR THE YEAR

On the Northeast side of the deposit the greater part of the ore has now been mined North and East of the limit of mining. A small pillar still remains Southwest of X Raise and ore along the foot North and East of M Raise. At the close of last year no ore had been mined West of No. 50, 36 and P_2 Raises. Practically all of the ore between the above raises North and West to the limit of mining was removed by Contract No's 3, 4, 6, 7, 11, 16, 17, 25, 26, 27, 28, 29, 32, 35, 36, 40, 41, 42 and 18.

On the Southwest side of 4th level No. 30 Contract extended the hanging wall drift 65 feet South to the boundary and then drifted Westerly along the boundary 200 feet.

No. 34 Contract started at a point 35 feet North of No. 30's last year's breast and drifted Northwesterly 55 feet and holed to the foot wall drift.

No. 46 contract started at a point about 15 feet South of winze to 5th level and drifted West 55 feet and holed to hanging wall drift.

WORK FOR DECEMBER

No. 16 and 24 Contracts,

No's 16 and 24 removed pillar West of No. 32 Raise.

No. 47 Contract, No. 46 Raise,

No. 47 finished stoping pillar Northeast of No. 46 Raise.

No. 46 Contract,

No. 46 extended its last months drift 45 feet and holed into old hanging wall drift.

FIRST SUB. BELOW 4TH LEVEL

WORK FOR THE YEAR

On the Southwest side of the deposit the greater part of the ore has now been mined from No. 4 raise South and West to 10_A Raise. Contract No's 14, 45, 44, 12 and 13 have been working in this end of the sub. level the greater part of the year mining the pillars that were left between 10_A and No. 10 Raises. No. 30 Contract after finishing its drift to West along the boundary on the 4th level came down on 1st sub. below 4th and starting 30 feet West of No. 12 Raise drifted West 50 feet, thence Southwest 55 feet, thence Southerly 140 feet to boundary, thence Westerly 60 feet along the boundary and then from end of its drift put up raise to 4th level. It then moved to a point 50 feet North of the boundary and drifted West 17 feet, then came back to its main drift and moving 40 feet Northeast drifted 14 feet.

On the Northeast side of the deposit the 1st Sub. below the 4th level was developed and greater part of the ore mined from No. 57 - 50 and 38 Raise Southeast to a point about 25 feet Northwest of No. 42 Raise. This work being

done by Contracts No's 36, 3, 22, 1, 6, 28, 15, 21, 42, 40 and 17. This sub. level is also being developed on the foot side from No. 34, 33, 35, 52, 36, 37, and 38 raised by Contracts No's 32, 31, 11, 40 and 25.

No. 17 Contract extended the hanging wall drift from No. 56 Raise Southwesterly 115 feet and holed to hanging wall drift that was driven Northeast from No. 2 raise by No. 7 Contract.

No. 3 Contract started at a point 15 feet West of No. 56 Raise and drifted Northeast 120 feet and holed to drift from No. 35 Raise driven by No. 11 Contract.

No. 17 Contract started at a point 100 feet Southwest of No. 3's drift and is driving a drift to the Northwest to hole to No. 46_b Raise being put up from 5th level.

No. 29 Contract cut out from the top of No. 46_a Raise and drifted Southwest 38 feet, then cut out on Northeast side of Raise and drifted Northeast 12 feet.

Contract No's 33, 8, 24 and 15 developed and mined all the ore from a point 60 feet East of No. 44 Raise Southeast to No. 55 Raise.

WORK FOR DECEMBER

No. 30 Contract, No. 12 Raise,

No. 30 drifted East along the boundary 20 feet and holed to raise put up from the 2nd Sub. below 4th level. It then moved to a point 50 feet North of the boundary and drifted 17 feet, then came back to main drift and moved 40 feet North and drifted Northeast 12 feet. It then came back to main drift and moved 40 feet to Northwest and drifted due West six feet and holed to No. 14 raise put up from the 5th level.

No. 14 and 45 Contracts, No. 12 Raise,

No. 14 and 45 are stoping pillar North of No. 12 Raise.

No. 44 Contract, No. 10 Raise,

No. 44 has been stoping pillar West of No. 10 Raise.

No. 50 Contract, No. 3 Raise,

No. 50 started 35 feet Southwest of No. 3 Raise and drifted West 20 feet and holed to old workings. It then caved back its drift re-

moving pillar on South as it returned.

No. 42 Contract, No. 2 Raise,

No. 42 started 55 feet Southwest of No. 2 Raise and drifted Northwest 35 feet to foot, thence North along the foot 35 feet.

No. 17 Contract, No. 2 Raise,

No. 17 extended its drift 45 feet.

No. 31 Contract, No. 33 Raise,

No. 31 continued its drift Northwest 15 feet to foot and sliced back to North side of its drift to main drift.

No. 32 Contract, No. 34 Raise,

No. 32 holed into No. 31 drift, then moved back and drifted North 20 feet to foot. It then took a second slice for 20 feet and is now stoping ore up on foot.

No. 40 Contract, No. 52 Raise,

No. 40 extended its drift Northwest 35 feet to foot. Then sliced back on either side of its drift for 35 feet.

No. 29 Contract, No. 46_a Raise,

No. 29 cut out from the top of its raise and drifted Northeast 18 feet, then came back to raise and drifted Southwest 39 feet.

No. 27 Contract, No. 34 Raise,

No. 27 drifted South from No. 34 Raise 50 feet, thence West 17 feet and holed to No. 45 Raise.

No. 11 Contract, No. 35 Raise,

No. 11 extended its drift 30 feet to Southeast and holed to No. 3 Contract, then took slice to Northeast for 18 feet and holed to old workings.

No. 3 Contract, No. 50m Raise,

No. 3 holed its drift into No. 11 drift, then started just North of cross-cut to No. 50 Raise and took slice on the West side of its drift for 35 feet.

No. 1 Contract, No. 50 Raise,

No. 1 started at the junction of cross-cut to No. 50 Raise and No. 3's drift and took slice to Northeast for 25 feet.

No. 26 Contract, No. 50 Raise,

No. 26 started at No. 50 Raise and drifted North 47 feet.

No. 25 Contract, No. 36 Raise,

No. 25 started 100 feet South of No. 36 Raise and drifted Southeast 55 feet.

No. 23 and 28 Contracts, No. 38 Raise,

No's 23 and 28 started 25 feet Northeast of No. 38 Raise and drifted Southeast 50 feet and are now caving back their drift, removing small pillars on either side of drift as they return.

No. 6 Contract, No. 39 Raise,

No. 6 finished removing pillar near No. 49 Raise and is now taking a slice on West side of No. 28's drift.

No. 35 Contract, No. 65 Raise,

No. 35 extended its drift to cave and has now started new drift Northeast from No. 65 Raise.

No. 36 Contract, No. 57 Raise,

No. 36 drifted 43 feet to caved ground and then caved back 15 feet.

No. 22 Contract, No. 50 Raise,

No. 22 drifted Northeast from No. 50 Raise 50 feet.

No. 15 and 21 Contracts, No. 53 Raise,

No's 15 and 21 removed pillar West of No. 53 Raise.

SECOND SUB. BELOW 4TH LEVEL

WORK FOR THE YEAR

No. 9 Contract extended its drift from No. 9 Raise 200 feet West, thence Southwest 90 feet to the boundary and 18 feet West along the boundary. It then moved to cross-cut from No. 13 Raise and drifted West 65 feet

No. 4 Contract started in No. 9's drift opposite cross-cut to No. 13 Raise and drifted South 84 feet to boundary and then drove cross-cut. from No. 9's drift to No. 12 Raise. It then moved to No. 7 Raise and drifted West from Raise 60 feet to foot and is now mining ore to the North along the foot.

No. 43 Contract started at No. 5 Raise and drove cross-cut 72 feet

Northwest to foot, then drifted South along the foot 50 feet and then stoped ore up on foot to oldmworkings.

No. 37 Contract drove cross-cut from No. 11 Raise 65 feet Southwest to foot, then drifted Southwest along the foot 20 feet and holed to foot wall drift from No. 10 Raise and stoped ore up on foot, it also took four slices to the North for a distance of 50 feet each.

No. 34 Contract started in hanging wall drift at a point 85 feet North of No. 8 Raise and drifted Northwest 45 feet, thence Southwest 20 feet and holed to No. 10 Raise. It then came back 20 feet and drifted Northwest 60 feet to foot and stoped ore from foot.

No. 19 Contract cut out from top of No. 15 Raise on Section 29 and drifted Northerly 90 feet.

No. 45 Contract started at a point 45 feet Southeast of No. 9 Raise and drove cross-cut 30 feet Southwest to boundary.

No. 51 Contract started 55 feet Northwest of No. 4 Raise and extended hanging wall drift 55 feet to the North.

On the Southeast side of the deposit No's 27 and 38 cut out from No's 63 and 59 raises and developed and mined all the ore on 2nd sub. below 4th level between the above raises.

No. 38 also drifted Southeast from No. 59 Raise 55 feet and holed to cross-cut from No. 51 Raise.

No. 8 Contract after it finished mining on the 1st sub. below 4th level cut out from No. 51 Raise and drifted Northeast 15 feet, thence Southeast 60 feet and holed to cross-cut from No. 61 Raise.

No. 10 Contract cut out from No. 61 Raise and drove cross-cut 30 feet to Southwest and holed to No. 55 Raise. It then moved 20 feet Northeast and drifted Southeast 120 feet, thence Northeast 20 feet and Northwest 50 feet. It then started at a point 110 feet Southeast of No. 61 Raise and caved back its drift for 70 feet stoping ore from both sides of its drift as it returned. It then started 40 feet Southeast of Raise and drifted Southwest 35 feet.

No. 33 Contract cut out from top of No. 64 Raise and drifted North-

east 70 feet, then came back 45 feet and drifted Northwest 75 feet, thence Southwest 30 feet, thence Southeast 15 feet.

No. 54 Contract cut out from top of No. 66 Raise and drifted South about 40 feet.

WORK FOR DECEMBER

No. 9 Contract, No.13 Raise,

No. 9 extended its drift 38 1/2 feet West along the boundary.

No. 12 Contract, No. 13 Raise,

No. 12 extended its drift North 50 1/2 feet.

No. 13 Contract, No. 13 Raise,

No. 13 finished mining on 1st sub. below 4th level. Then came down and cut out on East side of No. 13 Raise and drifted East 20 feet, thence Northeast 39 feet.

No. 34 Contract, No. 10 Raise,

No. 34 extended its drift 25 feet to cave and is now stoping ore near the end of its drift.

No. 37 Contract, No. 11 Raise,

No. 37 took two slices Northwest for 40 feet each.

No. 4 Contract, No. 7 Raise,

No. 4 spent the greater part of the month stoping on foot at the edge of its cave.

No. 43 Contract, No. 5 Raise,

No. 43 started 45 feet Northwest of No. 5 Raise and drifted Northwest 50 feet, then came back to main cross-cut and drifted West 15 feet.

No. 51 Contract, No. 4 Raise,

No. 51 extended its drift 35 feet to North and from end of its drift put up raise to 1st sub. below 4th level. Then starting opposite No. 4 Raise drifted West 15 feet.

No. 54 Contract, No. 66 Raise,

No. 54 extended its drift 37 feet.

No. 8 Contract, No. 60 Raise,

No. 8 extended its drift 20 feet holing into No. 10 drift. Then started 40 feet Southwest from turn to raise and drifted 20 feet to Southwest.

No. 10 Contract, No. 61 Raise,

No. 10 started 35 feet Southeast of No. 61 Raise and drifted Southwest 34 feet and is now caving back removing ore on South side of drift as it returns.

No. 38 Contract, No. 59 Raise,

No. 38 started just East of its raise and drifted East 30 feet to foot, thence North along the foot 23 feet.

No. 33 Contract, No. 64 Raise,

No. 33 extended its drift Southwest 30 feet, thence Southeast 28 feet and holed to old No. 10 drift, then stoped up on foot and holed to No. 10 stope.

No. 18 Contract, No. 64 Raise,

No. 18 started at No. 64 Raise and drifted West 20 feet.

FIFTH LEVEL

WORK FOR THE YEAR

During the year seventeen raises were put up from the 5th level on the Northeast side of the deposit to develop the sub. levels above the 5th level. Most of this work being done by contract No's 39, 21, 45 and 5.

On the Southwest side of the deposit two raises were put up to the elevation of the 2nd sub. below 4th level on Section 29 by contract No's 19 and 39. No. 17 raise was put up from the rock tramming drift 1st sub. below 4th level by contract No's 39 and 53.

Early in the year No. 5 Contract started at a point 40 feet Southeast of No. 44 Raise and drove a rock tramming drift 300 feet to Southeast, thence East 300 feet, thence Southeast 60 feet.

A hanging wall drift was started by No. 39 Contract from a point 35 feet Southwest of No. 5 Raise and extended by No. 7 Contract 110 feet to Southeast. It then came back 45 feet from its breast and drifted Northeast

72 feet.

No. 19 Contract started five feet West of No. 12 Raise and extended the rock drift 100 feet to the West, thence Southwest 45 feet and South 105 feet.

In the early part of the year No. 19 Contract also extended the rock tramming drift North of No. 2 Raise 23 feet to the Southeast.

No. 6 cross-cut on Northeast side of 5th level was extended by No. 22 Contract 34 feet.

No. 5 cross-cut on Northeast side of 5th level was extended 38 feet by No. 5 Contract.

WORK FOR DECEMBER

No. 53 Contract,

No. 53 extended No. 14 Raise 28 feet and holed to 1st Sub. below 4th level.

No. 19 Contract,

No. 19 extended its rock drift 34 feet and then came back 20 feet from its breast and is now putting up No. 15 Raise.

No. 7 Contract,

No. 7 extended its drift 46 1/2 feet.

No. 41 Contract,

No. 41 completed its raise in the early part of the month and repaired the main cross-cut from shaft beyond the contact of the Slate and Ore for the balance of the month.

No. 39 Contract,

No. 39 extended No. 46_b Raise 21 1/2 feet and is now putting up a raise from No. 5 drift at a point 56 feet East of No. 66 Raise. This raise is now up 26 1/2 feet above the back of the 5th level.

No. 5 Contract,

No. 5 extended its drift to Southeast 54 feet.

SIXTH LEVEL

WORK FOR THE YEAR

At the close of last year the work of cutting 6th level plat had been started. The plat had been excavated opposite the skip compartment, tail drift

extended to a point 25 feet West of shaft and drift for plat East of shaft extended to a point 120 feet from the shaft.

In the early part of this year No. 20 Contract extended the above drift 40 feet to the East and then sliced back to shaft on both North and South sides of its drift, thus completing the excavation for plat. It then excavated for pockets and also extended tail drift 50 feet Northwest. It then came back to the East end of the plat and drove the main 6th level cross-cut 677 feet to the Southeast.

WORK FOR DECEMBER

No. 20 Contract,

No. 20 extended its rock drift 125 feet.

UNDERGROUND IN GENERAL

Late in the year a raise was put up from the Southeast side of the 4th level to the elevation of the main 3rd level and about 30 feet Southeast of the old 3rd level workings. A drift was driven from the top of this raise 15 feet to the Northeast at which point it encountered the foot, a drift was then driven from the Southeast side of the raise 78 feet to the Southeast. Both the raise and the drifts so far have only cut lean ore.

In the early part of the year the balance of the ore was removed that was left along the limit of mining on the 3rd sub. below the 3rd level.

On the East side of the main 4th level practically all the ore has now been mined North and East of the limit of mining.

On the Southwest side of the 4th level the drift that was being driven along the hanging, at the close of the year, was extended in ore about 75 feet to the South at which point the hanging took a sharp turn to the West, the drift was then extended Westerly along the boundary 190 feet to the foot.

At the close of last year very little work had been done on sub. levels below the 4th level on the Northeast side of the deposit. During the year the 1st sub. below the 4th level was developed and greater part of the ore mined in the area between No. 57, 50 and 37 raises on the Northwest to a point about 25 feet Northwest of No. 42 Raise.

All the ore was also mined on this sub. level from a point about 60 feet East of No. 44 Raise Southeast to No. 55 Raise.

The area Northwest of No. 57, 50 and 32 raises is now being developed and mined from drifts driven along the foot and hanging and from cross-cuts driven from the above drifts.

On the Southwest side of the 1st sub. below the 4th level the greater part of the ore has now been mined. The principal ore that remains consists of pillars North and West of No. 3 Raise and South and West of No. 12 Raise.

On the Southwest side of the 2nd sub. below 4th level the drift from No. 9 Raise was extended 200 feet to the West to the slate foot. It was then driven Southerly along the foot 90 feet to the boundary, thence Westerly along the boundary 18 feet at which point it was cut off by the foot and stopped.

Mining on the Southwest side of this sub. level is now being carried on in the area between No. 5 and No. 10 Raises.

A cross-cut was also driven from the top of No. 15 Raise on C. & N. W. Lease Section 29. This cross-cut was driven in the Jasper about 90 feet to the North at which point it struck the ore and was stopped.

On the Southeast side of the deposit No. 59 and 63 Raises were put up from 5th level to the hanging and cross-cuts driven Northeast to the foot, the average width of the ore in this area being only about 50 feet. The ore at 61 Raise only shows a width of 25 feet and entirely pinches out at No. 64 raise, while the cross-cut driven South from No. 66 Raise again shows a width of about 25 feet. A raise is now being put up at a point about 55 feet East of No. 66 Raise to explore the deposit at this point.

The fifth level foot wall drift on Southeast side of the deposit was taking weight so badly that it was decided to extend the rock tramming drift. This drift was started about 15 feet North of the contact and about 40 feet South of No. 44 Raise and was extended to the Southeast in slate for 130 feet and then passed through about 25 feet of Jasper to the Arkose and was continued to the Southeast in Arkose 160 feet at which point it again struck the Slate. The drift was then turned to the East passing through 85

feet of Slate to the Granite and was then extended due East in the Granite for 200 feet. The drift was then turned to the South to explore the ground in this end of the deposit.

No's 5 and 6 cross-cuts on Northeast side of 5th level were also extended during the year. No. 5 cross-cut was extended 38 feet in Jasper to the contact, and No. 6 cross-cut was extended 34 feet in ore.

A hanging wall drift was started on Southwest side of the 5th level. This drift was started from the foot wall drift at a point 35 feet Southwest of No. 5 Raise. A cross-cut was driven in the ore 115 feet to Southeast to the hanging. A turn out was then made about 40 feet back from the hanging and drift extended Northeasterly along the contact.

In the extreme Southwest end of the 5th Level the rock tramming drift was extended to the West in slate for 95 feet. It then passed about 10 feet of Granite and struck the Greywacke. The drift was then turned due South and extended 115 feet in Greywacke to the boundary. Raises are now being put up from this drift to mine the ore above the 5th level in this end of the deposit.

The work on 6th level consisted in completing the excavation for platt and pockets, installing pockets and extending the main cross-cut to the Southeast in Granite. The present breast of the cross-cut is now 837 feet from the shaft.

The work of putting up a water raise will be started early in the year. This will be a two compartment raise and will be holed into the winze from 4th level about five feet above the floor of 5th level and will give a second exit from 6th level.

The permanent tracks were laid on 6thnlevel plat and track ballasted with crushed rock.

The C. & N. W. Lease, N½ of the N.W.¼ Section 29 - 45 - 25, adjoins the Stephenson Mine on the South and is a continuation of the Stephenson deposit. In order to develop the Section 29 ore it has required a great amount of development work on the extreme Southwest end of the 5th level Stephenson and the opening of the 6th level three or four years earlier than would other wise have been necessary. This work has all been charged to the Stephenson

Mine and shows as a considerable item in the cost of production.

The water pumped at the Stephenson Mine during the month of December was 65,525,900, or an average of 1423 gallons per minute.

STEPHENSON SURFACE

WORK FOR THE YEAR

The ground around the Captains Office was graded and seeded down.

A short sewer line was laid from the Northeast corner of the Stephenson dry and connected with the concrete launder just South of the shaft. This line takes care of the sewage from the mine office, captains office and water from the dry building.

A new wood launder was installed along the South side of the dry building and connected with the new sewer line. This launder takes care of the water from the dry building.

All of the Stephenson Bessemer ore in stock was shipped this season. This stocking ground Southwest of the shaft is now being used to stock the Stephenson No. 2 grade, while to its West is the stocking trestle for the C. & N. W. Section 29 ores. The Stephenson Bessemer ore is being stocked along the West side of the East stocking ground.

Ground was graded along the Northwest end of the West stocking ground to make room for the C. & N. W. Stockpile.

Nine single temporary bents were erected for Bessemer grade on the East stocking ground. Five new permanent bents and 20 double temporary bents were erected for No. 2 grade on West stocking ground.

Eleven permanent bents and 22 single temporary bents were erected for C. & N. W. trestle on the West stocking ground.

Congested stocking grounds interfered somewhat with handling of product and added to the expense of stocking the ore. This has embarrassed the Stephenson Mine for a number of years and a material saving could be made if the product stocked could be disposed of yearly. During the past shipping season the high phosphorus ore was dumped on stockpile and from thence will be loaded into cars, this entailing not only the cost of stocking but also adds the reloading charge. It is hoped this condition will not prevail this coming season.

A considerable tonnage was shipped this season from the Stephenson Mine stockpiles. During most of the shipping season a switch engine was provided which cut down the delays at the shovel somewhat as it permitted loading during practically all of the day, except when it was taking cars up the grade at the mine. Before this switch engine was provided most of the loading had to be done between the hours of 9:30 and 4, so as to permit the engine to make up its train and take its loads to Marquette that evening. At this mine the railroad grade is very heavy, permitting only four or five cars to be handled at one time, so that practically half of the time is taken in switching. If one switch engine could devote all of its time to the shovel, while another engine takes the loads over the grade and makes up the trains, the quantity handled could be almost doubled.

STEPHENSON MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	IRON	PHOS.	SILICA	MANG.
Stephenson Bessemer,	61.65	.052	6.18	
Stephenson,	61.83	.075	5.61	.988
Stephenson #2	60.89	.574	4.19	1.061

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

	Mine			Lake Erie	
GRADE	IRON	PHOS.	MANG.	IRON	MOIST.
Stephenson Bessemer,	All Mixed				
Stephenson,	"	"			
Stephenson #2,	59.14	.587	.877	59.08	14.11

ORE STATEMENT - DECEMBER 31ST, 1915

	STEPHENSON BESSEMER.	STEPHEN-SON.	STEPHENSON No.2.	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	56,400		404,781	461,181	340,369
Stockpile Overrun for Year,	4,395			4,395	
Output for Year,	38,229	24,125	140,975	203,329	214,608
Total,	99,024	24,125	545,756	668,905	554,977
Shipments,	89,661	24,125	129,672	243,458	93,796
Balance on Hand,	9,363	0	416,084	425,447	461,181
Decrease in Output-3%,				6,884	
Decrease in Ore in Hand,				35,734	

1915 - 1-8 Hr. Shift July 1st to July 31st-4 days per week only.
1-8 " " Aug. 1st to Dec. 31st-6 " " "

1914 - 2-8 Hr. Shifts Jany. 1st to May 31st-6 days per week only.
1-8 " " June 1st to Sept. 30th-6 days per week only.
1-8 " " Oct. 1st to Dec. 31st-4 days per week only.

STEPHENSON MINE

SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR	
Stephenson Bessemer,	28,830	60,831	89,661	60,724	
Stephenson,	8,355	15,770	24,125	9,858	
Stephenson No. 2,	75	129,597	129,672	23,214	
Total,	37,260	206,198	243,458	93,796	
Total Last Year,	42,047	61,749	93,796		
Increase - 160%			149,662		

STEPHENSON MINE.

COMPARATIVE MINING COST PER YEAR.

	1 9 1 5.	1 9 1 4.	INCREASE.	DECREASE.
PRODUCT	207,724	214,608		6,884
General Expense	.131	.158		.027
Maintenance	.126	.167		.041
Mining Expense	.929	1.120		.191
Cost of Production	1.186	1.445		.259
DEPRECIATIONS.				
Plant Account	.068	.103		.035
Equipment	.001	.002		.001
Total Depreciations	.069	.105		.036
Taxes	.083	.031	.052	
Central Office	.055	.079		.024
Supply Inventory	.002	.002		
Miscellaneous	.029	.013	.016	
Sundry Expense	.061	.032	.029	
COST ON STOCKPILE	1.485	1.707		.222
Loading and Shipping	.030	.012	.018	
Total Cost on Cars	1.515	1.719		.204
No.Days Operating	249	279		30
No.Shifts and Hours	1-8hr-4dys wk-121 1-8hr-6dys wk-128	2-8hr-125 1-8hr-154		
Avg.Daily product	834	769		65
COST OF PRODUCTION				
Labor	.742	.943		.201
Supplies	.444	.502		.058
Total	1.186	1.445		.259

STEPHENSON MINE.

COMPARATIVE WAGES AND PRODUCT.

	1915.	1914.	INCREASE.	DECREASE.
PRODUCT	207,724	214,608		6,884
No.Shifts and Hours 1-8hr-4da-wk-	121	2-8hr	125	
1-" 6da "	128	1-8"	154	
AVERAGE NUMBER MEN WORKING				
Surface	56	62		6
Underground	153	184		31
Total	209	246		37
AVERAGE WAGES PER DAY				
Surface	2.38	2.48		.10(4.03%)
Underground	2.81	2.79	.02(.71%)	
Total	2.69	2.70		.01(.37%)
WAGES PER MONTH OF 25 DAYS				
Surface	59.50	62.00		2.50
Underground	70.25	69.75	.50	
Total	67.25	67.50		.25
PRODUCT PER MAN PER DAY				
Surface	13.41	11.83	1.58(13.%)	
Underground	5.41	4.11	1.30(32.%)	
Total	3.86	3.05	.81(26.%)	
LABOR COST PER TON				
Surface	.178	.210		.032
Underground	.519	.678		.159
Total	.697	.888		.191
Avg. Product Breaking & Trm'g	9.61	7.49	2.12	
" Wages Contract Miners	2.98	2.92	.06	
" " " Trammers	0	0		
" " Labor	2.98	2.92	.06	
TOTAL NO. OF DAYS				
Surface	15,494	18,156½		2,662½
Underground	38,378¾	52,205½		13,826¾
Total	53,872¼	70,362		16,489¼
AMOUNT FOR LABOR				
Surface	36,923.96	45,031.16		8,107.20
Underground	107,869.36	145,548.20		37,678.84
Total	144,793.32	190,579.36		45,786.04

Prop. Surface to Underground Men-
1915-1 to 2.73*
1914-1 to 2.88
1913-1 to 313
1912-1 to 4.69
1911-1 to 4.18

* Decrease due to reduction to 4 days a week, as quite a number of regular surface men still worked 6 days a week.

NOTE: Oct.1,1914, Wage rates reduced 10% from schedule adopted Feb.1,1913.
Aug.1,1915, Wages restored to scale in effect prior to Oct.1, 1914.

Avg.wages 9 mos. from Jan.1,to Sept.30,1914 ..... 2.74
" " 10 "m " Oct.1,1914, to Aug.1,1915, . 2.56
Decrease during 10 month period ..... .18
Percent " " " 6.57

STEPHENSON MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31,1915.

KIND.	LINEAL FEET.	AVG.PRICE PER FOOT.	AMOUNT 1915.	AMOUNT 1914.
6" to 8" Timber	7,266	.02	145.32	20.72
8" to 10" "	33,118	.0398	1,317.58	2,309.24
10" to 12" "	27,510	.0588	1,616.98	3,002.36
12" to 14" "	13,032	.0832	1,084.04	1,245.92
14" to 16" "	4,146	.0866	359.05	
Total Timber 1915	85,072	.0534	4,522.97	
Total Timber 1914	122,924	.0535		6,578.24
5' Lagging	477,300	.448	2,139.95	2,591.00
7' "	48,859	.550	268.67	121.30
8' "	291,776	.460	1,345.36	1,500.00
Total Lagging	817,935	.459	3,753.98	4,212.30
Poles	154,650	.88	1,366.43	1,571.59
Total 1915	972,585	.526	5,120.41	
Total 1914	1,017,114	.568		5,783.89

	1915.	1914.
Product for year	207,724	214,608
Feet timber per ton of ore	.409	.572
Feet of Lagging "	3.94	3.962
Feet of Lagging per foot of Timber	9.61	6,925
Cost per ton for Timber	.0218	.031
" Lagging	.0181	.020
" Poles	.0066	.007
" Timber, Lagging & Poles	.0465	.058
Equivalent of stull timber to Board measure	231,834	298,105
Feet of Board Measure per ton of ore	1.116	1.388
Total cost for Timber, Lagging & Poles, 1915		9,643.38
" 1914		12,362.13
" 1913		15,053.54
" 1912		11,897.82
" 1911		9,696.65
" 1910		7,855.24
" 1909		5,428.62
" 1908		4,918.31

STEPHENSON MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICES.	AMOUNT 1915.	AMOUNT 1914.
30% Powder	5,300	.088	466.40	1,200.67
40% "	23,981½	.095	2,278.24	71.25
50% "	17,150	.105	1,800.75	4,751.89
80% "	4,100	.14	574.00	496.00
Total Powder			5,119.39	6,519.81
Fuse	168,100	.442	743.45	802.26
Caps	43,690	.83	362.62	348.76
Cap Crimpers	37	.25	9.50	10.50
Total Fuse, Etc.			1,115.57	1,161.52
Grand Total			6,234.96	7,681.33
Product			207,724	214,608
Cost per ton for powder			.0246	.0304
" fuse,caps,etc.			.0054	.0054
" explosives			.0300	.0358
Pounds of Powder per ton of ore			.243	.293
Avg. Price per pound for powder			.1013	.1038

PRINCETON MINE

The product for the year was as follows:

Cambridge,	122	tons,
Rock,	2,711	"
Total Ore & Rock,	2,833	"

17,171 tons were shipped from Stockpile.

THE MINE

WORK FOR THE YEAR

The work at the Princeton Mine was confined to sinking No. 2 Shaft and repairing main level drifts.

The 5th level plat was retimbered and the traveling road from No. 2 to No. 1 shafts repaired.

Sinking No. 2 Shaft was started February 5th and continued the greater part of the year. During the year the shaft was sunk 131 feet, ground excavated for 6th level plat and pockets constructed. Ground was also excavated on East side of shaft for 7th level pocket and on East side of shaft at an elevation of the Eighth level.

Seventeen sets of timber were installed in the shaft below the 6th level.

The mean sea elevation of the bottom of the shaft at the present time is 675.47 or 555.89 feet below the collar.

WORK FOR DECEMBER

No. 2 Shaft was sunk 12 feet and two sets of timber installed.

PRINCETON MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	IRON	PHOS.	SILICA	MANG.
Cambridge,	55.24	.676	7.15	1.047

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

GRADE	
Princeton Bessemer,	No Shipments
Princeton,	" "
Cambridge,	All Mixed

ORE STATEMENT - DECEMBER 31ST, 1915

	PRINCETON BESSEMER	PRINCETON	CAMBRIDGE	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	0	0	171,842	171,842	182,193
Stockpile Overrun,					2,488
Output for Year,	0	0	122	122	768
Total,	0	0	171,964	171,964	185,449
Shipments,	0	0	17,171	17,171	13,607
Balance on Hand,	0	0	154,793	154,793	171,842
Decrease in Ore on Hand,				17,049	

Mine idle during 1914 & 1915.

The 122 tons shown as output was sent to surface by the few men engaged in keeping drifts open.

PRINCETON MINE

SHIPMENTS FOR YEAR--1915.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Princeton Bessemer,				2,767
Princeton,				10,840
Cambridge,		17,171	17,171	0
Total,		17,171	17,171	13,607
Total Last Year,		13,607	13,607	
Increase - 26%			3,564	

PRINCETON MINE.

COMPARATIVE WAGES AND PRODUCT.

	1915.	1914.	INCREASE.	DECREASE.
PRODUCT	122	3,256		3,134
No.Shifts and Hours	2-8hr	2-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	4	4		
Underground	5	6		1
Total	9	10		1
AVERAGE WAGES PER DAY				
Surface	2.47	2.76		.29 See below
Underground	2.50	3.25		.75 "
Total	2.78	3.04		.26 "
WAGES PER MONTH OF 25 DAYS				
Surface	61.75	69.00		7.25
Underground	62.50	81.25		18.75
Total	69.50	76.00		6.50
TOTAL NUMBER OF DAYS (surface)	1,485¾	1,394½	91¼	
Underground	1,629¾	1,833¾		204
Total	3,115½	3,228¼		112¾
AMOUNT FOR LABOR				
Surface	3,675.19	3,853.88		178.69
Underground	4,991.31	5,966.59		975.28
Total	8,666.50	9,820.47		1,153.97

Prop. Surface to Underground Men:
1915-1 to 1.25
1914-1 to 1.31
1913-1 to 3.13
1912-1 to 4.69
1911-1 to 4.18

AVERAGE WAGES PER DAY.

	DAYS	AMOUNT	RATE
As shown above	3,115½	8,666.50	2.78
Development (Const)	866	2,660.80	3.07
Total	3,981½	11,327.30	2.84
Rate last yr.Total avg.			3.04
Actual decrease," "			.20

Decrease in rates as shown above is misleading on account development in 1915 not being included. The table shows actual decrease of .20, considering all labor for year.

GWINN MINE

The product for December was as follows:

Gwinn Bessemer,	8,267	tons,
Gwinn No. 2,	6,468	"
Total,	14,735	"

The product for the year was as follows:

Gwinn Bessemer,	78,000	"
Gwinn No. 2,	49,300	"
Total Ore,	127,300	"
Rock,	24,174	"
Total Ore and Rock,	151,474	"

The Lean Ore stocked during the year was as follows:

	TONS	IRON	PHOS.	MANG.	SILICA
Lean Ore, Low Phos.	10,385	43.77	.058		27.01
Lean Ore, High Phos.	6,714	47.48	.433	.243	21.33
Total Lean Ore in Stock December 31st, 1915:					
Lean Ore, Low Phos.	20,295	43.34	.059		27.54
Lean Ore, High Phos.	11,542	47.28	.392	.218	20.79

39,575 tons Gwinn Bessemer were shipped from Pocket.

13,259 tons were transferred to Gwinn from Bessemer pocket, 1

2,314 tons Gwinn Bessemer were shipped from Stockpile.

1,145 tons Gwinn were shipped from stockpile, (Transferred from Bessemer.)

1,617 tons Gwinn No. 2 were shipped from Pocket.

THE MINE

The work for the year consisted in developing sub. levels above 5th level and the main 5th, 6th, 8th and 9th levels. Exploring with diamond drills on the 5th, 7th and 8th levels and from the bottom of No. 1 winze below the 8th level.

The mining was principally confined to sub. levels above 5th level.

The ore in sight December 31st was 635,197 tons as against 333,677 tons a year ago.

FOURTH LEVEL

WORK FOR THE YEAR

Work was started on the 4th level about the middle of December at which time No. 18 Contract extended the tail drift 21 feet to Southeast and started to make turn to Northwest from main cross-cut 226 feet North of shaft.

SUB. LEVELS ABOVE FIFTH LEVEL

752 FOOT SUB.

WORK FOR THE YEAR

There is no work being done on this sub. level at the present time. In the early part of the year No. 2 Contract put up No. 1_5 Raise from 5th Level and from top of its raise drifted Northwest 15 feet, thence North 23 feet. This drift was then extended North 15 feet by No. 4 Contract.

760 FOOT SUB.

WORK FOR THE YEAR

No. 5 Contract put up No. 2 Raise to 744 foot sub. and from top of raise drifted North 31 feet and was cut off by the rock. It then came down 8 feet in its raise and again cut out and drove cross-cut Northerly 70 feet to the foot and drifted along the foot to the East 25 feet and Westerly 70 feet. On the East side of its cross-cut it removed all the ore to a point about 20 feet North of its raise and on the West side it removed all the ore between foot and hanging from a point 74 feet West of its cross-cut along the foot and a point 40 feet West of its raise along the hanging.

No. 13 Contract finished mining on the 743 foot sub. in August and then cut out from No. 3_5 Raise on 760 foot sub. and drifted South 34 feet to the hanging. It then came back to its raise and drove cross-cut to the North 58 feet to the foot. It then drove foot wall drift to the East 10 feet and holed to No. 5 stope and to the West 30 feet and stoped ore from foot back to No. 5's workings. Then from the East side of its cross-cut it took four slices for 35 feet each removing all the ore to a point 30 feet North of its raise, and starting in cross-cut 30 feet North of Raise drifted West 25 feet

and holed to No. 5 stope. It then moved South of its raise and drove hanging wall drift 30 feet to the West and 60 feet to Northeast at which point it again holed to No, 5 stope. It then came back 15 feet and drifted Northwest 40 feet.

No. 12 Contract cut out from No. 4_5 Raise and drifted South 33 feet to hanging and Northeast 42 feet to foot. It then came back 20 feet in its cross-cut and drifted East 25 feet and holed to No. 13's stope and also from cross-cut drifted Easterly 30 feet and then stoped all the ore from foot back to No. 13's workings.

From end of its cross-cut South of its raise it drifted Easterly along the hanging 50 feet and holed to hanging wall drift from No. 3_5 Raise, and from the East side of its cross-cut drifted Southeasterly along the hanging for 70 feet. It then moved to a point 8 feet North of its raise and drifted Southwest 18 feet.

No. 6 Contract cut out from No. 5_5 Raise and drove cross-cut 36 feet to foot and from end of cross-cut drifted along the foot 30 feet to East and 35 feet to West and then stoped ore from foot. It also drifted Southeast from its raise 40 feet holing into No. 12's drift and extended No. 12 drift 12 feet to Southwest.

WORK FOR DECEMBER

No. 13 Contract, No. 3_5 Raise,

No. 13 extended its drift to the Northwest 27 feet holing into its old drift. Then moved to the drift North of its raise and 22 feet from its raise drifted West 35 feet and caved back taking pillar to its right. Total Drifting 62 feet.

No. 12 Contract, No. 4_5 Raise,

No. 12 continued to stope along the foot caving back to main cross-cut. Then 6 feet North of its raise drifted Easterly for 20 feet.

No. 6 Contract, No. 5_5 Raise,

No. 6 extended its drift West 10 feet and then started stoping back its foot drifts. Has stoped within 10mfeet of its main cross-cut.

No. 19 Contract, No. 18_5 Raise,

No. 19 started the last week in the month and taking No. 7's place extended its drift 6 feet.

743 FOOT SUB. LEVEL

WORK FOR THE YEAR

On the 743 foot sub. practically all the ore has now been mined from a point 15 feet East of the cross-cut from 8_5 Raise to a point 45 feet East of the cross-cut from No. 3_5 Raise. Two pillars still remain in this area, one East of 8_5 Raise and one West of 7_5 Raise. The greater part of this work was done by Contract No's 12, 13, 6, 11 and 8.

No. 8 Contract cut out from 8_5 Raise and drifted North 25 feet and holed to foot wall drift from No. 9_5 Raise. It then came back to raise and drifted South 28 feet to hanging, thence Westerly along hanging 55 feet and holed to cross-cut from No. 9_5 Raise.

No. 4 Contract cut out from 9_5 Raise and drifted South 18 feet to hanging and from raise drifted Northerly 45 feet to foot. Then starting 10 feet back of the breast of cross-cut cut to foot and drove foot wall drift to East 38 feet and from cross-cut to the West 65 feet and holed to cross-cut from No. 10_5 Raise.

No. 2 Contract cut out from No. 10_5 Raise and drove cross-cut 40 feet Northerly to foot, came back 15 feet and drifted Easterly along the foot 47 feet and holed to cross-cut from No. 11_5 Raise. It also started in foot wall drift 27 feet East of its cross-cut and drifted Southerly 30 feet to hanging, thence Westerly along the hanging 95 feet holing to cross-cut from 10_5 and 11_5 Raises.

No. 15 Contract cut out from 11_5 Raise and drove cross-cut 15 feet South to hanging wall drift and a cross-cut 27 feet North to foot. It then drifted Westerly along the foot for 30 feet.

WORK FOR DECEMBER

No. 11 Contract,

No. 11 continued removing pillars East and Southeast of No. 6_5 Raise. Then removed part of pillar between 7_5 and 6_5 Raises.

No. 8 Contract, No. 8_5 Raise,

No. 8 worked on the 726 foot sub. for the greater part of the month, removed pillars from both sides of its main cross-cut. Then came down and cut out on the 743 foot sub. and drifted North from raise for 20mfeet.

No. 4 Contract, No. 15 Raise,

No. 4 extended its drift North 22 feet to the foot, then came back 10 feet and drifted East 37 feet and also West 63 feet holing into No. 2's drift North from its raise. Total drifting 122 feet.

No. 2 Contract, No. 10_5 Raise,

No. 2 extended its East hanging wall drift North for 20 feet holing into No. 4's drift and its Southwest drift 34 feet. Then moved to the drift North of its raise and 25 feet from the raise drifted West 50 feet. Total drifting 104 feet.

No. 15 Contract, No. 11_5 Raise,

No. 15 for the greater part of the month worked on the 726 foot sub., removed pillars to East and West of its drift. Then came down on No. 2's drift 50 feet West of turn along the hanging and drifted 12 feet to No. 11_5 Raise. Cut out this raise and drifted Northwest 22 feet, thence Westerly for 30 feet. Total drifting 64 feet.

726 FOOT SUB. LEVEL

WORK FOR THE YEAR

This sub. level was developed and greater part of the ore mined from 16_5 Raise East to 8_5 Raise. There being still some pillars left on the hanging side of the sub. level between 16_5 and 11_5 Raises. This work being done by Contract No's 10, 5, 17, 9, 14, 15, 4 and 2.

No. 1 Contract cut out from No. 17_5 Raise and drifted North 30 feet. This drift was then extended Northerly 70 feet by No. 16 Contract.

No. 10 Contract started 12 feet back from end of cross-cut from No. 16_5 Raise and took two slices to Southwest along the foot for 60 feet holing to cross-cut from No. 17_5 Raise.

No. 8 Contract cut out from 8_5 Raise and drifted North 70 feet to foot. Then drifted East along the foot two sets wide for 169 feet. It then drifted Southeast 18 feet and holed to old stope from 720 foot sub. and then from its foot wall drift continued to slice to South into stope, stoping down back as it returned and removed all the ore between the foot and old stope back to its cross-cut from 8_5 Raise.

WORK FOR DECEMBER

No. 14 Contract, No. 12_5 Raise,

No. 14 removed small pillar to the end of its drift where it was stoping last month, then moved to within 50 feet of its raise and drifted Southwest 56 feet to No. 9's drift. Then came back 20 feet and drifted 16 feet North into old stope. Also 15 feet West of its cross-cut took another slice North into stope for 16 feet. Total drifting 88 feet.

No. 9 Contract, No. 13_5 Raise,

No. 9 continued to stope pillars to the East and West of its cross-cut, then came back to within 32 feet of its raise and drifted Southwest for 55 feet to No. 17's drift.

No. 17 Contract, No. 14_5 Raise,

No. 17 extended its drift West for 18 feet holing into No. 5's drift. Then came back 15 feet and drifted North 14 feet into stope. Then started stoping back pillar. Total drifting 36 feet.

No. 5 Contract, No. 15_5 Raise,

No. 5 extended its drift West for 36 feet holing into No. 10's drift. Then came back 18 feet and drifted North 13 feet into stope. Total drifting 49 feet.

No. 10 Contract, No. 16_5 Raise,

No. 10 extended its drift Southwesterly along the foot, the greater part of two sets wide, for 55 feet, holing into No. 16's drift. Then came back to its cross-cut and started another drift to the Southwest drifting 29 feet. Total drifting 116 feet.

No. 16 Contract, No. 17_5 Raise,

No. 16 extended its drift North for 71 feet to the foot, then

came back 16 feet and drifted West 12 feet. Total drifting 83 feet.

720 FOOT SUB. LEVEL

WORK FOR THE YEAR

Contract No's 8 and 6 put up "D" and "B" Raises from the foot side of 742 foot sub. opposite cross-cuts from 7_5 and 5_5 Raises.

No. 8 cut out from "D" Raise at an elevation of the 720 foot sub. and drifted Easterly 40 feet.

No. 6 Contract cut out from "B" Raise on 720 foot sub. and drifted South 25 feet, thence Westerly 50 feet, thence Northeast 15 feet and holed to drift from "D" Raise. It then started 25 feet West of its raise and drilled holes on either side of its drift, also in bottom and back of its drift. Holes were also drilled vertically under this point on 742 foot sub. and all the holes blasted at the same time, and ore mined through cross-cuts on 742 foot sub. No. 6 continued to stope in the above manner until all the ore was removed between its raise and "D" Raise.

FIFTH LEVEL

WORK FOR THE YEAR

The principal work on the 5th level consisted in extending the main 5th level drift to the West and putting up raises from the above drift to mine the ore above the 5th level. 17 raises were put up from the West side of the 5th level during the year.

The work in detail was as follows:

No. 5 Contract in early part of year started in foot wall drift opposite cross-cut to No. 1_5 Raise and drove cross-cut South 40 feet and holed to top of No. 1_6 Raise put up from the 6th level. It then drifted Southwest 110 feet, thence Northwest 50 feet and holed to main 5th level drift.

No. 5 also put up No. 2_5 Raise to the 752 foot Sub.

No. 7 Contract started 45 feet West of No. 2_5 Raise and extended the main 5th level drift 270 feet to the Southwest, thence Northwest 198 feet. This drift was then extended by No. 1 Contract 140 feet to Southwest, thence West 445 feet.

No. 1 Contract also started in foot wall drift at a point 35 feet West

of main cross-cut from shaft and drifted due West 95 feet and holed to foot wall drift. This cut off being made for motor haulage.

No. 13 Contract started in main 5th level drift at a point 70 feet from No. 2_5 Raise and drove stub drift 40 feet to the West, then 15 feet back from its breast put up No. 3_5 Raise.

No. 2 Contract cut out from the top of No. 2_6 Raise and drifted North 25 feet and holed to main 5th level drift.

No. 7 Contract cut out from North side of drift at a point about 70 feet Southwest of cross-cut to No. 3_5 Raise and drifted Northwest 40 feet. This drift was then extended Westerly 40 feet by No. 12 Contract, thence Southwest 35 feet by No. 6 Contract.

No. 6 then put up No. 5_5 Raise from the end of its drift and No. 12 put up No. 4_5 Raise at a point 45 feet Northeast of No. 5_5 Raise.

No. 8 Contract cut out from the top of No. 3_6 Raise and drifted North 6 feet and holed to 5th level.

No. 6 Contract cut out from top of No. 4_6 Raise and drifted North 17 feet and holed to 5th level.

No. 7 Contract started opposite cross-cut from No. 4_6 Raise and drifted Northwest 25 feet. This drift was then extended Northwest 30 feet, thence North 30 feet by No. 8 Contract, thence Northeast 7 feet by No. 11 Contract and from end of drift No. 11 put up No. 6_5 Raise. No. 8 then started 22 feet South of No. 6_5 Raise and drifted Northwest 95 feet, thence West 27 feet. From end of this drift No. 1 Contract put up 8_5 Raise and 40 feet East of No. 8_5 Raise, No. 8 Contract put up No. 7_5 Raise.

No. 11 Contract cut out from top of No. 5_6 Raise and drifted North 15 feet and holed to 5th level.

No. 10 Contract cut out from the top of No. 2_7 Raise and drifted North 202 feet and holed to main 5th level drift.

No. 10_5 Raise was put up by No. 2 Contract.

No's 11_5, 12_5, 13_5, 16_5, 17_5 raises were put up by No. 1 Contract and No. 14_5 Raise by No. 17 Contract.

The tail drift at shaft was extended 70 feet to the Southeast, this work being necessary to afford tail room for motor haulage.

The 5th level pockets were also enlarged to accommodate the motor cars.

WORK FOR DECEMBER

No. 7 Contract,

No. 7 raised No. 18_5 Raise 12 feet to the 760 foot sub. then drifted West from the West chute compartment for 27 feet. Then went back to raise and extended its raise two compartments 25 feet. Total drifting 27 feet. Total raising 37 feet.

SIXTH LEVEL

WORK FOR THE YEAR

Mining in square set rooms above the 6th Level was stopped innthe early part of the year.

The principal work for the year consisted in extending the main 6th level drift to the Southeast and putting up seven raises from this drift to the 5th level.

The mining in square set rooms above the 6th level was as follows:

Room No. 2,

No. 2 Contract put in 4 1/2 sets on tier No. 4.

Room No. 3.

No. 8 Contract put in 7 1/2 sets on tier No. 5.

Room No. 5.

No. 9 Contract put in 10 sets above floor of 6th level.

The following development work was done on the 6th level during the year.

No. 12 Contract put up a raise from the top of No. 1 Room, above 7th level to 6th level elevation, and from top of raise drifted Northeast 52 feet and holed to main 6th level cross-cut from shaft.

No. 2 Contract finished mining in Room No. 2 early in the year and then put up No. 2_6 Raise to 5th level.

No. 8 Contract cut out from main 6th level and put up No. 3_5 Raise to 5th Level.

No. 6 Contract cut out for No. 2_6 and 4_6 Raises and then put up No. 4_6 Raise to 5th level.

No. 11 Contract extended the main 6th level drift 24 feet to Southwest and then stripped the North side of its drift making turn out for raise and put up No. 5_6 Raise to 5th level.

No. 9 Contract made cut out for No. 6_5 Raise and raised 8 feet.

No. 3 Contract started 30 feet Southwest of No. 1_7 Raise and drifted South 32 feet in Slate hanging.

No. 9 Contract started 26 feet Southwest of No. 5_6 Raise and extended the main 5th level drift 203 feet to the Southwest and holed to No. 10 drift from No. 2_7 Raise. It then started cross-cut 35 feet West of No. 6_6 Raise and drifted Northwest 51 feet. It then started 20 feet East of its point of holing to No. 10 and made turn-outs to North and South for 9 and 18 feet respectively and then extended its South drift 50 feet to the South.

No. 10 Contract extended No. 2_7 Raise to the 6th level early in the year and then cut out from top of its raise and drifted South 12 feet, thence East 139 feet. No. 4 Contract then extended this drift 30 feet to East at which point No. 10 Contract extended it 30 feet and holed to No. 9.

No. 10 also started at cross-cut from No. 10 Raise and drifted Southwest 121 feet and from end of drift made turnout to Northwest and Southwest for 15 feet and 17 feet respectively, and then extended No. 2_7 Raise to 5th Level.

No. 4 Contract extended No. 3_7 Raise 29 feet and cut out on 6th Level elevation and drifted North 120 feet and holed to main 5th level drift.

No. 9 Contract also started just West of No. 5_6 Raise and stoped up bottom of drift for 450 feet to the West.

SEVENTH LEVEL

WORK FOR THE YEAR

The principal work for the year consisted in exploring with diamond drills on the East side of the level. Four holes being drilled on this side of the level during the year.

No. 12 cross-cut on the West side of the mine was extended to the South 11 feet by No. 5 Contract.

No. 4 Contract extended No. 14 cross-cut 16 feet to the South and then came back 18 feet and put up No. 3_7 Raise to the 6th level.

No. 10 Contract in the early part of the year extended No. 2_7 Raise to 6th level.

WORK FOR DECEMBER

The pockets at the shaft were enlarged for use of motor cars and part of the drift widened onnthe curve near the shaft.

SUB. LEVELS BELOW SEVENTH LEVEL

949 FOOT SUB. LEVEL

WORK FOR DECEMBER

Contract No's 1 and 7 put up No. 1_8 Raise from the West end of the Eighth level to the 949 foot sub. No. 7 then cut out from top of its raise and drifted North 62 feet and then put up raise to 7th level raising 8 feet and holing to No. 6 cross-cut. No. 7 also cut out from top of No. 1 B_8 Raise and drifted North 61 feet.

977 FOOT SUB. LEVEL

WORK FOR THE YEAR

No. 7 Contract cut out from No. 1_8 Raise and drifted North 40 feet to the foot, thence West along the foot 222 feet. At a point 130 feet West of its cross-cut it put up No. 1 A_8 Raise, raising 21 feet and from the West end of its foot wall drift put up No. 1 B_8 Raise, raising 24 feet.

No. 7 also cut out on South side of No. 1_8 Raise on 977 foot sub. and drifted South 19 feet to hanging. Then came back to raise and drifted East 15 feet.

EIGHTH LEVEL

WORK FOR THE YEAR

No. 1 Contract extended the West foot wall drift Southwest 200 feet, thence Northwest 30 feet at which point it started No. 1_8 Raise.

No. 1 cross-cut was extended South 130 feet, No. 2 cross-cut 93 feet and No. 3 cross-cut 75 feet. This drifting being done by No. 1 Contract.

No. 1 Contract came back 30 feet from the breast of No. 3 cross-cut and drifted Southwest 12 feet. Starting at a point 45 feet North of the breast of No. 1 cross-cut, No. 1 Contract made turn out to Southwest and drove hanging

wall drift 40 feet to Southwest, thence Northwest 85 feet, thence Southwest 35 feet. No. 14 Contract then started 40 feet Northeast of the breast of No. 1 and extended hanging wall drift 115 feet due West, thence Southwest 50 feet, thence South 45 feet. No. 10 Contract then started at a point where No. 14 turned its drift to the South and extended the drift 130 feet to the Southwest, thence West 30 feet.

A hanging wall drift was also driven to the East from No. 1 cross-cut. This drift was started by No. 1 Contract at a point 60 feet North of the breast of No. 1, cross-cut and extended Southeast 20 feet, thence East 160 feet and Southeast 10 feet and holed to hanging wall drift driven by No. 3 Contract. The latter drift was started 65 feet South of No. 3's foot wall drift and extended Southwest 170 feet, thence Northwest 17 feet at which point it holed to No. 1.

No. 1 Contract also extended the drift along the hanging on the East side of the shaft, which it was driving at the close of last year, 12 feet to the Northeast.

The East foor wall drift was extended to the Southeast 10 feet by No. 1 Contract, thence Easterly by No. 3 Contract 65 feet, thence Southeast 75 feet, thence Northeast 115 feet, thence due North 250 feet. No. 3 Contract then came back 80 feet from its breast and drove stub drift to West 10 feet and from South side of this drift put up No. 2_8 Raise and holed to 7th level. It then came down from its raise and starting 20 feet North of turn to No. 2_8 Raise drifted Northeast 43 feet. Then moved back to within 50 feet of where its drift turns to the North and drifted Northeast 126 feet.

No. 3 Contract also started at the point where its foot wall drift turns to the Northeast and drifted 335 feet to Southeast.

No. 9 Contract started in East hanging wall drift at point where drift turns to Northwest and drifted Southwest 30 feet, thence South 30 feet, thence West five feet and holed to No. 1 winze.

A drift was started by No. 3 Contract at breast of No. 1 cross-cut and extended 115 feet to Southwest.

Five raises were put up from No. 1 cross-cut, three raises from No. 2

cross-cut and two raises from No. 3 cross-cut, to test the thickness of the ore at these various points. This work being done by Contract No. 10. The hanging was found dipping at a flat angle to the South, the thickness of the ore averaging 25 feet.

WORK FOR DECEMBER

No. 3 Contract extended its drift Southwest for 95 feet.

NINTH LEVEL

WORK FOR THE YEAR

No. 1 Contract sunk the winze five feet and then cut out from winze on Ninth level at an elevation of 1083 feet below the collar of the shaft and drifted Easterly 61 feet.

UNDERGROUND IN GENERAL

Work on the Fourth Level was started in December. The tail drift was extended for motor haulage and a drift to the Northwest about 80 feet South of the dam. This drift will be extended and utilized for filling the stopes above the Fifth Level. When the above drift is completed a drift will then be driven from the Fourth Level to the Jopling Mine and a vertical raise put up to hole to Jopling Shaft. The rock from the above drift will be utilized for filling the stopes above the fifth level.

The greater part of the production for the year was obtained from the sub. levels above the 5th level. These sub. levels were developed from raises put up from 5th level.

On the 726 foot sub. the greater part of the ore has been mined from No. 5_5 raise West to 11_5 Raise. The ore has been removed from the foot side of the sub. level in the area between 11_5 and 16_5 Raises, while quite a few pillars still remain along the hanging in the above area. The cross-cut from No. 16_3 raise cut only 25 feet of ore while the next cross-cut to the West from No. 17_5 Raise shows the ore to be about 55 feet wide.

The 743 foot sub. was developed from No. 3_5 Raise West to No. 11_5 Raise and all the ore mined East of No. 7_5 Raise. Late in the year hanging and foot wall drifts were driven in the area between 11_5 and 8_5 Raises; at No. 9_5

Raise the ore body was pinched and only shows a width of 15 feet, while at No. 10_5 Raise a width of 55 feet and at 11_5 a width of 40 feet ore shown.

Early in the year a cross-cut was driven from the top of No. 2_5 Raise and extended 30 feet to the North at which point it was cut off by the rock. This cross-cut only cut second class ore.

A drift was also driven from top of No. 1_5 Raise at the elevation of 751 ft. sub. This drift only cut about 10 feet of ore.

On 760 foot sub. the greater part of the ore was mined in the area between No. 2_5 and 3_5 Raises and ore stoped from foot West to No. 5_5 Raise. The cross-cuts from No. 3_5, 4_5 and 6_5 raises show a width of ore varying from 90 feet at 5_5 Raise, 60 feet at 4_5 Raise and 75 feet at 3_5 Raise.

A drift was driven from No. 18_5 Raise and extended 35 feet to the West. This drift so far has only shown a mixed lean formation.

Diamond drilling was started in the Gwinn Mine in February, the first hole being drilled from the extreme North breast of the 5th level. This hole was drilled due North and horizontal and passed through 203 feet of Graphitic Slate at which point it cut the Arkose and continued for 30 feet into the Arkose.

The main 5th level drift was extended to Southwest 80 feet, thence Westerly 72 feet in good ore and then passed into a mixed formation and was extended in this 89 feet to Southwest, thence West 40 feet. The drift at this point being too far in the hanging was turned to Northwest and after cutting 60 feet of lean ore and jasper again cut the ore and continued to the Northwest 65 feet to the foot, thence Westerly along the foot 55 feet, thence Southwest 130 feet, thence West 130 feet when it again cut 45 feet of lean ore and was then continued West in good ore for 170 feet at which point the ore pinched out and the drift was then extended West 103 feet in lean material and stopped.

A cross-cut was driven to the foot from a point about 60 feet West of 2_6 Raise and a second cross-cut from a point 20 feet West of 4_6 Raise. These cross-cuts show a width of 40 to 50 feet of 1st class ore, while the cross-cut from 2_7 Raise shows a width of about 35 feet of 1st class ore.

Motor haulage was installed on the 5th level and Started October 21st and is working very efficiently. The cost of tramming being less than half what it was before motor haulage was installed.

Very little ore was developed on the Sixth level during the year. The main 6th level drift was extended to the Southwest 20 feet in lean ore and then cut 15 feet of first class ore and again passed into lean ore for 10 feet and was then extended Westerly 245 feet in jasper and then 15 feet in second class ore, 35 feet in Jasper, then through 45 feet of mixed Jasper and lean ore, It then cut 110 feet of 1st class ore at which point the ore pinched out and was then extended about 30 feet in Jasper and stopped.

The cross-cut that was driven North from the top of No. 3_7 Raise cut about 95 feet of Jasper and was then extended through 20 feet of ore and holed to the foot wall drift showing the ore to be about 25 feet wide at this point.

A water raise was put up from the 6th level at a point about 25 feet Southwest of the forks of the foot wall drift and holed to 5th level cross-cut all the water from 5th level North of this point is now being brought down the 6th level through this raise.

There was very little work done on the 7th level during the year. The principal work was confined to diamond drilling, four holes being drilled on the East side of the level.

Hole No. 2 was a horizontal hole drilled due North from the extreme North breast of the 7th level and was extended 202 feet cutting Arkose the entire distance.

Hole No. 3 was drilled horizontal from a point about 160 feet Southeast of No. 2 and was extended Northeast 105 feet cutting the contact of the Slate and Arkose at a distance of 73 feet from the collar of the hole.

Hole No. 4 was a vertical hole put down in the East drift at a point 120 feet East of the main drift to North. This hole passed through the jasper into lean ore at a depth of ten feet below the collar of the hole. It then cut five feet of lean ore, five feet of 1st class ore and 15 feet of 2nd class ore and was continued in jasper reaching the contact of Chert and Arkose at a

depth of 59 feet below the collar of the hole.

Hole No. 5 was a vertical hole put down from a point 110 feet East of hole No. 4. This hole struck the contact of the Chert and Arkose at a depth of 32 feet below the collar of the hole.

There was no mining done on the 7th level during the year.

The work of removing the ore between the 7th and 6th levels will be started early in the year.

The 949 foot sub. level was developed from No. 1_8 Raise put up from the Eighth Level and from No. 1 B_8 Raise put up from the West end of the 977 foot sub.

The cross-cut driven North from the top of No. 1_8 Raise to No. 18_4 Raise cut about 40 feet of 2nd class ore and 24 feet of lean ore and jasper.

On the 977 foot sub. level a cross-cut was driven South from No. 1_8 Raise to the hanging and North to the foot, the width of the ore at this point being 55 feet. A foot wall drift was driven to the West from this cross-cut and cut about 140 feet of 1st class ore and then passed into second class ore and was continued about 70 feet in this material at which point the formation pinched and drift was stopped.

On the West side of the Eighth Level the foot wall drift was extended Westerly in ore along the contact for 206 feet at which point it was cut off by the foot. It followed a roll in the foot 28 feet to the Northwest and was stopped.

No. 1 cross-cut was extended South about 130 feet to the hanging showing a width of ore at this point of 272 feet.

No. 2 cross-cut was driven due South from foot wall drift at a point 180 feet West of No. 1 cross-cut. This drift cut 101 feet of ore.

No. 3 cross-cut was started 90 feet West of No. 2 cross-cut and was extended due South through ore 78 feet at which point it was cut off by the foot.

The hanging wall drift driven West from No. 1 cross-cut was extended in ore Southwest 40 feet, thence Northwest 70 feet, thence Southwest 45 feet and was cut off by the hanging. Then 40 feet back of this breast the drift

was again extended in ore 105 feet to West at which point it struck the foot on North side of drift and was then turned to Southwest and extended 72 feet, passing through a formation of ore and seams of Jasper. A cross-cut was then driven to the South 40 feet cutting nothing but Jasper. From point where cross-cut was started the drift was extended Southwest 85 feet and again encountered the Cherty Slate on the right side and also had the hanging in the back. The drift was then extended 25 feet in Jasper and stopped.

The drift driven East from No. 1 cross-cut was extended due East in ore for 180 feet, thence Southeast 35 feet at which point it has the hanging on South side of drift and cut about 20 feet of 2nd class ore. The drift then continued Northeast in ore, 110 feet, and then passed through about 50 feet of 2nd class ore, at which point it holed to cross-cut from East foot wall drift.

The East foot wall drift was extended due West through Jasper and Lean Ore for 80 feet. Thence Southwest 30 feet through 2nd class ore. The drift then passed into the ore and was extended West 40 feet and Northwest 111 feet, thence due North through 30 feet of 2nd class ore, 40 feet of 1st class ore and was then continued North through a mixed formation for 190 feet at which point it was cut off by the foot. Then 75 feet South of the breast a stub drift was driven 15 feet to the West and struck the foot rock which was standing almost vertical. A raise was put up from this stub drift to the 7th level. This raise cut 45 feet of 1st class ore.

A drift was started at a point 20 feet North of No. 2_8 Raise and extended Northeast 35 feet and struck the slate foot. Then 160 feet South of this drift another drift was started and driven Northeast 40 feet, thence East 60 feet. This drift cut about 10 feet of ore and then passed into a mixed formation of ore and seams of Jasper and was stopped in Jasper.

From the point where the foot wall drift turns to the Northeast a drift was driven to the Southeast 335 feet. This drift cut 10 feet of 1st class ore, 20 feet of 2nd class ore, 80 feet of lean ore and then passed into the hanging Slate. This drift was driven for the purpose of exploring with diamond drills.

Eight holes were drilled with diamond drills on the Eighth Level dur-

ing the year.

Hole No. 8 was a horizontal hole drilled from the breast of No. 1 cross-cut and was extended due South 696 feet. This hole only cut second class ore.

Hole No. 9 was a vertical hole drilled near the breast of the drift that was driven Southeast into the hanging. This hole was drilled to a depth of 260 feet below 8th level and cut five feet of ore at a depth of 195 feet and passed into the Arkose at 220 feet.

Hole No. 10 was a vertical hole drilled at a point 160 feet Northwest of No. 9. This hole struck the ore at a depth of 85 feet and cut 50 feet of 1st class ore, 20 feet of second class ore and 5 feet of lean ore. This hole was stopped in Chert at a depth of 174 feet.

Hole No. 11 was an inclined hole drilled from the same location of No. 10. This hole had an inclination of 29 1/2° and course was N-35°E, 10 feet of lean ore was cut at a depth of 140 feet and contact of Chert and Arkose struck at a depth of 195 feet.

Hole No. 12 was drilled from a point about 12 feet West of No. 11. This was an inclined hole with a dip of 45° and course due West. This hole cut ten feet of ore at a depth of 65 feet and struck the Granite at 110 feet.

Hole No. 13 was drilled from the same location as hole No. 9. This was an inclined hole with a dip of 61°, course due South. This hole encountered the ore at a depth of 225 feet and cut 29 feet of good ore and 11 feet of 2nd class ore and struck the Arkose at a depth of 265 feet.

No's 14 and 15 were both inclined holes drilled from same location as hole 13. No. 14 had an inclination of 43°, course S-45° E. This hole did not cut any ore and struck the Arkose at a depth of 314 feet.

No. 15 was an inclined hole with a dip of 35°, course S-13° E. This hole was still being drilled at the close of the year and at that time was in the formation but so far had cut no ore.

Two holes, No's 6 and 7 were drilled from the bottom of No. 1 winze.

Hole No. 6 was a horizontal hole, course S-45° E. This hole cut the ore 235 feet from the collar and continued in ore for 195 feet. This hole was in Slate at a distance of 482 feet from the collar.

Hole No. 7 was a horizontal hole drilled due South. This hole only cut about 17 feet of 2nd class ore, and struck the Arkose at a distance of 372 feet and was stopped in Granite at a distance of 709 feet from the collar.

The water pumped at the Gwinn Mine during the month of December averaged 267.2 gallons per minute. The total gallons pumped during the month was 11,930,440.

The Diamond Drilling in detail for the year was as follows:

Hole No. 1 was drilled horizontal and due North from the extreme North breast of the 5th level. This drilling was entirely on C. & N. W. Section 21 lease. Coordinates of hole S-2599.86 - 6972.66 E. Mean Sea Elevation of collar of hole 321.09. Material: Graphitic Slate 0 - 203'; Arkose 203 - 233'.

Hole No. 2 was drilled horizontal and due North from the extreme North breast of the East side of the 7th level. Coordinates of hole S-2935.23 - 7523.04 E. Mean Sea Elevation of collar of hole 167.40. Material: Arkose 5 - 202 feet.

Hole No. 3 was a horizontal hole drilled on the East side of the 7thnlevel at a point about 160 feet Southeast of Hole No. 2. Course of hole N-45^{0} E. Coordinates of hole S-3082.13 - 7591.86 E. Mean Sea Elevation of collar of hole 165.50. Material: Vein Quartz 0 - 3'; Chert 3 - 60'; Greywacke 60 - 63'; Ferr. Chert and Slate 63 - 68'; Green Slate 68 - 73'; Arkose 73 - 105';

Hole No. 4 was a vertical hole, drilled on East side of 7th level about 255 feet Southeast of Hole No. 3. Coordinates of hole S-3313.17 - 7708.53 E. Mean Sea Elevation collar of hole 161.94. Material: Jasper 0 - 10'; Lean Ore 10 - 15'; Ore 15 - 20'; 2nd class ore 20 - 35'; Jasper 35 - 52'; Chert 52 - 59'; Arkose 59 - 67'; Greenstone 67 - 139'.

Hole No. 5 was a vertical hole drilled on East side of 7th level about 110 feet East of Hole No. 4. Coordinates of hole - S-3312.56 - 7819.93 E. Mean Sea Elevation of collar of hole 165.80. Material: Jasper 0 - 12'; Ferr. Slate 12 - 15'; Lean Ore 15 - 20'; Slate 20 - 32'; Arkose 32 - 45'.

Hole No. 6 was a horizontal hole drilled from the bottom of the winze. Course of hole S-45° E. Coordinates of hole S-3791 - 7158 E. Mean Sea Elevation collar of hole 10.43. Material: Greenstone 0 - 80'; Graphitic Slate 80 - 87'; Gray Slate 87 - 103'; Chert 103 - 134'; Gray Slate 134 - 146'; Ferr. Slate and Chert 146 - 153'; Jasper 153 - 155'; 2nd class ore 155 - 160'; Jasper 160 - 165'; 2nd Class Ore 165 - 175'; Lean Ore 175 - 180'; Jasper 180 - 182'; Ferr. Slate 182 - 200'; Jasper 200 - 235'; Ore 235 - 430'; Jasper 430 - 447'; Green Slate 447 - 448'; Jasper 448 - 453'; Ferr. Slate 453 - 458'; Jasper 458 - 468'; Dary Gray Slate 468 - 482'.

Hole No. 7 was a horizontal hole drilled due South from the bottom of the winze. Coordinates of hole S-3788 - 7144-E. Mean Sea Elevation collar of hole 10.63. Material: Arkose 0 - 65'; Black Slate 65 - 75'; Arkose 75 - 77'; Slate 77 - 103'; Chert 103 - 122'; Vein Quartz 122 - 130'; Chert 130 - 136'; Black Chert 136 - 147'; Graphitic Slate 147 - 152'; Chert 152 - 155'; Graphitic Slate 155 - 156'; Chert 156 - 163'; Jasper 163 - 275'; Lean Ore 275' - 285'; 2nd class ore 285 - 297'; Jasper 297 - 310'; Slate and Jasper 310 - 315'; 2nd class ore 315 - 320'; Jasper 320 - 335'; Chert 335 - 356'; Ferr. Slate 356 - 361'; Chert 361 - 372'; Arkose 372 - 400'; Greenstone 400 - 456'; Arkose 456 - 468'; Greenstone 468 - 480'; Arkose 480 - 668'; Granite 668 - 702'.

Hole No. 8 is a horizontal hole drilled due South from the end of No. 1 cross-cut 8th level. Coordinates of hole S-3755 - 6987 E. Mean Sea Elevation collar of hole 89.94. Material: Lean Ore 0 - 5'; Jasper 5 - 38'; Ferr. Chert 38 - 114'; Black Slate 114 - 396'; Chert 396 - 401'; Ferr Slate 401 - 414'; Chert 414 - 458'; Jasper 458 - 490'; Chert 490 - 498'; Jasper 498 - 569'; Ferr. Slate 569 - 585'; Lean Ore 585 - 590'; Jasper 590 - 610'; Lean Ore 610 - 620'; Ferr. Slate 620 - 625'; 2nd class ore 625 - 630'; Lean Ore 630 - 635'; Jasper 635 - 640'; Lean Ore 640 - 650'; 2nd class ore 650 - 670'; Ferr. Slate 670 - 675'; Jasper 675 - 680'; Ferr. Slate 680 - 690'; Lean Ore 690 - 696'.

Hole No. 9 was a vertical hole drilled on Southeast side of 8th level. Coordinates of hole S-3859 - 7726 E. Mean Sea Elevation of collar of

hole 88.00. Material: Black Slate 0 - 11'; Gray Slate 11 - 135'; Ferr. Slate 135 - 142'; Jasper 142 - 195'; Ore 195 - 200'; Jasper 200 - 205'; 2nd class ore 205 - 210'; Chert 210 - 220'; Arkose 220 - 260'.

Hole No. 10 was a vertical hole drilled on Southeast side of the 8th level. Coordinates of hole S-3740 - 7616-E. Mean Sea Elevation collar of hole 87.23. Material: Ferr. Slate 0 - 51'; Jasper 51 - 85'; Lean Ore 85 - 90'; Ore 90 - 100'; 2nd class ore 100 - 110'; Ore 110 - 145'; 2nd class ore 145 - 155'; Ore 155 - 160'; Chert 160 - 171'; Gray Slate 171 - 174'; Chert 174 - 175'.

Hole No. 11 was an inclined hole with a dip of 30°. Course of hole N-35° E. Coordinates of hole S-3736 - 7618-E. Mean Sea Elevation of collar of hole 88.00. Material: Ferr. Slate 0 - 100'; Jasper 100 - 140'; Lean Ore 140 - 150'; Jasper 150 - 163'; Chert 163 - 195'; Arkose 195 - 201'; Greenstone 201 - 212';

Hole No. 12 was an inclined hole dipping 40°. Course of hole due West. Coordinate of hole S-3743 - 7605 E. Mean Sea Elevation collar of hole 87.50. Material: Ferr. Slate 0 - 30'; Jasper 30 - 50'; Lean Ore 50 - 55'; Jasper 55 - 60'; Lean Ore 60 - 65'; Ore 65 - 75'; Jasper 75 - 80'; Chert 80 - 104'; Jasper 104 - 110'; Granite 110 - 146'.

Hole No. 13 was an inclined hole dipping 61°. Course due South. Coordinates of hole S-3860 - 7725-E. Elevation of hole 88.08. Material: Gray Slate 0 - 22'; Ferr. Slate 22 - 46'; Gray Slate 46 - 92'; Ferr. Slate 92 - 173'; Chert 173 - 187'; Jasper 187 - 215'; Lean Ore 215 - 225'; Ore 225 - 254'; 2nd class ore 254 - 265'; Arkose 265 - 296'.

Hole No. 14 was an inclined hole dipping 43°. Course of hole S-45° E. Mean Sea Elevation of collar of hole 88.59. Coordinates of hole S-3861 and 7728-E. Material: Slate 0 - 249'; Chert 249 - 259'; Jasper 259' - 271'; Jasper and Lean Ore 271 - 285'; Jasper 285 - 290'; Lean Ore 290 - 305'; Jasper 305 - 309'; Chert 309 - 314'; Arkose 314 - 322'.

Hole No. 15 was an inclined hole, dipping 35°, Course of hole S 13° E. Mean Sea Elevation collar of hole.88.67. Coordinates of hole S-3862 and 7726.5 E. Material: Slate 0 - 309'.

GWINN MINE SURFACE

WORK FOR THE YEAR

The grading on Southwest stocking ground was extended about 400 feet Southwest.

The grading on Northeast stocking ground was extended about 250 feet Northeast.

Sixteen temporary bents were erected on the Non Bessemer Southwest stocking trestle and six temporary bents on the Bessemer or Northeast stocking trestle.

The ground around the Gwinn Mine Office was graded and beds made for planting.

Motor generator set for underground motor haulage was installed in the Southwest corner of engine room.

Grading for stockpile tracks to the Northeast stocking ground was made by the railroad department.

On Tuesday September 28th shortly after six o'clock fire of unknown origin was discovered in the Blacksmith Shop end of the shop building which completely destroyed the shop building and the old boiler house and partly destroyed the old dry building which is being used as a store house.

The fire had gained considerable headway when discovered but was fought by the men employed at the Gwinn Mine together with the Gwinn Fire Department with efficiency. They were successful in keeping the fire from the engine house which is only a few feet East of the boiler house.

The store shed was repaired and a temporary shed put up over the forges and drill sharpener.

A contract was let for new brick shop building and oil house late in the year. These buildings are now under construction and brick work nearly completed.

GWINN MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	IRON	PHOS.	SILICA	MANG.
Gwinn Bessemer,	58.87	.054	7.20	
Gwinn,	58.45	.072	7.10	.455
Gwinn No. 2,	57.37	.254	7.50	.343

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

GRADE	
Gwinn Bessemer,	All Mixed
Gwinn,	" "
Gwinn No. 2,	" "

ORE STATEMENT - DECEMBER 31ST, 1915

	GWINN BESSEMER	GWINN	GWINN No. 2	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	12,366		16,171	28,537	307
Output for Year,	63,596	14,404	49,300	127,300	48,389
Total,	75,962	14,404	65,471	155,837	48,696
Shipments,	41,889	14,404	1,617	57,910	20,159
Balance on Hand,	34,073	0	63,854	97,927	28,537
Increase in Output-163%				78,911	
Increase in Ore on Hand,				69,390	

2 - 8 Hr. Shifts during 1914 & 1915.

GWINN MINE

SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR	
Gwinn Bessemer,	39,575	2,314	41,889	13,551	
Gwinn,	13,259	1,145	14,404	4,501	
Gwinn No. 2,	1,617	0	1,617	2,107	
Total,	54,451	3,459	57,910	20,159	
Total Last Year,	20,159		20,159		
Increase - 187%			37,751		

GWINN MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 1 5.	1 9 1 4.	INCREASE.	DECREASE.
PRODUCT	127,300	48,389	78,911	
General Expense	.183	.298		.115
Maintenance	.151	.569		.418
Mining Expense	1.340	2.323		.983
Cost of Production	1.674	3.190		1.516
Exploratory	.076	.052	.024	
DEPRECIATIONS.				
Plant Account *	.353	.051	.302	
Equipment		.001		.001
Uncompleted Construction *		.250		.250
Total Depreciation	.353	.302	.051	
Taxes	.031	.064		.033
Central Office	.084	.147		.063
Supply Inventory	.001	.011		.010
Miscellaneous	.004			.004
Sundry Expense	.061	.056	.005	
Fire Loss	.006		.006	
COST ON STOCKPILE	2.282	3.822		1.540
Loading & Shipping	.011	.006	.005	
Total Cost on Cars	2.293	3.828		1.535
Nol Days Operating	304	224	80	
No.Shifts & Hours	2-8hr	2-8hr		
Avg. Daily Product	419	216	203	
COST OF PRODUCTION				
Labor	1.072	1.816		.744
Supplies	.602	1.374		.772
Total	1.674	3.190		1.516

* A6 Construction transferred to Plant A4 in 1915.

GWINN MINE.

COMPARATIVE WAGES AND PRODUCT.

	1915.	1914.	INCREASE.	DECREASE.
PRODUCT	127,300	48,389	78,911	
No.Shifts and Hours	2-8hr	2-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	40	43		3
Underground	129	95	34	
Total	169	138	31	
AVERAGE WAGES PER DAY				
Surface	2.41	2.39	.02(.84%)	
Underground	2.67	2.71		.04(1.48%)
Total	2.61	2.61		
WAGES PER MONTH OF 25 DAYS				
Surface	60.25	59.75	.50	
Underground	66.75	67.75		1.00
Total	65.25	65.25		
PRODUCT PER MAN PER DAY				
Surface	10.40	4.90	5.50(112%)	
Underground	3.24	2.27	.97(42.7%)	
Total	2.47	1.55	.92(60.%)	
LABOR COST PER TON				
Surface	.232	.488		.256
Underground	.824	1.197		.373
Total	1.056	1.685		.629
Avg.Product Breaking & Tramming	4.91	4.15	.76	
" Wages Contract Miners	2.88	2.92		.04
" " " Labor	2.88	2.92		.04
TOTAL NUMBER OF DAYS				
Surface	12,245¼	9,867	2,378¼	
Underground	39,281¼	21,343	17,938¼	
Total	51,526½	31,210	20,316½	
AMOUNT FOR LABOR				
Surface	29,483.75	23,607.22	5,876.53	
Underground	104,942.34	57,919.52	47,022.82	
Total	134,426.09	81,526.74	52,899.35	

Prop. Surface to Underground Men -
1915 - 1 to 3.22
1914 - 1 to 2.16

NOTE.

Oct.1,1914, Wage rates reduced 10% from schedule adopted Feb.1,1913.

Aug.1,1915, Wages restored to scale in effect prior to Oct. 1, 1914.

Avg.wages 9 Mos. from Jan.1st to Sept.30/14- 2.68
" " 10 " " Oct.1,14, to Aug.1/15 - 2.48
Decrease during 10 Mo.period .20
Percent " 7.46

GWINN MINE.

TIMBER STATEMENT FOR YEAR ENDING DECEMBER 31, 1916.

KIND.	LINEAL FEET.	AVG. PRICE PER FOOT.	AMOUNT 1915.	AMOUNT 1914.
6" to 8" Timber	2,728	.02	54.56	67.44
8" to 10" "	10,017	.04	400.68	119.20
10" to 12" "	20,480	.06	1,228.80	829.38
12" to 14" "	13,014	.0839	1,091.92	1,810.30
Total 1915	46,239	.060	2,775.96	
Total 1914	42,118	.0671		2,826.32
	LINEAL FEET.	PER 100'		
5' Lagging	277,780	.4534	1,259.20	628.00
5' to 7' Cribbing	45,929	1.588	729.18	
8' Lagging	307,028	.503	1,544.80	1,040.84
Total Lagging	630,737	.560	3,533.18	1,668.84
Poles	78,069	.816	637.02	134.12
Total 1915	708,806	.588	4,170.20	
Total 1914	338,382	.53		1,802.96

	1915.	1914.
Product	127,300	48,389
Feet Timber per ton of Ore	.363	.870
Feet of Lagging "	4.95	6.70
Feet of Lagging per foot of Timber	13.64	7.70
Cost per ton for Timber	.0218	.058
" Lagging	.0277	.034
" Poles	.0050	.004
" Timber, Lagging & Poles	.0545	.096
Equivalent of stull timber to Board Measure	143,509	158,718
Feet of Board Measure per ton of ore	1.127	3.28
Total cost for Timber, Lagging & Poles 1915		6,946.16
" 1914		4,629.28

GWINN MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY.	AVERAGE PRICES.	AMOUNT 1915.	AMOUNT 1914.
50% Powder				15.75
60% " Gelatin	72,850	.12	8,742.00	1,620.00
80% " "	22,850	.14	3,199.00	2,310.00
Total Powder	95,700	.1248	11,941.00	3,945.75
Fuse	236,100	4.215	995.23	380.07
Caps, Number	41,800	8.04	336.37	115.05
Cap Crimpers	11	.25	2.75	1.50
Exploders	200	.486	9.72	
Leading & Connecting Wire	26	.259	6.73	
Total Fuse, Etc.			1,350.80	496.62
Grand Total			13,291.80	4,442.37
Product			127,300	48,389
Pounds of Powder Per ton of Ore			.752	.623
Cost per ton for powder			.0938	.0816
" " Fuse,caps,etc.			.0106	.0103
" " explosives			.1044	.0919
Avg.price pre lb. for powder			.1248	.1308

JOPLING MINE

There was no work done at the Jopling Mine during the year.

FRANCIS MINE

WORK FOR THE YEAR

On January 23rd it was decided to open the Francis Mine and work was started on January 25th.

The only equipment that remained on surface was a 125 H. P. Burt locomotive type boiler and the small Sullivan compressor. The other two boilers that were originally there having been sent to the Crosby Mine several years ago. The Sullivan compressor was the one originally bought for the Austin and had a capacity of 500 cu. ft. When the boilers were removed to the Crosby it was thought that all new equipment for this mine would be electrically operated. The Austin Compressor, therefore, had had the steam end cut out. It was set up and belted to a motor.

The air from this compressor and the supply from Central Power Plant through a four inch pipe was deemed sufficient by the Mechanical Department for our needs in shaft sinking. Later in the year it was found that we had an inadequate supply of both steam and air and arrangements had to be made to install extra equipment.

The work for the year was confined to surface improvements and sinking the shaft.

The work of unwatering the shaft was started early in March. The water was lowered with air blower to a depth of about 87 feet. An electrical centrifugal sinking pump was then installed on the 9th set in the skip compartment and unwatering of the shaft completed.

Two No. 10 Cameron pumps were then installed in shaft. Solars and ladders were then placed in ladder compartment and the work of casing up shaft between cage and ladder compartments completed on March 22nd.

The bottom of the shaft was then reinforced in the following manner:

Three inch plank was placed on edge and spaced about one foot apart on top of the concrete in the bottom of the shaft and 12" timbers placed on top of the 3" plank. These timbers being braced with stulls placed

against the cast iron brackets which are bolted to the concrete walls of the shaft.

Preparations were then made to grout the holes which had been drilled in the bottom of the shaft previous to closing down in 1911. A grout machine was installed on a sollar in the West end of cage compartment about 15 feet above the bottom of the shaft. A 6" air line to act as receiver for high pressure air was placed in North side of ladder compartment and connected with 2" low pressure air line in such a way that either high or low pressure air could be forced into the grout machine. A 4" feed pipe was placed in West skip compartment for sending down grout. The grout being mixed on surface at the collar of the shaft.

The grout pipes were made from 1 1/2" standard iron pipe 3 to 4 feet long. To the end driven in the hole a bell made from a piece of 2" pipe 8" long was welded. The 1 1/2" pipe is pushed into the large end of the bell until its end is even with the unexpanded end of the bell and welded at this point. The other end of the pipe was equipped with 1 1/2" stop cock, a 1 1/2" nipple and a 1 1/2" Tee, which was left open on the side to prevent the full flow of water while the pipe was being driven, and a nipple to which was screwed a cap. Before the pipe was driven in the hole the bell was wrapped with Oakum and this in turn coated with clay after driving the pipe in the hole the collar is made tight by forcing in oakum and wedging with wood and steel wedges. When ready for grouting the nipple in the stop cock with its attached tee and cap was replaced by another nipple to which was attached a half union for the coupling with the grout hose.

Grouting was started on March 26th. The first hole grouted was one of the old holes drilled in 1911 and was located near the concrete wall in West end of cage compartment. This hole was about three feet deep and was making about 250 gallons of water per minute. This hole was grouted under a pressure of 50 lbs. which was later raised to 65 pounds. Under this pressure quite a few of the other holes sprung a leak, the old plugs were then removed and replaced with new dry pine plugs. Grouting was again resumed and continued until all leaks gradually took up and were entirely

eliminated and grout pipe took no more. 18 bags of cement having been used.

Grouting was then discontinued until the 29th to give cement time to set up.

On March 29th six holes were drilled about equal distance apart around the perimeter of the shaft close to the wall and dipping at an angle of about 70° towards the outside of the shaft. These holes were continued until they struck water. The following day these holes were grouted and for the next two days work was suspended to give the grout time to set up.

A total of 41 holes were drilled and 27 were grouted. As the work progressed the holes were drilled deeper until 14 feet holes put in at an angle of 45° encountered no water.

On any days grouting the hole showing the largest flow of water was generally the first one connected to and grout forced into it as long as it could be made to take any. When once started the grouting of a hole was finished with out any stop for if the cement was allowed to start to set no more could be forced in and the hole would be lost. Hole No. 13 required 332 bags of cement. Grouting was started at 8:30 A. M. and ran continuously until 3 P.M.

After a couple of days work with 60 lbs. of air it was decided that the seal and bracing were strong enough to stand a pressure of 80 lbs. and from then on this pressure was used almost entirely. Some holes that would not take grout at 80 lbs. were made to take a few batches under 150 lbs. pressure. Finally a few holes, No's 38, 3 A, 40 and 41, were put down in the interior of the shaft to reach any seam that might run up into the shaft parallel to the incline holes which these holes might have missed. As no water was encountered all was now ready for the excavating of the bottom of the shaft.

The grouting was finished on April 26th, a month after starting.

After it had been demonstrated that the water had been all cut off the rectangular shaft was started. Eight foot holes were drilled around the perimeter of the rectangle two feet back from the West line of the shaft and as close together as possible. The first four feet were then broken out by

moiling with wedges. Below these four feet shallow holes and very light charges of powder were used. For the next cut the holes were drilled on the outside of the shaft as before and ground broken out by drilling and blasting with light charges. Not over a half stick of powder to the hole and never more than two or three holes at a time.

This operation was continued until the shaft was 18 feet below the shoe of the concrete shaft sunk by the Foundation Company.

To secure further the portion of the shaft which had been grouted, the sides of the shaft traversed by the filled seams were lined with a reinforced concrete wall averaging two feet in thickness. Hitches were cut 12 feet below the shoe and 9" I-Beams put in for bearers along the small dimension of the shaft. To these bearers hanging bolts were attached so that sets could be hung below. Forms were then constructed along the West line of the shaft from the top of the concrete seal to two feet below the bearers. 1 3/4" cramp rods spaced two feet apart were put in the walls of the shaft, wire rope, iron bars and pieces of old angle iron and channel were fastened in for reinforcing. The space was then filled with concrete. This was given a couple of days to set up and then the work of sinking was resumed. For the first two or three cuts the perimeter was drilled around as in the previous cuts and holes blasted carefully so as not to damage the concrete.

When the bottom of the shaft was taken up it was found the seal had a good contact with the ledge over the entire area of the bottom of the shaft but there was a large seam varying from 2 to 6" in width cutting across the entire shaft. On the South and East sides it was within a few inches of the bottom of the seal.

From six places in the sides of the shaft small streams of water issued, the combined flow of which was not over 25 gallons per minute. Holes were drilled in the rock at these points and plugged with grout pipes. In addition several weep holes were put in which all ran dry as soon as the concrete set after the concrete lining had been allowed to set six weeks. The holes making water and the weep holes were grouted. Although some of the water was shut off and total flow cut down to about 15 gallons per minute it could not be entirely cut off with the available air pressure. During the

time between the installation of the concrete lining and the last grouting the shaft was sunk 16 feet.

After the weep holes were grouted the forms were removed, dividings installed and shaft equipped for sinking in the ordinary way. Up to this time the work was done on day shift only.

To reach this stage four months were required, from March 26th to July 27th. The greater part of the last three months were spent in sinking.

Two eight hour shifts were started on August 1st and continued up to November 8th at which time three eight hour shifts were adopted, and so continued for the balance of the year.

In the Southeast corner of the shaft was diamond drill hole No. 11. The grout entered this hole to a depth of thirty feet or there about. However, when this depth was reached water was found coming from the hole. When attempts to grout it were made the water came into the shaft through the seams in the rock. The formation of Slate was found to contain seams which were quite open, most of which contained water. This continual increase made more water than the shaft pump could handle so it was necessary to provide a temporary pumping station in the shaft at 295 feet below the collar. The station was cut out from the ladder compartment of the shaft and provided room for a small steel tank.

When sinking was again resumed more or less trouble was had with the newly installed centrifugal pump which was run by a high voltage line. As there was inadequate steam and air capacity in our equipment it was decided to install another boiler and compressor and dispence with the centrifugal pump in the shaft. A second temporary pumping station 11 1/2 x 15 and 9 feet high, was cut out from the skip compartment of the shaft and a sump 11 1/2 x 6 x 8 feet deep excavated in the back end of this station. The elevation of the floor of this second pumping station is about 395 feet below the collar of the shaft. Concrete foundations for two Prescott sinking pumps were constructed and pumps installed.

The mean sea elevation of the bottom of the shaft December 31st was 699.44 or 405.33 below the collar of the shaft. The total sinking for

the year being 302.47 feet. 47 steel sets were installed during the year.

WORK FOR DECEMBER

The work for December consisted in sinking the shaft 50 feet, excavating for pump room and sump off the skip compartment of the shaft at an elevation of 710 feet. The pump room being 11 1/2 x 15 x 9 ft. and sump 11 1/2 x 6 x 8 ft. Concrete foundations for two pumps were constructed on the floor of the pumping station and two Prescott sinking pumps installed.

Eight steel sets were installed during the month of December.

FRANCIS MINE SURFACE

WORK FOR THE YEAR

The following surface improvements were made at the Francis Mine during the year:

The 4" air line from Gwinn Mine was opened up.

Concrete foundations for temporary hoist constructed East of the permanent engine house and the Webster, Camp and Lane geared hoist brought from the Gwinn Mine and installed on the above foundation and hoist enclosed by temporary frame building.

A room 30 x 12 ft. was constructed in the Northeast corner of the boiler house for temporary dry. Steam coils placed in the center of the room and ventilator placed in the roof of the building over the coils.

The steel lockers were brought in from the Mackinaw Mine and installed in the temporary dry.

A "Booster" for generating high pressure air was installed in the Francis engine house and connected with the 6" high pressure pipe in the ladder compartment of the shaft. This "Booster" was from a Westinghouse Air Brake Compressor such as is used on a locomotive.

Railings for safety device were constructed around the landing floor of the shaft house and on both sides of the rock trestle.

A temporary landing floor and chute for dumping the bucket were constructed above the permanent landing floor of the head frame.

Three sets of doors were also constructed over the cage compartment, one at the collar of the shaft, one at the permanent collar of the shaft, one

at the permanent landing floor and one at the temporary landing floor. These doors were constructed for safety device to prevent anything from falling into the shaft.

Right of way cleared and road graded from a point just West of the Jopling Shaft to the Francis Mine.

Shop building constructed by the company carpenters.

Mine office and permanent dry buildings were built by contract. These buildings were completed during the month of May.

A brich man hole was constructed just West of the South end of the shop building and drains laid from this man hole to office and dry buildings and from man hole drain pipe laid to Johnson Lake. The total length of the sewer or drain being 1502 feet.

Land was cleared and brush and stumps burned Southwest of the Francis Shaft on the N.E.$\frac{1}{4}$ of S.E.$\frac{1}{4}$ Section 28 - 45 - 25. This land to be utilized for stocking ground. The area cleaned consists of a strip 700 feet long by 120 feet wide and a second strip just West of the above 120 feet wide by 250 feet long.

Permanent walks and roads to the various buildings were laid out and graded.

Eight bents were erected for coal dock and connected with the bulk head on coal dock approach of which was constructed by the C. & N. W. Ry. Co. in 1911.

A motor driven fan was installed on surface with a 10" pipe line down the shaft.

A second cross-head and bucket were installed in the West skip way so that rock can be hoisted with two buckets.

A chute and three doors were also constructed over the skip compartment, one door at the temporary landing floor, one at the permanent landing floor and one at the collar of the shaft.

A landers shanty was constructed on the West side of the permanent landing floor. This building was built of rough hemlock and covered with poultry netting and this in turn covered with concrete, thus making a fire

proof building. The building is heated with steam.

The Sullivan air compressor that was in the old boiler house at the Gwinn Mine was brought over to the Francis and installed on a concrete foundation that was constructed on the South side of the boiler house. This compressor was in a small building North of the Gwinn boiler house at the time of the fire in September. It was necessary to take it completely apart, provide new bearings and gaskets. The foundation frame shows a small crack but it is possible this will give no trouble if it can be securely anchored to the concrete foundation. This compressor will be enclosed in a temporary building.

A 150 H. P. boiler was brought over from the Princeton Mine and installed in the boiler house and stack erected over the boiler.

MACKINAW MINE

There was no work done at the Mackinaw Mine during the year.

GARDNER MINE

There was no work done at the Gardner Mine during the year.

GENERAL SURFACE

GWINN TOWNSITE

There were very few changes made in Gwinn during the year. The principal improvement was at the site of the new Town Hall. This building was completed and clock installed in the tower. The grounds were graded and seeded down and shrubs planted around the building. Contrete walks were also constructed and the lot enclosed by boundary fence. All of the above work being done by Forsyth Township.

GWINN ASSOCIATION

More interest is being given to the Gwinn Association than ever before in its history. This is principally due to the enthusiasm of the new Director.

The membership December 1st, 1915 was 696 as against 442 a year ago.

Educational work was started consisting of eight classes with total enrollment of 101. Seven of these classes were for foreign-born to learn English and one class for those who want to study mechanical drawing. All of the above classes being entirely for men. Classes in English for women will be started early in 1916.

The Womens Department is now well organized. Every girl member belongs to some organization. There are two groups of "Camp Fire" Girls, one group of girls too young to belong to the Camp Fire organization called the "Busy Bees". Another group, older than the Camp Fire Girls, called the "Sunshine" Club. Both of these last named are local organizations.

In the Boys Department there is one group of "Boy Scouts" under the direction of the Physical Director, all other boys of the department are organized into one large group.

The gymnasium work for boys is exceptionally good.

There are more people attending the Movies than a year ago. This is shown by comparison of two months taken by random. In October 1914 the total attendance was 1812, while the same month 1915 the attendance was 3077. This

increase is probably due to the fact that we are now having a better class of pictures.

The orchestra has been reorganized with prospects of having a larger and better one than ever before.

The band has bi-monthly rehearsals and plays when ever called upon for any public function.

The association has coming to its building each month 43 different magazines and six different news papers.

The Club Basket Ball team has started to do some good work in getting ready for the season.

The building is being used more and more by outside organizations for their various activities.

AUSTIN LOCATION

Garden Lots were staked out on the East and West sides of the Location and leased to the employes of the company for a nominal sum. This was a great benefit to the employes and especially to men working at the Stephenson Mine, as during the summer months the men were only working four days a week.

FORES FIRES

Due to the wet season very few fires occurred in 1915.

Three fires occurred in the latter part of April. They were as follows:

April 19th. A fire occurred in the N.W.$\frac{1}{4}$ of Section 27, T 45 N, R 25 W. This fire started about 600 feet South of the M. M. & S. E. Ry. track and burned over about five acres consisting of Jack Pine. This fire was started by Joe Amel of New Swanzy who was burning brush and chips. The weather being very dry and strong wind blowing he lost control of this fire.

April 21st. A fire started in N.E.$\frac{1}{4}$ of Section 19, T 45 N, R 25 W, and burned over 10 acres of brush and second growth Maple. This fire was also probably started from burning brush, as Charles Tapola and others had been cleaning up some land when the fire started.

April 24th. A fire occurred on parts of Sections 4, 5, 7, 8, 9 and

10, T 45 N, R 24 W. This fire started along C. & N. W. Ry. and burned over about 1500 acres consisting of Jack Pine. The fire was probably started by sparks from C. & N. W. engines No. 187, as the train went up shortly before the fire was discovered.

ACCIDENTS

There was one fatal accident in the Gwinn District in the year of 1915.

This accident occurred at the Stephenson Mine at 3:30 P.M. July 13th, Louis Gasparini being instantly killed by a fall of ground.

The place where the accident occurred was No. 61 Raise on 2nd Sub. below 4th level. Gasparini and his partner, Joe Dincau, started to work in this place on the morning of the 13th and were cutting out from raise to start a drift on 2nd Sub, below 4th level., In order to start this drift it was necessary to blast. Small charges of powder were used and during the day they blasted three times. The third time about 3 o'clock in the afternoon. The place previous to this blast was timbered and in good condition. The middle cap over the raise was dislodged by the blast.

Gasparini and Dincau went to the top of the raise and discovered that the cap had been dislodged and immediately started to replace it. They were in the act of lifting the cap to its position when a fall of ground occurred which caught Gasparini, his body being practically covered with ore, causing almost instant death.