GWINN MINE.

The Gwinn Mine was operated on two 8-hour shifts from Jan. 1st to March 4th, and on one 8-hour shift from March 4th to Dec. 31st. The product for the year was as follows:

<table>
<thead>
<tr>
<th>Gwinn Bessemer</th>
<th>25,873 tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gwinnport No. 2</td>
<td>129,661 &quot;</td>
</tr>
<tr>
<td>Total Ore</td>
<td>155,534 &quot;</td>
</tr>
<tr>
<td>Rock</td>
<td>25,100 &quot;</td>
</tr>
<tr>
<td>Total Ore and Rock</td>
<td>180,634 &quot;</td>
</tr>
</tbody>
</table>

The decrease in product of 6,429 tons in 1918 was mainly due to operating on single shift for 10 months in 1918, as compared with six months in 1917. There has been considerable development work under way throughout the entire year, the principal work being the opening of the 10th level and raising to connect the shaft. The cost of the product has been higher than in the other soft ore mines operated by the Company. The reasons for this higher cost may be briefly stated as follows; first, the thin deposit; second, double as much development work for each ton of ore produced due to developing all of the levels and mining only on alternate levels; and third, the semi-hard character of the ore, placing it in a class between the soft and the hard ores.

The Bessemer output for the year was very small. It now seems to be an established fact that the Bessemer ores are found only near the hanging in the steeper pitching parts of the ore body. The major part of the ore produced in 1918 came from the flat lying deposit on the 8th level, where there was no ore of Bessemer grade. The development work in ore between the 9th and 10th levels was confined to the footwall, and no Bessemer ore was obtained here. The greater part of the Bessemer ore hoisted during 1918 came from the small pillars mined between the old square set rooms between the 7th and 6th levels. The Bessemer ore hoisted during 1918 graded about one half Bessemer and one half Gwinn ore. The conditions existing during 1918 are not likely to be duplicated unless it should again develop that the greater part of the ore produced in any given year should
be obtained from another flat lying part of the ore body. The Bessemer product for 1918 averaged considerably higher in iron than during any previous year, in fact all the ore at greater depth is running more uniformly high grade.

The shipments for 1918 and balance of ore in stock are as follows:

<table>
<thead>
<tr>
<th>Shipments for 1918</th>
<th>Balance Ore In Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gwinn Bessemer</td>
<td>20,113 tons</td>
</tr>
<tr>
<td>Gwinn</td>
<td>21,781 &quot;</td>
</tr>
<tr>
<td>Gwinnport</td>
<td>140,647 &quot;</td>
</tr>
<tr>
<td>Total</td>
<td>182,541 &quot;</td>
</tr>
<tr>
<td></td>
<td>44,097 &quot;</td>
</tr>
<tr>
<td></td>
<td>45,171 &quot;</td>
</tr>
</tbody>
</table>

The ore in sight at the Gwinn Mine on Dec. 31st, 1918, was 802,200 tons. This is an increase of approximately 3,000 tons over the amount of ore shown in sight a year ago. The actual increase is, however, over 158,000 tons, for to the 3,000 tons increase, shown above, must be added the product obtained in 1918.

The estimate of ore in sight is as follows:

<table>
<thead>
<tr>
<th>Ore above 5th Level</th>
<th>Bessemer</th>
<th>Gwinn</th>
<th>Gwinnport</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot; 6th &quot;</td>
<td>7,390</td>
<td>7,390</td>
<td>14,760</td>
<td>29,520</td>
</tr>
<tr>
<td>&quot; 7th &quot;</td>
<td>42,750</td>
<td>42,750</td>
<td>85,500</td>
<td>171,000</td>
</tr>
<tr>
<td>&quot; 8th &quot;</td>
<td>4,000</td>
<td>4,000</td>
<td>26,740</td>
<td>34,740</td>
</tr>
<tr>
<td>&quot; 9th &quot;</td>
<td>10,000</td>
<td>10,000</td>
<td>25,580</td>
<td>135,580</td>
</tr>
<tr>
<td>&quot; 10th &quot;</td>
<td>15,000</td>
<td>15,000</td>
<td>27,650</td>
<td>297,650</td>
</tr>
<tr>
<td>Total Developed Ore</td>
<td>94,130</td>
<td>94,130</td>
<td>565,540</td>
<td>853,800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prospective Ore Below</th>
<th>Bessemer</th>
<th>Gwinn</th>
<th>Gwinnport</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10th Level</td>
<td>5,000</td>
<td>5,000</td>
<td>40,400</td>
<td>50,400</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td>99,130</td>
<td>99,130</td>
<td>605,940</td>
<td>804,200</td>
</tr>
</tbody>
</table>

Additional ore has been developed during the past year, particularly in the territory between the 8th and 10th levels; also in the isolated ore body between the 8th and 7th levels. During the year the territory to the west of the developed ore body on the 9th level has been thoroughly explored with the result that it has been entirely eliminated as a high grade ore possibility. The work here showed that the formation was very flat and it is evident that the drill holes, which showed ore in this territory, merely followed a narrow seam of ore in the flat formation. Early in the year it was thought that the ore body below the 10th level was not large enough to warrant sinking the main shaft below the 10th level; however, later in the year sufficient ore was proven up on the 10th level to render it advisable.

Gwinn Mine.
to sink the main shaft to the bottom of the deposit, which work will be
done in 1919.

The work in detail for the year is as follows:

**FOURTH LEVEL.**

There was no mining on this level in 1918. It is being kept open
in order that monthly examinations may be made of the stopes in order to
determine the manner in which they are filling and to give accurate inform-
ation of the height to which the cave has extended. It is a matter of
great satisfaction to be able to report that there has been no movement of
ground in this territory during 1918. No ground has fallen in the stopes,
which are nearly filled to the back. This apparently proves that the sys-
tem of mining alternate levels is an entirely safe proposition and that
there is no danger of the ground caving through to surface. Any break of
the capping through to surface above the Gwinn Mine would mean the immediate
flooding and permanent abandonment of this property.

The fourth level drifts will be kept in repair in order that
these monthly examination may be continued.

**SUB-LEVELS BELOW SIXTH LEVEL.**

Mining of the pillars between the old square set rooms Nos. 1 to
5 were completed on the first and second sub-levels in 1917.

3rd Sub Below 6th.

Two contracts were mining ore on this sub-level in January 1918.
Work was completed on the pillar between the square set rooms Nos. 1 and 2
during this month, and mining was completed in April on the only remaining
pillar which was between rooms 2 and 3. This finished the mining of all
the pillars between the square set rooms at the elevation of the 3rd sub-
level.

4th Sub Below 6th.

Mining of the pillar between rooms Nos. 1 and 2 was started the
last of January and completed in June and work on the pillar between rooms
Nos. 2 and 3 was started in May and finished in September. The two pillars
between rooms Nos. 3 and 5 were mined in 1917. This completed the mining

GWINN MINE.
of all the ore on the 4th sub-level.

5th Sub Below the 6th.

In 1917 the ore was being mined on the 5th sub-level between square set rooms Nos. 3 and 4. Mining of this pillar was completed the last of April 1918. Mining of the pillar between square set rooms Nos. 1 and 2 was started in June and completed in December. Mining of the pillar between rooms Nos. 2 and 3 was started in October and had not yet been completed at the close of the year.

6th Sub Below the 6th.

Mining was started on the 6th sub-level in the pillar between square set rooms Nos. 3 and 4 in May and the mining of this pillar was completed in September. The pillar between square set rooms Nos. 4 and 5 was mined in 1917.

7th Sub Below the 6th.

Mining of the pillar between square set rooms Nos. 3 and 4 was started in October and had not yet been completed at the end of the year.

It will be noted from the above that there were a large number of sub-levels operated during the year between the 6th and 7th levels. These subs are located only 10 feet apart, as it is necessary to work under the floor covering of the sub-levels above and keep the places well timbered in order to prevent accidents on account of the open square set rooms on each side of the pillars. The territory available for mining ore is small as the pillars are only 21 feet in width between the square set rooms. Three gangs worked during the year in this territory and only at one point has a pillar been mined down to the floor of the 7th level. There will be work here for two gangs for at least another year.

SEVENTH LEVEL.

There are 34,740 tons of ore in sight between the 7th and 6th levels, part of which is represented by the shaft pillar, which cannot now be mined, the balance is in the pillars remaining to be mined between the old square set rooms.

During the year a drift was driven from the old 7th level haulage...
drift over to a point above where mining had been completed on the 8th level. This drift holed to the cave above the 8th level workings in order that a watch might be kept of the manner in which the capping was breaking and the stopes being filled above the 8th level.

**SUB-LEVELS ABOVE THE EIGHTH.**

Considerable work has been done during the past year on and above the third sub, which had been opened in this territory several years ago when the ore body on the 8th level was originally developed. At that time a small deposit was found between the 8th and 7th levels which did not connect with these levels. Work was started in this isolated ore body in 1917 and has been continued on double shift throughout the year 1918.

5th Sub Above the 8th.

Work was started on this sub-level in March, by which time it had been found that the ore body extended far enough above the third sub to warrant opening other subs higher up in the ore. Accordingly the 5th Sub was opened by putting up raises from the third sub, the back of this 5th Sub being only a short distance below the old 7th level. The crosscuts on the 7th level were in jasper and, at the time they had been driven, it was not expected any ore would be found in the territory under them. This sub-level was opened up from two raises in March and mining was not completed until the last of October. A much larger tonnage was developed at this elevation than had been expected at the time the sub-level was opened. The ore, however, did not average over 54.50 in iron and in several places was found too lean to be mined. All the merchantable ore was mined up to the hanging, the floors lagged and the contracts dropped down to open a new sub beneath the floor covering. The ore obtained from this 5th Sub was dumped by the miners into short raises, which had been put up from the third sub-level. From this point it was trammed and dumped into a raise which had been put up from the 9th level. This place was worked on double shift, the product from the night shift being held in the long raise from the 9th level and drawn out during the day when hoisting was in progress.

GWENN MINE.
4th Sub Above the 8th.

This sub was opened in September and at the close of the year there were three gangs working here. It was opened just beneath the floor covering of the sub above. The grade of the product obtained from this sub has been considerably better than from the sub above, the ore averaging about 56% in iron. The deposit has been found to be larger than on the sub above and it is evident that a considerable tonnage will be obtained on this sub-level. Raises are now being put up from a new rock drift on the 9th level, which will permit of the product from this sub-level being dumped by the miners directly into raises extending through to the 9th level. This will render it possible to do away with the trammers now employed in transferring the ore from this sub-level to a raise from the 9th level, and will materially decrease the cost of the product here.

3rd Sub Above the 8th.

Work was started on this sub-level the latter part of 1917, and considerable work has been done here during 1918. From mining operations here early in the year it was found that the ore extended up some distance above this sub-level and that in order to mine it it would be necessary to open two subs above. In addition to a number of raises, which were put up from the third sub to the subs above, a drift was driven along the hanging, outlining the ore body. This showed that this isolated deposit was large enough to warrant drifting in rock on the 9th level and putting up raises which would hole to this ore body. On account of mining operations on the subs above it has not been possible to mine out the ore on this sub-level but it has been thoroughly developed in preparation for mining. Work done here has shown that there is a roll in the footwall between the foot and hanging wall drifts so that all of the pillar at the elevation of this sub-level is not ore. The formation beyond the roll is very flat, dipping about 15 degrees to the south, and the ore developed near the hanging indicates that the deposit will probably be thin below the elevation of this sub.

The work done here in 1918 has resulted in the development of about five
times as much ore as it was anticipated would be obtained from this territory. One of the new raises from the 9th level has already holed here and three other raises are now being put up. When these hole, the rock development work, connected with the mining of this ore body, will have been completed. It is estimated that there are now 20,000 tons of ore developed on these sub-levels, all of which can be mined.

1st Sub Above 8th.

The first sub above the 8th was opened early in 1917 and mining continued throughout the year. It was opened in the flat lying ore body above the main 8th level. This sub-level was worked at two points, as the hanging rolled downward in the center of this ore body, separating the ore at this elevation into two parts. In January there were three gangs working on this sub-level and work was continued throughout the summer, all the ore being mined at this elevation in September. Part of the ore mined here was obtained under very unfavorable mining conditions. As the contracts approached the roll in the hanging the ore decreased in height and it was necessary to mine part of it using short legs from 4 to 6 feet in length. The ore body is nearly horizontal and it required a large number of holes to break the ore. This increased the amount of powder required and resulted in increasing the cost of the product from this sub-level. All the ore has now been mined on the first sub above the main deposit on the 8th level, except in the shaft pillar. It may develop later on that there will be a sub-level opened at this same elevation in the downward extension of the isolated ore body being mined on the third and fourth subs, described in previous paragraphs, but there is as yet no apparent connection between this ore body and the main 8th level ore body.

EIGHTH LEVEL.

During the early months of 1918 a large number of gangs were engaged in mining pillars on the main floor of the 8th level. Ore was mined here on double shift in January and February, at which time it became evident that on double shift these pillars would be mined out very much in advance of the opening of the 10th level, with the result that there would be a sudden de-
crease in the product from the mine with the completion of the mining on the 8th level. Results of the work here demonstrated that it would be advisable to put the mine back on single shift in order that the mining here might not advance more rapidly than the development work on lower levels. During the past year the greater part of the remaining pillars have been mined and at the close of the year there were only four gangs working here. At the end of the year there were 159,540 tons of ore remaining between the 8th and 7th levels, of which amount 120,000 tons are in the main pillar and will therefore not be available for mining until all the ore has been mined out below the 8th level.

**SUB-LEVELS BELOW THE EIGHTH.**

Some development work was done during 1917 in opening various sub-levels between the 8th and 9th levels. According to the system of mining being followed here, the ore between the 8th and 9th levels should be left intact until mining has been completed on the lower levels, after which part of the ore remaining on alternate levels will be mined. A portion of the flat ore body on the 8th level extends down far enough for one sub-level to be opened below the 8th, this being in territory entirely independent of the ore pillar between the 9th and 8th levels. In addition to mining operations on this ore it became necessary, in order to keep the product up to 400 tons per day, to do some mining at the elevation of the first sub below the 8th in the main pillar between the 8th and 9th levels. Fortunately the ore between these levels lies on a rather flat pitch so that it was considered safe to mine all the ore out at the elevation of the first sub below the 8th, as there would still be a large pillar left here.

1st Sub Below the 8th.

In January 1918 there were three gangs working on this sub-level. The number of gangs working here was gradually increased to six in the summer and during the last three months of the year there were eight gangs working here. About 75% of the ore on this sub-level has now been mined. As the contracts complete work here they will start mining the pillar between the 9th and 10th levels.

GWINN MINE.
5th Sub Below 8th or 1st Sub Above 8th.

The work of outlining the ore under the hanging on this sub-level was started in April and continued through August. This work was done in anticipation of the mining of the pillar between the 8th and 10th levels, which rendered it necessary to take out the ore up to the hanging above the main 9th level.

NINTH LEVEL.

The major portion of the development work on the 9th level was completed in 1917, but some additional rock work has been done during the past year. In 1917 a drift had been started to the west of the developed 9th level ore body for the purpose of proving up some ore which had been shown up in drill holes to the south of the 8th level. This drift had been driven a distance of 300 feet in 1917. In January 1918 it was extended 183 feet further, at which point it was decided to stop drifting and do the balance of the exploratory work through raises and by drifting from one of these raises. This drift was driven in 1918 in the footwall beneath the ore formation. Three raises were then put up from the drift, in all of which some lean ore was found, but at no point was there ore of merchantable grade. The formation was found to lie almost horizontal and it seemed very doubtful whether an ore body of any size would be found in this territory. The work done on the sub-level opened from one of these raises will be described in another paragraph.

The size of the isolated ore body developed between the 8th and 7th levels rendered it advisable to drive a rock drift to the west on the 9th level and to put up raises from this drift to hole directly to this ore body. This drift, which was 365 feet in length, was completed in the fall. One raise has been extended through to this ore body a distance of 85 feet and three other raises are now being put up. As this ore body does not exceed 20 feet in thickness, the greater part of these raises will be in rock.

In order to provide working places for some of the gangs which had completed work on the 8th level, it was decided to start mining along the

GWINN MINE.
hanging on the 9th level, as it was necessary to do this work before mining could be started on the ore pillar between the 9th and 10th levels. One gang started working here early in the summer, later on another gang started, and mining has been continued here during the balance of the year. An area 140’ x 50’ in size had been mined out here by the end of the year.

Some work was also done on the main level in preparing for the installation of the small electric hoist, which was purchased this summer to handle the ore from the 10th level until such a time as the main shaft had been extended down from the 9th to the 10th levels.

50 Ft. Sub Below the 9th.

A small amount of work was done on this sub-level during the summer, a drift about 100 feet in length under the hanging being driven to connect a raise to #2 winze. No further work will be done at this elevation until mining of the pillar between the 9th and 10th levels has been started.

Exploratory Drift on Sub 45 Ft. Above 9th Level.

A sub-level was opened at this elevation to develop the ore shown up in two horizontal drill holes drilled to the south from the main 9th level. These holes are located about 700 feet west of the main ore body on 9th level and the survey of the holes show that they had dipped downward so that the ore encountered here was about midway between the 9th and 8th levels. The exploratory drift driven on the 9th level in this territory had not shown favorable indications of ore but it was nevertheless considered advisable to drift to these drill holes. This drift was driven in a southwesterly direction from the raise following a four foot seam of good ore, there being jasper on both sides of the ore. The product from the drift averaged between 46 and 52½% in iron. Work was started in March and continued until in September, by which time it had been fully demonstrated that there was no merchantable ore deposit here. A total of 225 feet of drifting was done to reach the location of the drill holes and in addition a crosscut was then driven nearly 100 feet to the south. There was no change in the formation, and accordingly further work here was abandoned. The formation was found to lie nearly horizontal and consisted of alternate bands of high grade ore.

GWNN MINE.
and jasper. There are apparently two main seams of ore here, each of which are about four feet in thickness, with other seams from a few inches up to a foot thick. It is evident that the drill holes on the 8th level followed one of these thicker horizontal seams of ore, this giving a false idea of the thickness of the ore here. As a result of the work done here in 1918, this territory has been definitely eliminated from further consideration.

TENTH LEVEL.

The 10th level was opened from No. 2 winze in 1917 at an elevation of 100 feet below the 9th level. Up to the close of the year 1917 there had been 350 feet of ore drifting on the level. The development of the 10th level was continued during the year 1918, the limits of the ore body being fully determined. It was found to extend a distance of 230 feet to the south beyond the limits determined in 1917. The ore here, however, is narrow and did not result in increasing the tonnage to any great extent. During 1918 there has been a total of 553 feet of drifting in ore and 690 feet in rock on the 10th level.

A rock drift, 600 feet in length, was driven in 1918 to the line of the shaft and the shaft sunk 65 feet below the 10th level, skip pit drift driven, and raising to connect with the present bottom of the shaft was started the last of December. It will require another month before the cage and skips can be operated to the 10th level.

A rock drift was also driven in the footwall on the 10th level, beneath the 9th level ore body, from which four raises have been extended up to the 9th level in preparation for mining the ore pillar between these levels.

Early in the year an incline two compartment raise was started from the 10th level following the footwall, which, when completed, was equipped and used for handling the material from the 10th level. Two one-ton skips were operated here in balance. The rock work on the 10th level has been done on double shift throughout the year. Even then the work has not progressed fast enough to permit of starting to mine the ore pillar between the 9th and 10th levels so that working places in ore could be provi-
ded for a sufficient number of gangs to maintain the product at 500 tons per day.

There was a total of 3411 feet of rock drifting and raising in 1918, as compared with a total of 3031 feet in 1917, an increase of 380 feet for 1918.

Development work has now been practically completed on the 10th level, and the work of sinking and opening the 11th level must be started within 90 days. There will continue to be a heavy charge for shaft sinking and rock drifting until the bottom of the ore body is reached, as two levels must be fully developed in order that one may be mined. There will only be one more level necessary for mining the ore body on the Gwinn Mine property, deeper levels may become necessary if the ore body extends over on the Wadsworth lands and it is decided to mine this ore from the Gwinn Mine shaft.

SURFACE.

The work of installing 40" rail in each skip compartment from the collar of the shaft down to the first level was completed in November. These rails were installed on the end pieces of the shaft to prevent the skips from catching in the timbers should they accidentally dump while being hoisted. Every winter for the past several years the skip ropes have broken due to the skip dumping over and catching in the end pieces of the shaft. This has always occurred in the winter time and was probably caused by ice. Some of these accidents have been very serious, wrecking the shaft, making it necessary to close the mine down for several days while repairs were being made. Steam pipes have been installed in the skip-roads near these rails to prevent ice forming on them and it is confidently expected that there will be no future wrecks of the skips due to catching in the shaft.

In the fall an addition was made to the barn at the mine in order to provide room so that the team from the Francis Mine could be kept here. This addition cost less than it would have cost to have built a barn at the Francis Mine, and by concentrating the horses it decreased the expense of taking care of them on Sundays and holidays. At this time some needed repairs were also made to the barn, so that all the expense for this work is GWINN MINE.
not chargeable to the addition.

During the year several of the top tram cars, both ore and rock, were rebuilt in the Gwinn Mine shops. Under ordinary operating conditions, the top tram cars will last through one year without much repairing, however, it is then necessary to take them into the shops and give them a thorough overhauling.

The surface expense at the mine was increased during 1918 due to the fact that all mine tracks, as well as the steam shovel tracks, have to be maintained by the mining company under General Order No. 15. In order to handle this work in the district a small section crew with a foreman was employed the latter part of the shipping season.

The only other maintenance charge of any importance at the Gwinn Mine for 1918 was incurred in inclosing the shaft-house. This work was not started until late in the year and was not completed at the close of the year. Both the skip and cage roads have been inclosed from the ground level up to the landing. This has had a very good effect in that it has given a control of the draft in the shaft. Heretofore in the winter time the skip roads have been downcast and the cage road upcast, which has resulted in the formation of ice in the skip compartment, often with serious results. Since inclosing the shaft-house from the ground to the landing, however, it has been possible to change the draft, making either the cage or skip roads downcast or upcast as desired. The draft is now controlled by opening and closing the doors to these compartments at the ground level, and thus far it has been possible to keep all ice out of both the cage and skip roads. Conditions may not be so favorable in very cold weather for thus far there has not been any extremely cold weather. It is planned to inclose the skip dumps up to the sheaves at the top of the shaft-house. When this work is completed it will be an easy matter to handle ore and rock on surface, even in the most severe weather.