UNWATERING AND EXPLORING--DEXTER MINE.

The work of unwatering the old Dexter Mine and exploring for ore by diamond drilling, was authorized the last of January. The material necessary for the work was ordered the first of February, and some work was done during the latter part of the month. In March an air line was put in from the Chase Mine over to the Dexter shaft, and a temporary engine house built. A pole line was also put in from the Chase engine house over to the temporary engine house at the Dexter, and the wires strung for carrying the current for operating the unwatering pumps. Before the work of unwatering could start, it was necessary to re-timber the old shaft down to ledge, which was 18 ft. below surface. This work was started the last of March and completed April 20th. During this time a temporary head frame was put up over the shaft, and in April the sheaves were put in and the skip road extended up into the head frame. Two air hoists were set up in the temporary engine house, one to operate the platform on which the unwatering pump would be set up, and the other to be used for hoisting and lowering material into the mine. A discharge line to carry the water away from the shaft, was put in to a point 400 ft. West of the shaft; from this point a ditch was made 1000 ft. to the S.W., which carried the water to a point from which it drained from the mine.

From all reports, it was concluded that the Dexter Mine made about 500 gallons of water per minute. There was several pumps on hand at North Lake of 300-gallon capacity, but these, however, were too small to be used for this work. A water end for a centrifugal pump with a capacity of 600 gallons per minute, 200 ft. head, was ordered, and when it arrived, was fitted on to the frame and motor of one of the 300 gallon, 400 ft. head pumps which were on hand at North Lake. The latter part of April this pump was set up on the platform of the cage which was to be used in unwatering, a connection made to the discharge line through a 4 in. discharge hose, and the work of unwatering was started April 27th. In order to carry the current to this pump as it was lowered into the mine, an armored cable was purchased and rigged up on a reel on the cage above the unwatering pump. The water level in the shaft was 40 ft. from surface on the incline. The work
of unwatering started on the morning of the 27th, and the water was lowered 25 ft., on the 26th 30 ft., or to a point 95 ft. below the collar of the shaft. At 3 o'clock on the morning of the 26th, the transmission line broke a half mile West of Ishpeming, shutting off the current, and as it was impossible to hoist the unwatering pump, it was soon covered with water. Repairs were made to the transmission line on the 29th, and the pump was pulled to surface, the motor taken off and brought to North Lake to be dried out. Work was resumed on May 4th, but on account of a number of accidents to the motor and starting box, the actual unwatering did not start until 12:30 P.M. May 5th.

The 1st level, 150 ft. below surface on an incline, was reached on May 25th. The 2nd level was reached early in June, and the 3rd level a week later. This was as far as the 600 gallon 200 ft. head pump could be used. It was then decided to set it up on the 2nd level, where there was a large sump, and to use a 300 gallon 400 ft. head pump for unwatering. The old stopes on the 1st and 2nd levels were opened a considerable distance to the East, where they connected with the old "Dey" shaft. Near this point the ore had been mined out up to the surface, which had caved in, and it was here that fully 80% of the water came in. It was thought for a time that it would be possible by means of concrete dams to shut off this water, but when the old stopes had been surveyed, it was found that it would be impossible to do this, as they connected with the lower levels.

It was also decided to put in a pump on the 3rd level, and a 300 gallon, 400 ft. head centrifugal pump was installed here the last of June, a separate 4 in. discharge line being put in for it. Unwatering was completed on July 18th, when the 8th level was reached 482 ft. vertically below surface. Until a point about 375 ft. below surface was reached, the pump used for unwatering pumped the water to surface, it then discharged the water to the pump on the 2nd level. On completing the work of unwatering the mine, the pump used for this purpose was taken off the cage and installed on the 7th level, where previous operators had made a small sump. A small Cameron pump located at the bottom of the mine, pumped the water which came in here to the pump on the 7th level, which pumped it to the 2nd level sump, from which point it was then thrown to surface. The pump on the 3rd level was only
operated during the time that the 7th level pump was in operation, as the
pump on the 2nd was not able to handle all the water which came in here, and
the additional water pumped by the 7th level pump.

The actual work of unwatering required seventy five days to complete. The timber in the old shaft was found to be in very bad condition, and
in order to lower the cage on which the unwatering pump was placed, it was neces-
sary to block up and repair the old skip road. At every level the old sol-
lers had to be taken out and new ones put in. As the pump was lowered, it was
necessary to bar down all loose pieces from the back of the shaft, some of
this ground would fall to the foot of the shaft and lodge on the old sills
under the skip road. The balance would go down the shaft and accumulate on
the sills of the level below. Every time a level was reached, it required
about two days to hoist the dirt, tear out and put in the new sills. A
substantial ladder road was put in as the unwatering progressed, which was
located near the back of the shaft; beneath the ladder road a slide was built
of 2 in. plank, on which all the old timber and rock was hoisted out. This
slide was also used for lowering pipe and other supplies into the mine.

During the time that unwatering was in progress, surveys and maps
were made of those portions of the old levels which it was possible to pen-
trate. Large falls of ground had occurred in the old stopes, so that it was
impossible to explore some of them. As soon as unwatering was completed,
the work of cleaning up the 7th and 8th levels was started, and this work
was in progress on July 26th, when a severe electric storm occurred, lightning
setting fire to the temporary engine house, burning it to the ground. On the
27th a temporary connection was made to the pole line so that the current
could be gotten to the pumps and pumping resumed before any of the pumps
were drowned out. The hoists were badly damaged by the fire, and it was
necessary to renew all packing, bands, etc., before they could be used. Mat-
terial for rebuilding the engine house was ordered, and it was re-built as
soon as possible. The hoists were repaired on Aug. 6th, and a diamond drill
was taken into the mine to the 7th level, where it had been decided to start
exploring work while sampling was being done on the 8th level. On the 6th
level there was a number of large stopes of ore which had been mined out

DEXTER MINE - UNWATERING.
above the 6th, and of which no downward extension had been found in the exploratory work done by the previous operators on the 7th level.

Hole No. 1 was located 280 ft. East of the shaft on the 7th level, and was drilled to the Northeast. This hole was started on August 8th, and was completed on August 17th at a depth of 125 ft. It passed through dike and lean jasper without encountering any ore. This drill was then moved further in on the 7th level to a point 430 ft. Northeast of the shaft, and a hole drilled to the Northwest.

Hole No. 2 was started on August 19th, and completed on Sept. 1st at a depth of 170 ft. From a depth of 55 ft. to 60 ft., the material analyzed Iron 46.65, Phosphorus .126. From 60 to 65 ft. this hole showed material which ran Iron 54.28, phosphorous .142, from 65 to 65 ft., Iron 46.38, phosphorous .110. The hole then passed into jasper to a depth of 114 ft., where there was 6 ft. of material averaging 50.19 iron, .153 phosphorous, then into jasper to 151 ft., and slate from 151 to 170 ft. It showed bands of lean ore in the jasper without any indications of a concentration at this point.

While No. 2 was being drilled, sampling was in progress on the 6th level. Three ore stopes were found here, which have been designated on all reports as stopes "A" "B" and "C". Stope "A" was located at the East end of the 6th level workings about 260 ft. from the shaft, and was roughly 25 x 20 ft. in area. The average of three hand picked samples in this stope ran Iron 53.70, Phosphorus .062, Manganese 3.60, Silica 5.60. One diamond drill hole in the floor, No. 6, showed 5 ft. of ore averaging 53.60 iron, .133 phosphorous, .60 manganese.

Stope "B" is another small stope 170 ft. East of the shaft, and is roughly 20 x 30 ft. in size. The average of three hand picked samples here ran Iron 57.50, Phosphorus .065, Manganese .37, Silica 10.10. Drill hole No. 5 was put down in the floor for the purpose of sampling ore, and showed 35 ft. of ore averaging Iron 61.91, Phosphorus.052.

Stope "C", the main ore stope on the 6th level, roughly 65 x 60 ft. in size, was located to the North and East of the shaft, the shaft being bottomed in this ore at the West end of the stope. As this was the main ore area, very careful sampling was done here. A line of six machine drill holes each 5 ft. deep, were put in the bottom of the stope in a line North and South,
the average of these holes being Iron 53.50, Phosphorus .088. The average of three carefully hand picked samples across the entire ore body, gave an average of Iron 53.60, Phosphorus .086, Silica 8.80, Manganese 1.60. Two diamond drill holes were put down also in this stope for sampling purposes, the first being No. 3 hole, which struck quartzite at a depth of 35 ft., the average analysis of the 35 ft. of ore was Iron 52.90, Phosphorus .155, Manganese 1.68. Diamond drill hole No. 4, was also drilled in the floor of this stope at a point 20 ft. West of hole No. 3, and struck quartzite at a depth of 37 ft. The average analysis of the 37 ft. of ore was, Iron 54.90, Phosphorus .099, Manganese 1.70.

Drill holes No. 3, 4, 5 and 6, were drilled on the 8th level between August 10th and 20th. They were all put down for the purpose of determining the average analysis of the ore in the stopes, and also to show the depth of the ore to the quartzite. It was not possible to thoroughly explore for ore below the 8th level from the 8th level workings. It was therefore decided to drive a crosscut about 75 ft. North of the main ore stope near the shaft, and do considerable drilling from the end of this drift, which would permit of crosscutting the ore body at greater depth. This drift was started on August 20th, and completed on Sept. 7th. The North end of the drift was widened to 15 ft., and the back raised to a height of 15 ft. for a distance of 10 ft. back of the breast. The drift was in dike and jasper, and as there was no facilities for hoisting the material broken in this drift, it all had to be disposed of on the 6th level in the ore stope which had been opened here by former operators.

Hole No. 7 was located on the 7th level and was drilled immediately after hole No. 2 was completed on this level. It was located 140 ft. East of the shaft, and was drilled to the North to test the hanging. It started on Sept. 2nd, and was completed on Sept. 16th at a depth of 165 ft., passing through jasper and dike. The drilling which was done on the 7th level indicated that the 6th level ore bodies did not extend down to this level. It was decided that the results on the 7th level did not warrant any further drilling in this territory, and for the balance of the year drilling was confined to the 6th level.
Drilling was started on the 6th level from the new crosscut on Sept. 6th, Hole No. 8, a vertical hole being drilled to a depth of 80 ft. This hole passed through the ore formation, striking quartzite at a depth of 61 ft., and was continued in this material to a depth of 80 ft. It indicated a roll in the quartzite which forms the footwall of the Dexter ore body, and rendered it more likely that an ore body would be found here than would have been the case if the quartzite had maintained its regular dip to the North.

Hole No. 9 was drilled from the same station, dipping 45 degrees South, 28 degrees East. It was started on the 16th of September, and was stopped on the 21st at a depth of 77 ft. It was in dike to 31 ft., and in soft ore jasper and dikes to 50 ft., from 50 to 65 ft. was in ore averaging 52.10 iron, .156 phosphorus, 4.02 manganese, and then passed into dike, striking quartzite at 70 ft. This hole, with Hole No. 6, proved beyond question that there was a big roll in the quartzite footwall just below the 6th level.

Hole No. 10 was located at the West end of the 6th level stope in a small drift that had been driven about 20 ft. West of the shaft into the hanging by the former operators. It was drilled on a course of South 81 degrees West, dipping at 45 degrees; it was started on Sept. 22nd, and completed on the 16th of October at a depth of 223 ft. It showed considerable lean material averaging about 46% iron, striking the quartzite at a depth of 219 ft. It was assumed that this hole was drilled in a lean run of material which lies between the quartzite foot and the main ore body.

Hole No. 11 was drilled from the North side of the main ore stope, dipping 70 degrees. This hole was planned to go down through the quartzite roll into the underlying formation with the expectation that it would strike the underlying hard ore jasper where there was a possibility of finding ore. This hole was started on the 30th of September, and was completed on the 26th of October at a depth of 300 ft. The first 25 ft. showed ore running 55.04 iron, .147 phosphorus, 2.22 manganese, the next 10 ft. ran 57.99 iron, .100 phosphorus, 1.58 manganese, and the next 5 ft. showed iron 53.70, Phosphorus .153, Manganese 1.58. It then passed through Jasper and dike to a depth of 56 ft., when it struck quartzite, in which it was continued to a depth of 110 ft. It passed through 10 ft. of soft ore jasper, and then back into quartzite.
in which it was continued to a depth of 230 ft. It then struck soft ore jasper to 255 ft., the next 40 ft. being in hard ore jasper, and the last 5 ft. in soft ore jasper. This drill hole showed an irregularity in the quartzite, either folding or faulting, as shown by the band of jasper encountered between 110 and 120 ft. After passing through the quartzite at a depth of 220 ft., it evidently continued close to the contact, as shown by the soft and hard ore jasper. It was not considered advisable to continue this hole to a greater depth, as it was evidently located practically on the fault. From the results of Hole No. 11, it was thought advisable to return to Hole No. 8 and drill it deeper.

Drilling was started again in hole No. 8 on the 30th of October at a depth of 80 ft., the hole being stopped on Nov. 4th at a depth of 158 ft. It showed a corresponding formation to that encountered in hole No. 11, the drill hole passing through quartzite into soft ore jasper, and back again into the quartzite, in which it was stopped.

Hole No. 12 was drilled from the same station as hole No. 10, i.e., the small drift West of the shaft on the 8th level, dipping forty degrees, and drilled on a course of North, eighteen degrees West. It was thought that this hole would intersect the main ore body on its pitch to the West. The hole was started on the 19th of October and completed on the 28th at a depth of 134 ft. From a depth of 35 to 65 ft., it showed ore averaging Iron 50.73, Phosphorus .035, Manganese 5.22.

Hole No. 13 was then drilled from the same station, dipping 35 degrees, on a course of North, 59 degrees 30' West. It was thought this hole would strike the ore body at a considerably greater depth than hole No. 12. It was started on the 26th of October and completed on the 14th of November, at a depth of 169 ft. It passed through soft ore jasper and dike, striking lean ore at a depth of 150 ft., which only averaged 45.62 iron. It indicated that the ore chute did not continue to the West to the line of this drill hole, but the evidence was not considered conclusive, as it was drilled nearly in line with the strike of the ore body.

Hole No. 14 was located near the West side of the main ore stope, and was drilled with the idea of following the ore down to the West on its
pitch. It was thought that this hole would not only tend to prove up the
length of the ore chute, but would be valuable as giving analysis along the
strike of the ore body. It showed low grade ore to a depth of 65 ft., pass-
ing into jasper at this point, in which it was continued until it was stopped
at a depth of 135 ft. The general average of the ore in this hole was about
50% iron, .032 phos., 4.50 manganese.

Hole No. 15 was located in stope "B", and was drilled in order to
prove up the depth of this high grade ore body, to assist in determining the
tonnage, and also to give analysis of the ore below the 8th level. It was
started on the 16th of November, and completed on the 18th at a depth of 61
ft. It was drilled on a dip of 22½ degrees North, 62 degrees West, and
showed 30 ft. of high grade Bessemer ore and 30 ft. of low grade ore.

Hole No. 16 was located at the end of the crosscut North of the
ore body near the shaft, and was drilled to intersect the ore chute on its
pitch to the West at a point in advance of where it had been located by
other drill holes. This hole was drilled on a dip of 28 degrees South, and
a course of 37°-30' West. It was started on the 16th of November and com-
pleted on the 29th at a depth of 194 ft. From 75 to 90 ft., it was in ore
averaging 50.42 iron, .033 phos., 4.31 manganese. It then continued in lean
ore and jasper to a depth of 158 ft., where 17 ft. of high grade ore was en-
countered, averaging Iron 60.82, Phosphorous .123, Manganese .19. The last
run of ore was evidently not the extension of the main ore chute, but is
another lense of ore lying near the footwall. When the direction of the
drill hole is taken into consideration, it was thought that this 17 ft. of
ore was really only a narrow seam, possibly not more than 7 or 8 ft. in
width. It was not given any consideration in figuring the tonnages devel-
oped by drilling below the 8th level.

Hole No. 17 was located in the high grade ore stope designated
as stope "B", to further prove up the downward extension of this ore body.
It was drilled at a dip of forty degrees, on a course of North, 76 degrees
West. The first 35 ft. averaged about 62½ iron, then 5 ft. of lean ore,
then 15 ft. of ore averaging 59.65 iron, .064 phosphorous, with 5 ft. of
lean ore beneath, running 52.70 iron. This hole passed into quartzite at
a depth of 72 ft. It showed this stope to extend on its strike a distance
of 60 ft. below the 8th level.

Hole No. 18 was located on the 8th level in the breast of the cross-cut driven to the North of the main ore stope, and was drilled on a dip of 62 degrees North, 15 degrees East, in an endeavor to test the heresy reports of previous operators, who claimed to have struck material which did not make core, and which they thought was ore. In addition to testing these reports, it also served to show the geological features in the territory at depth to the North and East of the crosscut. This hole was started on the 24th of November, and was completed on the 22nd of December at a depth of 288 ft. It was in jasper and dikes to a depth of 194 ft., where it struck quartzite and continued in quartzite to a depth of 209 ft. It passed into jasper to a depth of 221 ft., then back into quartzite to a depth of 254 ft., then into soft ore jasper, in which it was continued until it was stopped at a depth of 288 ft. It merely proved that the ore formation continued and that the quartzite footwall at depth was irregular, the same as in the territory farther to the West.

It was also decided to drill hole No. 8, a vertical hole located at the end of the crosscut North of the main ore stope, which was already 138 ft. deep, on down through the quartzite to the underlying hard ore formation. This hole was started again on Dec. 1st, and was continued until Dec. 23rd, when it was necessary to stop drilling and ream the hole for casing to a depth of 106 ft., where it was caving. From 136 ft. to 218 ft. it was in quartzite, then in soft ore jasper for 18 ft., and back into quartzite again to a depth of 254 ft., when reaming was started.

The drill which had been working on hole No. 18, on completing this hole was taken to surface and sent back to the Republic Mine, from whom it had been borrowed when work at the Dexter was started.

In the report made on November 24th covering the work done to this date, it was shown that there was not sufficient ore developed by the drilling to warrant opening the mine for ore production. It was decided, however, before abandoning the proposition, to drill hole No. 8 deeper to test the underlying formation, and to drill hole No. 18 to test the heresy reports of former operators as to certain material which they encountered below the quartzite.

Altogether, there will be a total of eighteen holes drilled on the
property, fifteen on the 8th level, and three on the 7th. Up to Dec. 31st, there had been 2505 ft. of drilling done here, 1791 in rock and 914 in ore and lean ore. Three ore lenses can be seen on the 8th level, only two of which are large enough to be given consideration. The Eastern one of these two, stope "B", is a high grade Bessemer ore stope which is estimated to contain 3,920 tons of ore below the 8th level, and 1,224 tons above, a total of 5,144 tons. It is separated from the main ore stope by 70 ft. of jasper, and from the drilling done, there is no evidence to show that these stopes connect below the 8th level. The main stope, or stope "C", lies near the shaft on the 8th level, and was shown by the estimate to contain 14,668 tons of ore below the 8th level, and 2,856 tons above, a total of 17,544 tons. The total developed ore is 22,686 tons, the average analysis being as follows: Iron 54.72, Phosphorous, .097, Manganese 2.26. Combining the iron and manganese units, on the assumption that they are of equal value, gives 56.96 iron units. From a comparison of this ore with the Chase ore, it was assumed that the moisture would not exceed 7%, which makes the net iron content of this ore 53.01.

As there was not enough ore developed to warrant opening the property, it was a question whether the development of this ore body by sinking a shaft and drifting, would lead to the discovery of other ore bodies. After careful consideration of all the facts, it was decided that the chance of finding ore bodies at depth would not warrant the opening of the property. It is probable that the work will be abandoned here, and the equipment removed from the mine during the coming month.

The cost of the work, deducting the salvage from equipment purchased for this work, will be about $19,000, this amount being about $10,000 below the estimated cost.
I beg to submit my report on the work done in the Gwinn District for the year ending December 31st, 1914.

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

GENERAL REMARKS
AUSTIN MINE
STEPHENSON MINE
PRINCETON MINE
GWIMN MINE
JOPLING MINE
FRANCIS MINE
MACKINAW MINE
GARDNER MINE
GENERAL SURFACE
ACCIDENTS
ANALYSIS OF COST SHEETS

*** *** ***

GENERAL REMARKS
MINEs

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 two eight hour shifts from January 1st to May 31st and one eight hour shift from May 31st to September 30th, at which time the mine was put on four eight hour shifts per week and so continued.

The work at the Princeton Mine was confined to a few surface improvements and excavating for pocket on 6th Level No. 2 Shaft.

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

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

Stephenson Mine product for the year was 214,608 tons.
Gwinn Mine product for the year was 46,369 tons.
Princeton Mine product repairing drifts was 768 tons.
Stockpile over-run - 2,488 tons.
Total, 3,256 tons.
Total Product for the year was 266,253 Tons.
At the Jopling Mine there was no work done during the year.
At the Francis Mine there was no work done during the year.
At the Mackinaw Mine the work was confined to surface improvements and sinking the shaft. The Mine was worked on two eight hour shifts up to September 30th at which date work was stopped.
At the Gardner Mine the principal work consisted in sinking the shaft. This shaft was also worked on two eight hour shifts up to the time of closing down which occurred on September 30th.

The Princeton and Austin Mines being closed and Stephenson Mine working only one eight hour shift the greater part of the year and finally being put on four eight hour shifts per week and the closing down of the Mackinaw and Gardner Mines has had a very depressing effect on the district.

In the Gwinn Townsite we have twelve empty houses and in the Austin Location four empty houses.

At the Mackinaw-Gardner Location five double houses were erected this season and before the mines were closed on September 30th all of the above houses were occupied as well as the five that were erected the year before. At present eighteen of these houses are empty as well as the boarding house.

At the Gwinn Townsite very few changes occurred during the year.