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Florence Iron Mine: Historical maps showing location of surface development, regional setting, and underground workings

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Introduction

The Florence Mine was located northwest of the City of Florence, Wisconsin in Sections 20 and 21, T40N, R18E. The mine operated from 1880 to 1931, producing a total of 3,680,000 tons of soft hematite and limonite ore with lesser amounts of hard hematite. Regardless of mineralogy, all of this ore was referred to as direct shipping ore as it was of sufficiently high grade (>51.5% iron) to be used in blast furnaces without further beneficiation. Ores from this mine formed by secondary enrichment that resulted from oxidation and leaching of sedimentary iron formation, primarily interlayered chert and siderite (iron carbonate) at the Florence Mine. Ore was first mined from a small open pit, but most of the ore produced over the life of the mine was from underground workings on 10 levels to a depth of 650 feet. A detailed description of the geology of the Florence area including the Florence mine and other nearby iron ore deposits is provided in the U.S. Geological Survey Professional Paper 633 by C.E. Dutton (1971).

This report consists of a brief descriptive text and a set of 21 maps of the Florence Mine site and surrounding area, and detailed mining company maps of the 10 underground levels. The maps of surface development and underground workings at the mine site are scans of original maps and blueprints which mine owners were required to submit to the State of Wisconsin for tax assessment purposes. The Wisconsin Geological and Natural History Survey received the maps and conducted the reserve estimates needed to determine taxable value. The Survey retained the original annual mine maps along with any other data submitted as part of the annual reports on file. Unfortunately, many annual reports for the Florence Mine are missing from the files. Almost all of the maps remaining today are from the early 20th century (1903–1910). There are no maps or reports from the early years of the mine (1880–1902) and only one map, plate 3, survives from the final years of mining (1910–1931).

These maps are of historical interest in that they show the layout of the mine site during the middle years of operation, and the location of buildings and other surface features no longer in existence. Current aerial imagery shows no evidence of these original surface features except for three small ponds which seem to correspond to pits shown here on plates 1 and 2, and on plate 3 of Dutton (1971). Other features shown by Dutton correspond reasonably well with those on the original maps. An exception is that plate 3 of Dutton shows two additional shafts, one at the extreme northwest and one at the extreme southeast, that appear to be test pits on the original maps. It is possible that some evidence of structures such as building foundations or shaft collars could be located in a detailed ground survey of the site, particularly if modern geophysical techniques such as ground-penetrating radar were utilized.

These maps have potential practical value today in that the Florence Mine site, like many other former mine sites in Wisconsin, is now being developed as residential and recreational property. There are very few records of how shafts and prospect pits were abandoned. If improperly backfilled, they can be subsidence hazards many years after mining has ceased. Underground workings that are no longer accessible could be a potential problem for water well construction. Drilling through mine workings can result in loss of or damage to drilling tools. These historical maps are the only surviving primary records of what once existed at the surface and what still exists below.

Overview of the maps

The maps shown in the 21 plates illustrate the development of the Florence mine over the period from approximately 1903 thru 1910.

The first two plates are of particular historical interest in that they show the locations of mine buildings such as office, engine (hoist) houses, blacksmith and machine shops, dry house, and powder magazine. Other features that have long since disappeared include roads, railroad tracks, ore and coal storage piles, exploration pits and drill holes, and the location of the main haulage, access, and ventilation shafts. The information on these maps, although not easily located in terms of present land features, is essential for locating potential future surface hazards.

Plates 1 and 2 show surface development of the mine site as of 1903. The surface maps show the location of the survey base line through the property, which appears on all of the subsurface maps, and provides a reference for locating features and scaling distances on all levels. The base line is divided into 100-foot intervals numbered from southeast to northwest. Plates 1 and 2 show the relative locations of the main haulage shafts, #4 and #7, and shafts #5 and #8 which in 1903 were probably used for ventilation as no hoist works are shown. The shaft locations along with the base line provide reference points for interpreting the maps of the underground levels. Plate 2 is essentially the same 1903 surface map, but is included because it has penciled in locations of additional shafts #1, #2, #3, and #9 which were probably no longer in use as major haulage shafts but are located on some of the subsurface maps. Only two engine houses are shown, #1 for #4 shaft and #3 for #7 shaft. The #4 shaft was probably the main access shaft as it has both a cage cable and a skip cable shown. The cage was used to raise and lower miners and the skip for moving ore. The surface maps also show a cross section of surface geology along a line roughly parallel to the base line with a vertical scale for the different levels. The surface maps provide the best control for locating features on subsurface levels. Key to accurate location of features on all levels is establishing the base line on the present surface. This should be possible if several features such as foundations or shaft collars can be located and the base line reestablished with modern surveying techniques.

Plates 3 and 4 are maps produced by the M.A. Hanna Mining Co., longtime operators of the mine. They provide a regional context and locate geologic features such as outcrops, exploration drill holes, and prospect pits. These maps provide an historical view to compare with Dutton's interpretation of the geology and exploration history.

The remaining 17 maps show the location of underground workings on 10 levels to a depth of 650 feet. These are of historical importance in that they provide the only existing data that could be used to construct a three-dimensional picture of the size and shape of the ore bodies and to reconstruct the history of how the ore was mined.

Most of the subsurface-level maps show some of the geology on each level. A key with symbols is usually present in the lower right, but the geologic symbols are often crudely drawn or not distinctive, and provide little useful information. Notes and annotations along with some color coding provide the only geological control. Other symbols include those for raises and winzes. Raises are shafts excavated vertically from one level to a higher level. Winzes are excavated down to workings on a lower level. These were used to provide access and to transfer mined ore between levels.

Description of map plates

Editor's note: With two exceptions, the maps are untitled; the bold text below is intended to help distinguish them. Years are included when available.

Plates are available to download as supplemental material for this report at the WGNHS Publication Catalog website (<https://wgnhs.wisc.edu/catalog/>).

Plate 1: Extent of Florence Mine surface development in 1903. Note location of roads, railroad tracks, exploration drill holes, prospect pits, and mine buildings such as office, machine shop, blacksmith shop, dry house, rope house, and the #3 engine house. The #4, #5, #7 and #8 shaft locations are marked. The #4 shaft was a main haulage shaft for the northeast orebody. The survey base line passes just north of #7 shaft. Surface projections of some workings on levels 3 and 7 (dashed outlines) are indicated. Also shown are ore and waste rock piles and the trace of bedrock geologic formations at the surface.

Plate 2: Florence Mine surface development in 1903 with annotated shaft locations. This plate has additional information such as the locations of "old" shafts #1, #2, #3, and #9 added in pencil. The scanned portion of this map includes a cross section of near-surface geology and a diagram showing the depth of the working levels.

Plate 3: Mines in the area adjacent to the City of Florence in 1928. Shows geology and the locations of the Florence, Ernst, Commonwealth, Little Commonwealth, Buckeye, and Badger Mines. Map by M.A. Hanna Co. For reference, compare to Dutton (1971) plate 2. Dutton provides a description for these mines and other prospects in the area.

Plate 4: Florence iron mining district covering part of Florence County. Shows geology, outcrops, drill holes and prospect pits. Map by M.A. Hanna Co. For geologic reference and interpretation see Dutton (1971) plates 1 and 2.

Plate 5: Florence Mine level 1 with annotated shaft locations and surface features. Plan of workings on first underground level (Level 1, 132 feet below the #7 shaft collar) showing the three ore zones being mined, the base line, and the location of shafts #1, #2, #3, #4, #5, #7, #8, and #9. This plate shows the location of more surface features relative to mine shafts than any of the following.

Plate 6: Florence Mine level 1, southeast ore zone. Map shows location of #9 shaft. Access to this area is not clear, shaft #9 does not have a hoist indicated at this time.

Plate 7: Florence Mine level 1 (1910), northwest ore zone. Map shows location of #4, #5, and #7 shafts. Parts of some stopes were being backfilled with sand.

Plate 8: Florence Mine level 2, southeast ore zone. Map of part of Level 2 accessed by #4 shaft with location of shafts #1 and 2.

Plate 9: Florence Mine level 2 (1907), northwest ore zone. Map shows locations of #4, #5, #7 and #8 shafts. This map shows extensive sand backfill on this level and several raises and winzes.

Plate 10: Florence Mine level 3 (1910), southeast ore zone. Map shows locations of #4 and #2 shafts. This map appears to show primarily exploration work but also many raises, winzes, and drill holes.

Plate 11: Florence Mine level 3, northwest ore zone. Map shows locations of #4, #5, #7, and #8 shafts. Other shafts have disappeared, possibly not reaching this depth.

Plate 12: Florence Mine level 3.5 (1910), southeast ore zone. This was an intermediate level not accessed by a main haulage shaft but connected to levels 3 and 4 by raises and winzes. Base line and #4 shaft shown for locational reference.

Plate 13: Florence Mine level 4 (1907), northwest ore zone. Map shows area of northwest ore zone between #4 and #7 shafts. Shows outline of stopes and backfilled areas.

Plate 14: Florence Mine level 5 (1910), southeast ore zone. Map of area southeast of #4 shaft. This level appears to be primarily exploratory, showing drifts and drill hole locations but no production stopes. Shows numerous raises and winzes but does not specify levels accessed. Color annotation added to the map is not explained.

Plate 15: Florence Mine level 5 (1907), northwest ore zone. Map of area between #4 and #7 shafts. Notes dated 1909 and 1910 identify stopes mined out to levels 6 and 8 and areas backfilled with sand.

Plate 16: Florence Mine level 6 (1907), northwest ore zone. Map shows #4, #5, and #7 shafts and extensive workings in both northwest and southeast ore zones. Numerous winzes are shown but no indication of connected levels.

Plate 17: Florence Mine level 7, southeast ore zone. Map in area of #4 shaft. This area of level 7 appears to be mainly exploration drifts and drill holes in the southeast ore zone. No areas of active mining are shown.

Plate 18: Florence Mine level 7 (1907), northwest ore zone. Map includes colored geologic annotation. No detailed explanation of the colors is provided. Shafts #4, #5, and #7 are shown along with the outline of mined-out areas in the northwest ore zone. As in plate 17, only exploration activity is shown in southeast ore zone. This is the deepest level reached by #4 shaft. Raises and winzes shown, but no indications of levels reached.

Plate 19: Florence Mine level 8 (1907), northwest ore zone. Shafts #5 and #7 shown to this level, symbol shows projected location of #4 shaft which did not reach this level. Only two small stopes on the northwest ore zone were being mined at this level. Most activity appears to have been exploration drifts. Several raises and winzes identified; some indicate destination levels.

Plate 20: Florence Mine level 9 (1907), northwest ore zone. Map shows location of #5 and #7 shafts and a symbol for the location of #4 shaft, probably shown for aid in locating features. Two small stopes are shown in the northwest ore zone. Dashed outlines of stopes may indicate projections from higher levels. Most activity evident is exploratory. Drill hole #36 reports mostly slate and lean ore.

Plate 21: Florence Mine level 10 (1907), northwest ore zone. Map shows #7 shaft and the projected location of #4 shaft. Except for one small stope in the northwest ore zone, all activity appears to have been exploration. A cross section based on drill hole #34 shows the geology and stopes in the northwest ore zone on levels 9 and 10. Drilling encountered only slate, graphite, and lean iron ore.

Reference

Dutton, C.E., 1971, Geology of the Florence area, Wisconsin and Michigan: U.S. Geological Survey Professional Paper 633, 54 p., 8 plates.