Location Restrictions
Bottom Ash Pond
Sherburne Country Generating Plant

Introduction

This report presents documentation and certification for the location standards for the Bottom Ash Pond at the Sherburne County Generating Plant (Sherco) in Becker, Minnesota. The Bottom Ash Pond is an "existing" (i.e. received coal combustion residuals both before and after October 14, 2015) coal combustion residual (CCR) surface impoundment. This document addresses the requirements of 40 CFR Sections 257.60 through 257.64 (Rules), i.e. location standard requirements, for CCR surface impoundments and demonstrates the Bottom Ash Pond's compliance with the requirements.

Location Restrictions

The sections below provide substantiation of compliance for each of the location restrictions.

Compliance with §257.60, Placement above the uppermost aquifer

To comply with §257.60, the owner or operator must demonstrate that:

(a) *New CCR Landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer…*

Hydrogeologic conditions beneath the Bottom Ash Pond have been documented in the *General Site Evaluation for Northern States Power's SHERCO Plant and Type II RDF Facility (NSP, 1990).* The uppermost aquifer beneath the Bottom Ash Pond is an unconfined, sand and gravel aquifer comprised of Quaternary-age alluvial sediments, and the potentiometric surface (i.e. water table) within this aquifer constitutes the upper limit of the uppermost aquifer. Based on groundwater elevation measurements reported in the *CCR Annual Groundwater Monitoring and Corrective Action Report, Bottom Ash Pond (Carlson McCain, 2018)*, the minimum separation from the Bottom Ash Pond base liner to the groundwater table during 2017 was 18.8 feet. This occurred in the northeast corner of the base liner of the Bottom Ash Pond.

The highest recorded measurement of the Bottom Ash Pond wells occurred in July, 1985. During this event groundwater elevations were 5.8 feet higher than the October, 2017 measurements. This equates to a groundwater separation between the Bottom Ash Pond base liner and the groundwater of at least 13.0 feet for the documented historic high water table.

Figure 1 shows the groundwater contours generated for the CCR Annual Groundwater Report. The Bottom Ash Pond base liner contours are shown on several drawings found on Xcel Energy's CCR website, including; *Construction Certification Report, Pond 3 Vertical Expansion (Carlson McCain, 2015)*.

Compliance with §257.61, Wetlands

To comply with §257.61, the owner or operator must demonstrate that:

(a) New CCR Landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in §232.2 of this chapter…

There are no wetlands mapped within the Bottom Ash Pond footprint according to the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) database. The wetland nearest the Site is located approximately 3,000 feet to the south.

On-site observations do not indicate the presence of wetlands within the Bottom Ash Pond footprint. Figure 2 shows the National Wetland Inventory map.

Compliance with §257.62, Fault Areas

To comply with §257.62, the owner or operator must demonstrate that:

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time…

Based on a review of the United States Geologic Survey (USGS) Faults and Folds Database map, the Bottom Ash Pond is not located within 200 feet of a fault zone which has had displacement in Holocene time. Hydrogeologic investigations conducted within the Bottom Ash Pond area confirm the absence of fault activity in recent geologic history.

Figure 3 shows the site location on a USGS Quaternary Faults and Folds Database map.

Compliance with §257.63, Seismic Impact Zones

To comply with §257.63, the owner or operator must demonstrate that:

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in in seismic impact zones…

To clarify, the Preamble to 40 CFR 257 states that *"a seismic impact zone means an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g) will exceed 0.10 g in 50 years.*

Based on the USGS 2014 two-percent probability of exceedance in 50 years map, the Bottom Ash Pond is located in an area of peak acceleration ranging from 0.02 g to 0.04 g, which is less than the 0.10 g threshold constituting a seismic impact zone. A map showing the Bottom Ash Pond site location relative to peak acceleration zones is provided as Figure 4.

Compliance with §257.64, Unstable Areas

To comply with §257.64, the owner or operator must demonstrate that:

(a) An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area...

(b) The owner or operator must consider all of the following factors, at minimum, when determining whether an area is unstable:

(1) On-site or local soil conditions that may result in significant differential settling;

(2) On-site or local geologic or geomorphologic features; and

(3) On-site or local human-made features or events (both surface and subsurface).

The General Site Evaluation Report (NSP, 1990) referenced above describes the soils and geology beneath the Bottom Ash Pond. The Bottom Ash Pond site is located on the Anoka Sand Plain, a physiographic region which occupies large portions of Sherburne, Anoka, and Isanti counties and is characterized by widespread sand and gravel deposits underlain by glacial till. Unconsolidated sediments beneath the Bottom Ash Pond consist primarily of fine- to coarse-grained sand with gravel along with a layer of silty to sandy, dense glacial till. These soils are stable and are well-suited to support the pond foundation. Standard penetration blow counts (N-values) taken from soil borings surrounding the Bottom Ash Pond range from 12 near the surface to over 100 in the till. No soft soils, areas susceptible to mass movements, or karst terrains were reported in the investigation area.

The undeveloped land surrounding the Bottom Ash Pond is flat to very gently rolling and slopes gradually (one to three percent slope) south and west to the Mississippi River approximately 2,500 feet south of the Bottom Ash Pond.

The arrangement of soils and topography provide a stable base not prone to differential settling or mass movements. Additionally, pond construction practices such as removal of all topsoil and vegetation, soil compaction, and geotechnical testing of the base and embankments ensure the underlying soils are capable of supporting the pond's structural components (clay liner, future final cover, run-on/run-off systems).

The Bottom Ash Pond is near other infrastructure with aboveground and underground utilities located adjacent to the pond. There are no utilities that would cause unstable conditions beneath the pond.

Conclusion

The Bottom Ash Pond meets all of the location restrictions listed under 40 CFR §257.60 to §257.64 and there are no apparent conditions that would cause underlying soils to move or impact the structure of the unit and cause risk to human health or the environment through structural failures.

Certification

I hereby certify under penalty of law that this report was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

October 17, 2018

Daniel J. Riggs, PE
License No. 49559

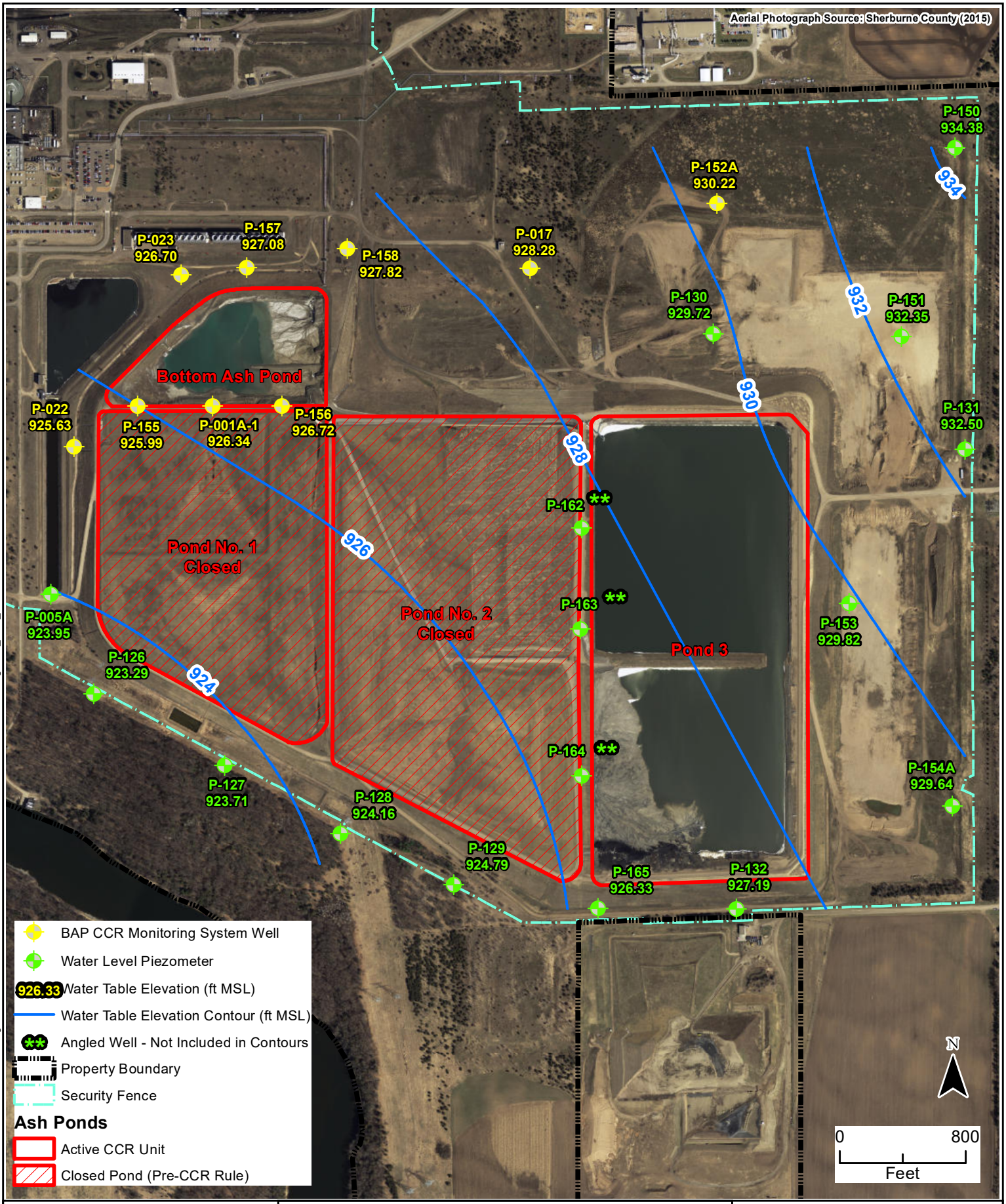
Date

References

NSP, 1990. General Site Evaluation for Northern States Power's SHERCO Plant and Type II RDF Facility. Prepared by Northern States Power, November 1990.

Carlson McCain, 2018. Annual Groundwater Monitoring and Corrective Action Report, Bottom Ash Pond. Prepared by Carson McCain Inc., January 29, 2018.

Carlson McCain, 2015. Construction Certification Report, Pond 3 2015 Vertical Expansion. Prepared by Carlson McCain Inc., December, 2015.



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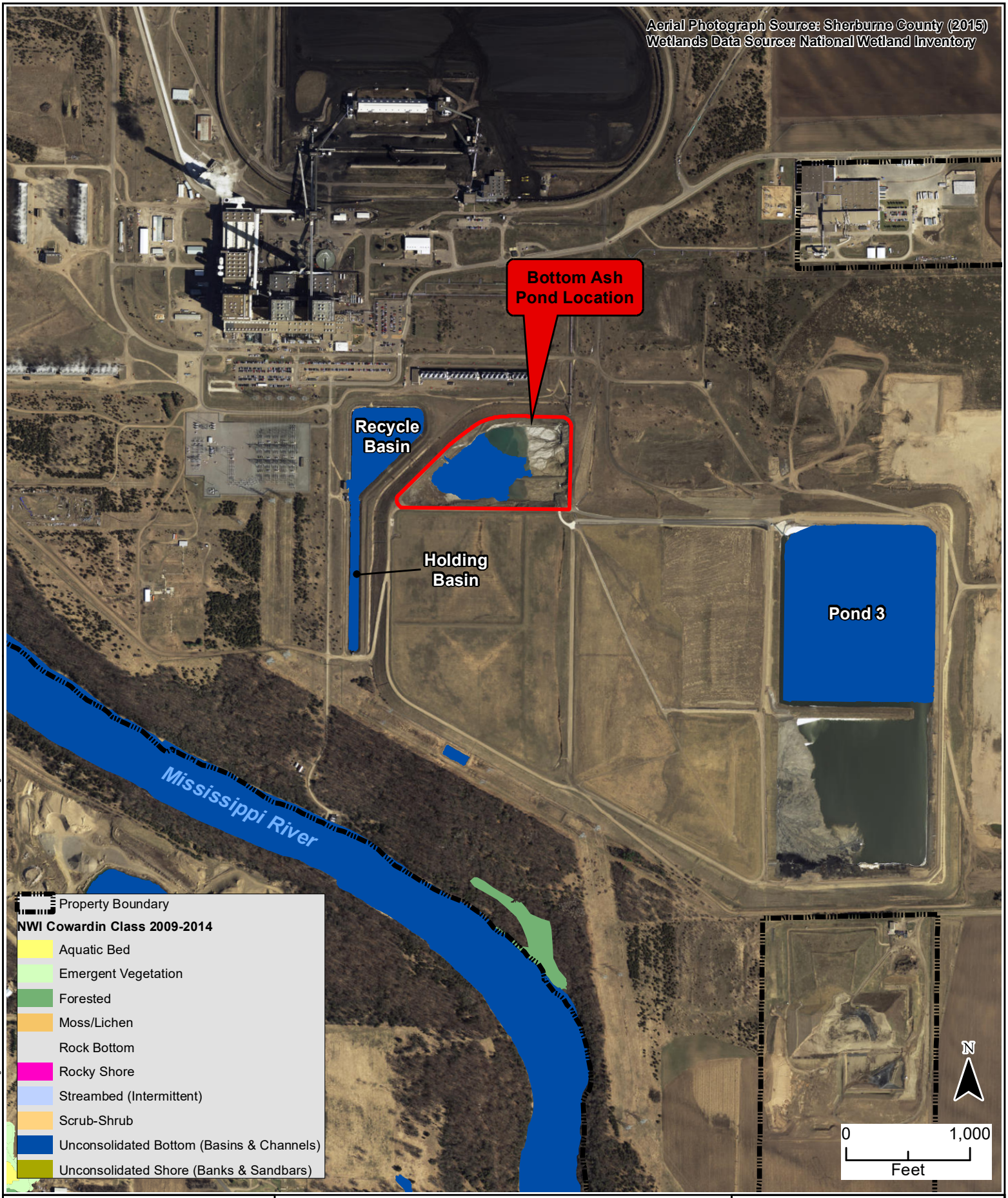
CCR LOCATION DOCUMENTATION REPORT
Bottom Ash Pond
Sherburne County Generating Plant
Becker, Minnesota

FIGURE 1
WATER TABLE ELEVATION CONTOUR MAP (10/9-12/2017)



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Bottom Ash Pond

Sherburne County Generating Plant
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FIGURE 2

CFR §257.61 WETLANDS

Source: USGS Quaternary Faults and Folds Database

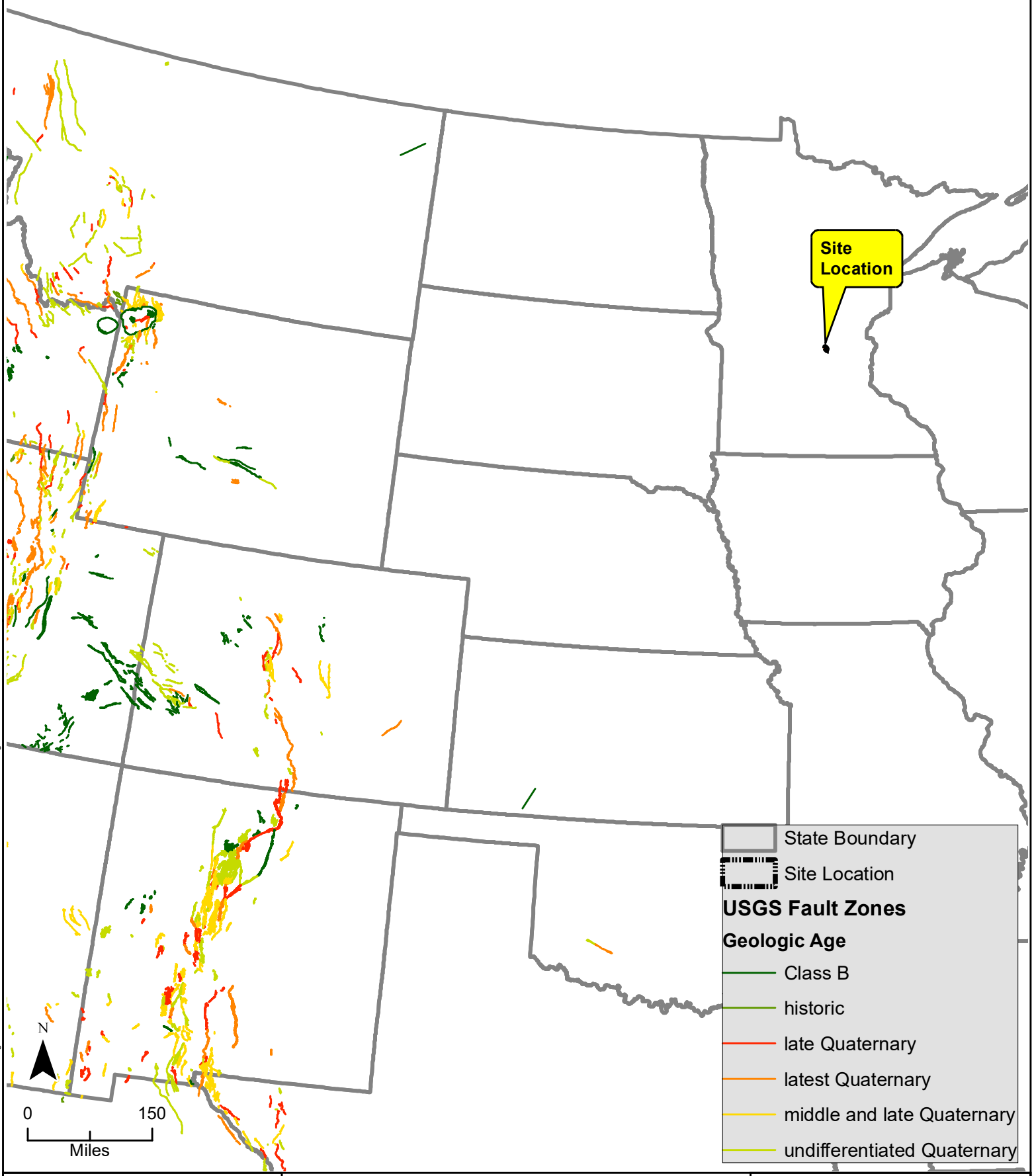

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FIGURE 3
CFR §257.62 FAULT AREAS

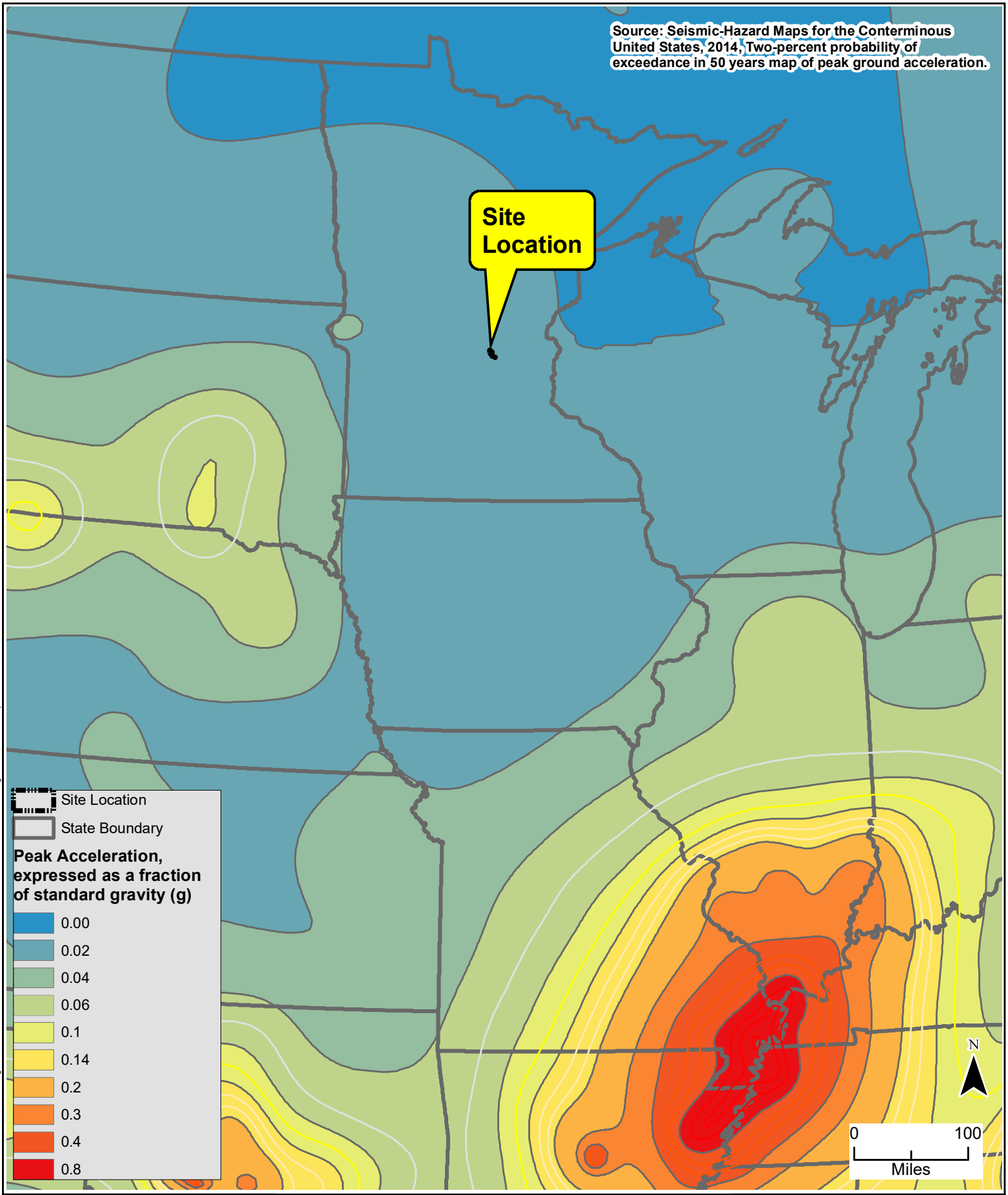

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FIGURE 4
CFR §257.63 SEISMIC IMPACT ZONES