



D.E. Karn Generating Facility

Bottom Ash Pond - Location Restriction Certification Report

Pursuant to:

40 CFR 257.60

40 CFR 257.61

40 CFR 257.62

40 CFR 257.63

40 CFR 257.64

Submitted to:

Consumers Energy Company

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Submitted by:

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Project No. 1899528

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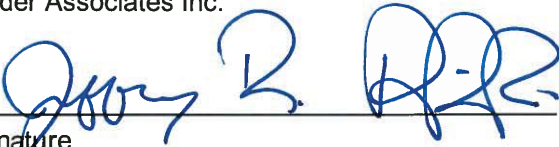


CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.60-64]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Sections 257.60-64 (40 CFR Part 257.60-64), I attest that this Location Restriction Certification Report is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards and with the requirements of 40 CFR Part 257.60-64.

Golder Associates Inc.



Signature

October 17, 2018

Date of Report Certification

Jeffrey R. Piaskowski

Name

6201061033

Professional Engineer Certification Number



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1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) (“CCR RCRA Rule”) to regulate the solid waste management of CCR generated at electric utilities. Sections 257.60-64 of the CCR RCRA Rule require the owner or operator of an existing CCR surface impoundment to document that the unit was designed to meet the location restriction criteria outlined therein. According to Sections 257.60(b), 257.61(b), 257.62(b), 257.63(b), and 257.64(c); the documentation must be certified by a qualified professional engineer no later than October 17, 2018. The documentation must be placed in the facility’s operating record and posted to the publicly available website per Sections 257.60(c), 257.61(c), 257.62(c), 257.63(c), and 257.64(d).

Golder Associates Inc. (Golder) is submitting this report in an attempt to demonstrate that the Bottom Ash Pond at the Consumers Energy Company (CEC) D.E. Karn Generating Facility (DE Karn) is located in an area that meets criteria outlined in 40 CFR 257.60-64.

2.0 PLACEMENT ABOVE THE UPPERMOST AQUIFER [40 CFR 257.60]

Section 257.60 of the CCR RCRA Rule requires that a CCR surface impoundment be constructed with a base that is located no less than five feet above the upper limit of the uppermost aquifer or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations.

CEC cannot demonstrate that the base of CCR in the Bottom Ash Pond is no less than five feet above the upper limit of the uppermost aquifer. Per Section 257.101(b)(1)(i), a CCR surface impoundment that fails to comply with the requirements of Section 257.60 must cease receiving waste no later than October 31, 2020 and must be closed in accordance with Section 257.102. CEC has ceased placing waste in the Bottom Ash Pond and posted a notification of intent to initiate closure on October 12, 2018.

3.0 WETLANDS [40 CFR 257.61]

Section 257.61 of the CCR RCRA Rule requires that a CCR surface impoundment not be located in wetlands, as defined in 40 CFR Section 232.2, unless the owner or operator demonstrates the unit meets the requirements of paragraphs (a)(1) through (a)(5) of Section 257.61. The following sources were utilized, in part, to determine if the Bottom Ash Pond is located within a wetland:

- US Geological Survey (USGS) topographic map
- National Wetland Inventory (NWI) map
- Michigan Department of Environmental Quality (MDEQ) wetland map
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey map
- Aerial imagery
- Federal Emergency Management Agency (FEMA) floodplain map

According to the NWI and MDEQ maps, a portion of the Bottom Ash Pond is either mapped as a wetland and/or mapped with areas that include wetland soils.

A visual evaluation of the Bottom Ash Pond footprint was performed on September 21, 2018 by a Golder professional wetland scientist. The results of the visual evaluation contradict the desktop study by noting that the Bottom Ash Pond footprint did not exhibit characteristics of a wetland. The results of the visual evaluation of the Bottom Ash Pond footprint satisfy the requirements of Section 257.61. The visual evaluation is documented in the RCRA Location Restriction Assessment, D.E. Karn CCR Surface Impoundment, Wetland Assessment Technical Memorandum (Golder 2018).

4.0 FAULT AREAS [40 CFR 257.62]

Section 257.62 requires that a CCR surface impoundment not be located within 200 feet of the outermost damage zone of a fault that has had displacement in Holocene time (approximately 12,000 years ago to present day). According to the USGS U.S. Quaternary Faults and Folds Database (USGS 2014b), the fault zone nearest to the Bottom Ash Pond with documented displacement in Holocene time is the New Madrid Seismic Zone. While active fault zones are not expressed at the surface, movement along these faults have caused seismic activity in the region for the past 4,500 years.

According to the Missouri Department of Natural Resources, the New Madrid Seismic Zone is primarily located in southeastern Missouri, northeastern Arkansas, western Tennessee, western Kentucky, and southern Illinois. The Bottom Ash Pond is approximately 500 miles northeast of the New Madrid Seismic Zone, satisfying the requirements of Section 257.62.

5.0 SEISMIC IMPACT ZONES [40 CFR 257.63]

Section 257.63 requires that a CCR surface impoundment not be located in seismic impact zones, defined in Section 257.53 as an area having two percent or greater probability that the maximum expected horizontal ground acceleration will exceed 10 percent of gravity (0.10g) in 50 years (return period of approximately 2,500 years). Data published in 2014 from the USGS indicates that the Bottom Ash Pond footprint has an annual frequency of exceedance of 4.98×10^{-5} for an earthquake with a maximum expected horizontal ground acceleration of 0.10g, which corresponds to a probability of exceedance of 0.25 percent in 50 years and a return period of 20,000 years.

Since the probability of exceedance is less than two percent in 50 years for a maximum expected horizontal ground acceleration of 0.10g, the Bottom Ash Pond is not located in a seismic impact zone, satisfying the requirements of Section 257.63.

6.0 UNSTABLE AREAS [40 CFR 257.64]

Section 257.64 requires that a CCR surface impoundment not be located in an unstable area. As outlined in Section 257.64(b), the following must be considered when determining whether an area is unstable:

- Onsite or local soil conditions that may result in significant differential settling
- Onsite or local geologic or geomorphologic features
- Onsite or local human-made features or events (both surface and subsurface)

Previous geotechnical investigations in and around the Bottom Ash Pond indicate the onsite soils are comprised of a mixture of glacial, lacustrine, and alluvial deposits with varying thicknesses and extend to depths of approximately 100 to 120 feet below natural ground surface where bedrock of the Saginaw Formation consisting of gray and black shale is encountered. The glacial deposits generally consist of well sorted outwash and poorly sorted glacial till (Golder 2016). Additionally, the annual inspection for the Bottom Ash Pond in 2017 per Section 257.83 did not indicate any significant effect of settlement on inflow/outflow structures for the impoundment (Golder 2017).

A desktop study was conducted using GeoWebFace (MDEQ 2018), an online GIS database managed by the MDEQ, which confirmed that none of the following are located in a proximity that would affect the stability of the Bottom Ash Pond.

- Oil wells
- Gas wells
- Underground mines

Additionally, maps provided by the USGS (USGS 2014a) and the Michigan Natural Features Inventory (Albert, et al. 2008) indicate that the Bottom Ash Pond is not located in an area prone to karst development.

A slope stability analysis for the Bottom Ash Pond was performed in 2016 by Golder as part of the Structural Stability and Safety Factor Assessment per Section 257.73(e) (Golder 2016). Soil conditions observed during the geotechnical investigations were incorporated into the analysis to account for onsite geologic features. Slope stability analyses were conducted for the following scenarios:

- Maximum pool storage
- Maximum pool surcharge
- Seismic loading conditions

Results of the stability analyses indicated that the Bottom Ash Pond met the safety factor and structural stability requirements per Section 257.73(e) (Golder 2016).

The previous geotechnical investigations, the results of the annual inspection, the results of the slope stability analyses, and the desktop study indicate the Bottom Ash Pond is not located in an unstable area, satisfying the requirements of Section 257.64.

7.0 CONCLUSION AND SUMMARY

Golder has determined that the Bottom Ash Pond at DE Karn does not meet the location restriction outlined in 40 CFR 257.60. Per Section 257.101(b)(1)(i), a CCR surface impoundment that fails to comply with the requirements of Section 257.60 must cease receiving waste no later than October 31, 2020 and must be closed in accordance with Section 257.102. CEC has ceased placing waste in the Bottom Ash Pond and posted a notification of intent to initiate closure on October 12, 2018. Prior to October 17, 2018, this report must be placed in the facility's operating record in accordance with Section 257.105(e) and must be made available on the facility's publicly accessible internet site in accordance with Section 257.107(e).

Sincerely,

Golder Associates Inc.



Jeffrey R. Piaskowski, PE
Senior Project Geotechnical Engineer



Matthew J. Wachholz, PE
Senior Consultant

8.0 REFERENCES

- Albert, D.A., Cohen, J.G., Kost, M.A., Slaughter, B.S., and Enander, H.D. 2008. Distribution of Maps of Michigan's Natural Communities. Michigan Natural Features Inventory, Report No. 2008-01, Lansing, MI.
- Golder Associates Inc. October 2018. RCRA Location Restriction Assessment, D.E. Karn CCR Surface Impoundment, Wetland Assessment Technical Memorandum.
- Golder Associates Inc. October 2017. D.E. Karn Generating Facility, Bottom Ash Pond, 2017 Annual Surface Impoundment Inspection Report.
- Golder Associates Inc. October 2016. D.E. Karn Generating Facility, Bottom Ash Pond Structural Stability and Safety Factor Assessment Report.
- Michigan Department of Environmental Quality (MDEQ). 2018. GeoWebFace GIS Database.
- U.S. Geological Survey (USGS). 2014a. Karst in the United States: A Digital Map Compilation and Database.
- U.S. Geological Survey (USGS). 2014b. U.S. Quaternary Faults and Folds Database.



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