

MWVG

Midwest Generation, LLC

Waukegan Generating Station

2023 Structural Stability Assessment for East Ash Pond & West Ash Pond



Revision 0

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55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000

www.sargentlundy.com



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Appendix A: 2016 Federal Structural Stability Assessment for East & West Ash Ponds

1.0 PURPOSE & SCOPE

1.1 PURPOSE

The East Ash Pond and West Ash Pond at Midwest Generation, LLC's (MWG) Waukegan Generating Station ("Waukegan" or the "Station") are existing coal combustion residual (CCR) surface impoundments that are regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." Pursuant to 35 Ill. Adm. Code 845.450(a), MWG must conduct and complete an annual structural stability assessment that documents whether the design, construction, operation, and maintenance of the East and West Ash Ponds are consistent with recognized and generally accepted engineering practices for the CCR surface impoundments' storage capacities.

This report documents the 2023 structural stability assessment conducted and completed in accordance with the Illinois CCR Rule by Sargent & Lundy (S&L) on behalf of MWG for the East and West Ash Ponds at Waukegan.

1.2 SCOPE

In addition to being regulated under the Illinois CCR Rule, Waukegan's East and West Ash Ponds are also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), also referred to herein as the "Federal CCR Rule." Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the East and West Ash Ponds will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program; the Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval. However, the scope of this 2023 structural stability assessment is strictly limited to demonstrating compliance with the Illinois CCR Rule. Pursuant to 40 CFR 257.73(f)(3), the next structural stability assessment for demonstrating compliance with the Federal CCR Rule is not required until 2026, five years after the last periodic assessment was completed (2021).

2.0 INPUTS, PREVIOUS RESULTS, & CURRENT OPERATIONS

2.1 INPUTS

The findings documented in this 2023 structural stability assessment for the East and West Ash Ponds are based on visual observations made during a site visit by S&L on September 19, 2023; discussions with

MWG personnel; historical and recent aerial images obtained from Google Earth Pro (Ref. 3); and the following documents:

- Initial federal structural stability assessment for the East and West Ash Ponds (Ref. 4),
- Annual inspection reports for the East and West Ash Ponds (Refs. 5 through 10), and
- History of construction for the East and West Ash Ponds (Ref. 11).

The initial federal structural stability assessment for the East and West Ash Ponds, which was completed in October 2016, is included in its entirety in Appendix A.

2.2 2022 RECOMMENDED CORRECTIVE MEASURES

The following corrective measures were recommended for the East and West Ash Ponds based on the findings documented in the 2022 annual structural stability assessment (Ref. 12):

- Mow vegetation that is taller than 12 inches along the crests and downstream slopes of the East and West Ash Ponds' embankments.
- Remove woody vegetation in accordance with 35 Ill. Adm. Code 845.430(b)(4).
- During closure activities for the West Ash Pond, conduct a visual surveillance program to verify that the hydraulic structures passing through the West Ash Pond's northern dike are in good, working condition and are free of significant material defects that could compromise the structures' integrities.
- During closure activities for the East Ash Pond, remove the hydraulic structures passing through the pond's northern dike.

2.3 CURRENT POND OPERATING CONDITIONS

In June 2020, Waukegan took the West Ash Pond out of service for routine cleaning. During S&L's site visit on September 19, 2023, small quantities of CCR and less than a foot of surface water were observed in the pond. In April 2021, MWG filed a notice of intent to close the West Ash Pond in accordance with the Federal CCR Rule's closure criteria (Ref. 2, § 257.102). Closure construction activities will commence at the pond upon receipt of a closure construction permit from the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule.

Following the retirements of Units 7 and 8 in June 2022, Waukegan ceased placing CCR wastestreams in the East Ash Pond. However, the pond continues to manage stormwater run-off from the Station property. During S&L's site visit on September 19, 2023, approximately six feet of surface water was present in the pond. Upon re-routing stormwater run-off flows from the East Ash Pond to an alternative facility, MWG will file a notice of intent to close the East Ash Pond. Closure construction activities will commence at the pond upon receipt of a closure construction permit from the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule.

3.0 ASSESSMENT

3.1 STABLE FOUNDATIONS & ABUTMENTS

(35 Ill. Adm. Code 845.450(a)(1))

The East and West Ash Ponds are comprised of earthen dikes on all sides and do not have any abutments. Detailed information on the soils supporting the East and West Ash Ponds' dikes is provided in the ponds' initial federal structural stability assessment in Appendix A. Based on reviews of the ponds' annual inspection reports (Refs. 5 through 10) and Google Earth aerial images (Ref. 3), there have been no significant modifications to East and West Ash Ponds' geometries since their initial federal structural stability assessment was completed. Therefore, the details of the soils supporting the East and West Ash Ponds' dikes and corresponding conclusions documented in the ponds' initial federal structural stability assessment remain valid for this 2023 assessment (see Appendix A). Thus, the soils supporting the East and West Ash Ponds' dikes are considered to be stable for the maximum volume of CCR and CCR wastewater which can be impounded therein.

3.2 SLOPE PROTECTION

(35 Ill. Adm. Code 845.450(a)(2) & (4))

The upstream slopes of the East and West Ash Ponds are lined with high-density polyethylene (HDPE) geomembrane liners. This form of cover protects the upstream slopes of the ponds' dikes against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown.

Slope protection for the downstream slopes of the East and West Ash Ponds consists of vegetative cover which provides protection against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown. It should be noted that the ponds' downstream slopes are unlikely to be inundated by surface water of an adjacent water body. Thus, these slopes are not expected to be subject to wave action or sudden (rapid) drawdown.

During our site visit on September 19, 2023, S&L noted that the Station had mowed the vegetation that was observed to be taller than 12 inches along the downstream slopes of the East and West Ash Ponds' northern and southern dikes during the 2022 structural stability assessment in accordance with the corrective measures recommended therein (see Section 2.2, Ref. 12). S&L also noted that the woody vegetation that had been present in these areas had also been removed in accordance with our recommendations. However, vegetation in some areas that had been mowed since last year's assessment was observed at heights taller than 12 inches during this year's assessment; some woody vegetation had also regrown.

During our September 2023 site visit, we also observed vegetation taller than 12 inches along the crest of the interior berm within the West Ash Pond and along the crest of the dike separating the East and West Ash Ponds. Some woody vegetation was also observed along these dike crests.

It is recommended that the Station continue mowing grassy vegetation and removing woody vegetation, increasing the frequency as needed to maintain vegetative cover less than 12 inches in accordance with the Illinois CCR Rule (Ref. 1, §§ 845.430(b)(4) and 845.430(b)(5)). Any woody vegetation that is removed shall be removed in a manner that does not risk destabilizing the subject CCR surface impoundment or otherwise adversely affect the stability and safety of the CCR surface impoundment or personnel removing the woody vegetation.

3.3 DIKE COMPACTION

(35 Ill. Adm. Code 845.450(a)(3))

As documented in the East and West Ash Ponds' initial federal and 2023 safety factor assessments (Refs. 4 and 13), the ponds' dikes are sufficiently compacted to withstand the range of loading conditions in the CCR surface impoundments.

3.4 SPILLWAYS

(35 Ill. Adm. Code 845.450(a)(5))

The East and West Ash Ponds do not have spillways. As documented in the ponds' 2023 inflow design flood control system plan (Ref. 14), each pond is capable of managing the design flood event (1000-year, 24-hour storm) without a spillway.

3.5 EMBEDDED HYDRAULIC STRUCTURES

(35 Ill. Adm. Code 845.450(a)(6))

The West Ash Pond has a reinforced concrete distribution trough along the upstream slope of its northern dike that, when the pond was operating, received wastewater from a reinforced concrete inlet trench that passes through the pond's northern dike. The East Ash Pond has a similar reinforced concrete distribution trough that receives wastewater from two reinforced concrete inlet trenches that pass through the pond's northern dike. Meanwhile, portions of three discharge pipes from the Recycle Water Sump located between the East and West Ash Ponds also pass through the ponds' northern dikes. The locations of these hydraulic structures are shown on Figure 2 of the ponds' initial federal structural stability assessment in Appendix A.

As documented in the initial federal structural stability assessment, visual surveillance of the hydraulic structures passing through the East and West Ash Ponds' northern dikes was performed in June 2016. No

significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris that may negatively affect the ponds were identified during the surveillance program except for two isolated locations in two of the discharge pipes from the Recycle Water Sump (labeled Pipes 4E and 4W in Figure 2 of Appendix A). The Station subsequently repaired the deficient portions of these pipes that were identified by the surveillance program.

No similar visual surveillance programs have been performed since the initial video camera inspection in June 2016. However, no visual signs of distress at the dike surfaces that could be indicative of deterioration, failure, deformation, *etc.* (e.g., soft spots caused by leaking water, distortions in dike alignment) were observed during S&L's September 2023 site visit. Moreover, since the West Ash Pond has been taken out of service and had minimal surface water remaining in it, the hydraulic structures passing through the West Ash Pond's northern dikes are not expected to convey water again unless they are re-used as part of the pond's closure design. Therefore, it is recommended that the Station conduct a visual surveillance program to confirm the hydraulic structures passing through the West Ash Pond's northern dikes are in good, working condition and are free of significant material defects that could impact the structures' integrities as part of the planned closure activities for the West Ash Pond. Finally, it is recommended that the Station remove the hydraulic structures passing through the East Ash Pond's northern dike as part of the pond's closure construction activities.

3.6 LOW POOL & RAPID DRAWDOWN STABILITY

(35 Ill. Adm. Code 845.450(a)(7))

As documented in the East and West Ash Ponds' initial federal safety factor assessment (Ref. 4), the results of which were revalidated in their 2023 safety factor assessment (Ref. 13), the structural stabilities of the ponds' downstream slopes are maintained during low pool conditions in the unnamed channel south of the ponds. As previously mentioned, the ponds' downstream slopes are unlikely to be inundated by surface water of an adjacent water body, including the unnamed channel south of the ponds. Thus, the East and West Ash Ponds are not considered to be susceptible to a sudden (rapid) drawdown loading condition.

Based on reviews of the East and West Ash Ponds' annual inspection reports (Refs. 5 through 10) and Google Earth aerial images (Ref. 3), there have been no significant modifications to either pond since their initial federal structural stability assessment was completed. Therefore, the conclusions documented therein regarding the stability of the ponds' southern dikes during low pool conditions at the unnamed channel south of the ponds remain valid for this 2023 assessment (see Appendix A).

4.0 RECOMMENDED CORRECTIVE MEASURES

(35 Ill. Adm. Code 845.450(b)(1))

Table 4-1 lists the corrective measures recommended for the East and West Ash Ponds in accordance with the findings documented in this 2023 structural stability assessment.

Table 4-1 – Recommended Corrective Measures for East & West Ash Ponds

Recommended Corrective Measure	Timeframe
Continue mowing vegetation taller than 12 inches and removing woody vegetation. Woody vegetation shall be removed in a manner that does not risk destabilizing the subject CCR surface impoundment or otherwise adversely affect the stability and safety of the CCR surface impoundment or personnel removing the woody vegetation.	Now, and As Required to Maintain Vegetative Cover Under 12 Inches
Conduct a visual surveillance program to verify that the hydraulic structures passing through the West Ash Pond's northern dike are in good, working condition and are free of significant material defects that could compromise the structures' integrities.	During Closure Construction
Remove the hydraulic structures passing through the East Ash Pond's northern dike.	During Closure Construction

5.0 CERTIFICATION

I certify that:

- This structural stability assessment was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.450.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: October 13, 2023

Seal:



6.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed October 13, 2023.
2. U.S. Environmental Protection Agency. "Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments." 40 CFR Part 257 Subpart D. <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D>. Accessed October 13, 2023.
3. Google Earth Pro v7.3.0.3832. Accessed October 13, 2023.
4. Geosyntec Consultants. "Structural Stability and Factor of Safety Assessment, East and West Ash Basins, Waukegan Station." October 2016.
5. Geosyntec Consultants. "Annual Inspection Report, West and East Ash Basins, Waukegan Station." October 9, 2017.
6. Civil & Environmental Consultants, Inc. "Annual Inspection Report, East Ash Pond and West Ash Pond, Waukegan Station." October 16, 2018.
7. Civil & Environmental Consultants, Inc. "Annual Inspection Report, East Ash Pond and West Ash Pond, Waukegan Station." October 16, 2019.
8. Civil & Environmental Consultants, Inc. "Annual Inspection Report, East Ash Pond and West Ash Pond, Waukegan Station." October 9, 2020.
9. Civil & Environmental Consultants, Inc. "Annual Inspection Report, East Ash Pond and West Ash Pond, Waukegan Station." October 13, 2021.
10. Civil & Environmental Consultants, Inc. "Annual Inspection Report, East Ash Pond and West Ash Pond, Waukegan Station." October 26, 2022.
11. Geosyntec Consultants. "History of Construction, East and West Ash Basins, Waukegan Station." October 2016.
12. Sargent & Lundy. "2022 Structural Stability Assessment for East Ash Pond & West Ash Pond." S&L Project No. A12661.123. October 2022.
13. Sargent & Lundy. "2023 Safety Factor Assessment for East Ash Pond & West Ash Pond." S&L Project No. A12661.098. October 2023.
14. Sargent & Lundy. "2023 Inflow Design Flood Control System Plan for East Ash Pond & West Ash Pond." S&L Project No. A12661.098. October 2023.

**APPENDIX A: 2016 FEDERAL STRUCTURAL STABILITY
ASSESSMENT FOR EAST & WEST ASH PONDS**

