

MWG

Midwest Generation, LLC
Joliet 29 Generating Station

2021 Structural Stability Assessment for Ash Pond 2



Revision 0

October 14, 2021

Issue Purpose: Use

Project No.: 12661-121

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com



TABLE OF CONTENTS

Table of Contents i

1.0 Purpose & Scope.....1

 1.1 Purpose..... 1

 1.2 Scope..... 1

2.0 Assessment1

 2.1 Inputs & 2021 Ash Pond Conditions 1

 2.2 Stable Foundations & Abutments 2

 2.3 Slope Protection..... 2

 2.4 Dike Compaction..... 3

 2.5 Spillways 3

 2.6 Embedded Hydraulic Structures 3

 2.7 Low Pool & Rapid Drawdown Stability..... 4

3.0 Recommended Corrective Measures5

4.0 Certification5

5.0 References6

Appendix A: 2016 Ash Pond 2 Structural Stability Assessment

1.0 PURPOSE & SCOPE

1.1 PURPOSE

Ash Pond 2 at Midwest Generation, LLC's (MWG) Joliet 29 Generating Station ("Joliet 29" or the "Station") is an existing coal combustion residual (CCR) surface impoundment that is 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 a structural stability assessment that documents whether the design, construction, operation, and maintenance of Ash Pond 2 are consistent with recognized and generally accepted engineering practices for the CCR surface impoundment's storage capacity.

Ash Pond 2 is 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." Pursuant to 40 CFR 257.73(f)(3), the Federal CCR Rule requires MWG to conduct and complete a structural stability assessment in accordance with 40 CFR 257.73(d) for Ash Pond 2 every five years.

This report documents the 2021 structural stability assessment conducted and completed in accordance with the Illinois and Federal CCR Rules by Sargent & Lundy (S&L) on behalf of MWG for Ash Pond 2 at Joliet 29.

1.2 SCOPE

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, Ash Pond 2 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, and so MWG must conduct structural stability assessments pursuant to both sets of regulations at this time.

2.0 ASSESSMENT

2.1 INPUTS & 2021 ASH POND CONDITIONS

The findings documented in this 2021 structural stability assessment for Ash Pond 2 are based on visual observations made during a site visit by S&L on September 14, 2021; discussions with MWG personnel; historical and recent aerial images obtained from Google Earth Pro (Ref. 3); and Ash Pond 2's initial structural stability assessment (Ref. 4), annual inspection reports (Refs. 5 through 9), and history of construction (Ref. 10). The initial structural stability assessment for Ash Pond 2, which was completed in October 2016, is included in its entirety in Appendix A.

Ash Pond 2 was originally designed to manage CCR and miscellaneous non-CCR wastestreams from the Station. Following the conversion of Joliet 29's coal-fired units to natural gas, the pond was no longer used to manage CCR wastestreams and was eventually taken out of service. In accordance with the Station's ash pond maintenance practices, the Station then began dewatering and removing CCR from the pond. As documented in the pond's annual inspection reports since 2019 (Refs. 8 and 9), minimal CCR remains in Ash Pond 2. During the September 2021 site visit, no CCR and only a few feet of stormwater were visually observed in Ash Pond 2. In April 2021, MWG filed a notice of intent to close Ash Pond 2 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. After closing Ash Pond 2, MWG currently plans on subsequently repurposing the area as a new service water basin for the Station.

2.2 STABLE FOUNDATIONS & ABUTMENTS

(35 Ill. Adm. Code 845.450(a)(1); 40 CFR 257.73(d)(1)(i))

Ash Pond 2 is comprised of three earthen dikes and does not have any abutments. Detailed information on the soils supporting Ash Pond 2's dikes is provided in the pond's initial structural stability assessment in Appendix A. Based on reviews of the pond's annual inspection reports (Refs. 5 through 9) and Google Earth aerial images (Ref. 3), there have been no significant modifications to Ash Pond 2's geometry since its initial structural stability assessment was completed. Therefore, the details of the soils supporting Ash Pond 2's dikes and corresponding conclusions documented in the pond's initial structural stability assessment remain valid for this 2021 assessment (see Appendix A). Thus, the soils supporting Ash Pond 2's dikes are considered to be stable for the maximum volume of CCR and CCR wastewater which can be impounded therein.

2.3 SLOPE PROTECTION

(35 Ill. Adm. Code 845.450(a)(2) & (4); 40 CFR 257.73(d)(1)(ii) & (iv))

The upstream slopes of Ash Pond 2 are lined with high-density polyethylene (HDPE) geomembrane. This form of cover protects the upstream slopes of the pond's dikes against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown.

Slope protection for the downstream slopes of Ash Pond 2 consists of either the HDPE geomembrane liner of Pond 1 (western dike) or vegetative cover (eastern and southern dikes). The gravel, sand, and cobble surfacing noted in the pond's initial structural stability assessment was also observed along the downstream slopes of the pond's eastern and southern dikes during the September 2021 site visit. These forms of cover protect the downstream slopes of the pond's dikes against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown.

During the September 2021 site visit, vegetation greater than 12 inches was observed along portions of the pond's downstream slopes and dike crests. Some woody vegetation was also observed. Pursuant to the Illinois CCR Rule (Ref. 1, §§ 845.430(b)(4) and 845.430(b)(5)), the Station should remove the woody vegetation and mow the areas where the height of vegetative cover exceeds 12 inches.

It should be noted that the Federal CCR Rule requirement that vegetation on slopes of dikes and surrounding areas not exceed a height of six inches (Ref. 2, § 257.73(d)(1)(iv)) was vacated by the U.S. Court of Appeals, District of Columbia Circuit after the provision was challenged following publication of the Federal CCR Rule in April 2015. See *USWAG et al. v. EPA*, No. 15-1219 (D.C. Circ. 2015). The U.S. EPA has yet to finalize a rule that re-establishes federal limitations for the height of vegetation above the surfaces of CCR surface impoundment dikes.

2.4 DIKE COMPACTION

(35 Ill. Adm. Code 845.450(a)(3); 40 CFR 257.73(d)(1)(iii))

As documented in Ash Pond 2's initial and 2021 safety factor assessments (Refs. 4 and 11), the pond's dikes are sufficiently compacted to withstand the range of loading conditions in the CCR surface impoundment.

2.5 SPILLWAYS

(35 Ill. Adm. Code 845.450(a)(5); 40 CFR 257.73(d)(1)(v))

Ash Pond 2 does not have spillways. As documented in the pond's 2021 inflow design flood control system plan, the pond is capable of managing the design flood event (1000-year, 24-hour storm) without a spillway.

2.6 EMBEDDED HYDRAULIC STRUCTURES

(35 Ill. Adm. Code 845.450(a)(6); 40 CFR 257.73(d)(1)(vi))

Portions of the discharge pipes from Pond 1 and from Ash Pond 2 underlie the latter's southern dike. The locations of these two pipes are shown on Figure 2 of the pond's initial structural stability assessment in Appendix A. As documented in the initial assessment, visual surveillance of these pipes was performed in May 2016 by a third party that specializes in video camera pipe inspections. No significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris that may negatively affect Ash Pond 2 were identified during this surveillance program. It is noted that a portion of Pond 1's discharge pipe passes under Ash Pond 2's northern crest, but this portion of Ash Pond 2 is effectively incised and, thus, is not considered to be at risk if the discharge pipe's integrity was to become compromised.

No similar pipe surveillance programs have been performed since the initial video camera inspection in May 2016. However, no visual signs of distress at the dike surfaces that could be indicative of pipe deterioration, failure, deformation, *etc.* were observed (*e.g.*, soft spots caused by leaking water, distortions in dike alignment) during the September 2021 site visit. Moreover, since Ash Pond 2 has been taken out of service and had minimal surface water remaining in it as of the September 2021 site visit, the pond's discharge pipe is not expected to convey water again until the pond is closed and subsequently repurposed as a new low volume waste pond. Therefore, it is recommended that the Station conduct a visual surveillance program to confirm the discharge pipes for Pond 1 and (the current) Ash Pond 2 are in good, working condition and are free of significant material defects that could impact the pipes' integrities prior to repurposing Ash Pond 2 as a new service water basin.

2.7 LOW POOL & RAPID DRAWDOWN STABILITY (35 Ill. Adm. Code 845.450(a)(7); 40 CFR 257.73(d)(1)(vii))

As documented in Ash Pond 2's initial safety factor assessment (Ref. 4), the results of which were revalidated in its 2021 safety factor assessment (Ref. 11), the structural stability of the pond's downstream slopes is maintained during a low pool condition in Pond 1. Because Pond 1 is lined with an HDPE geomembrane, a sudden (rapid) drawdown condition was determined to not be an applicable loading condition for Ash Pond 2 since Pond 1's liner precludes the infiltration of water into Ash Pond 2's western dike.

Based on reviews of Ash Pond 2's annual inspection reports (Refs. 5 through 9) and Google Earth aerial images (Ref. 3), there have been no significant modifications to Pond 1 since Ash Pond 2's initial structural stability assessment was completed. Therefore, the conclusions documented therein regarding the stability of Ash Pond 2's western dike during low pool and sudden (rapid) drawdown conditions at Pond 1 remain valid for this 2021 assessment (see Appendix A).

3.0 RECOMMENDED CORRECTIVE MEASURES

(35 Ill. Adm. Code 845.450(b)(1); 40 CFR 257.73(d)(1)(2))

Based on the findings documented in this 2021 structural stability assessment, the following corrective measures are recommended:

- Mow vegetation that is greater than 12-inches tall along Ash Pond 2's downstream slopes and dike crests,
- Remove woody vegetation in accordance with 35 Ill. Adm. Code 845.430(b)(4), and
- Conduct a visual surveillance program to verify that the discharge pipes for Pond 1 and Ash Pond 2 are in good, working condition and are free of significant material defects that could compromise the pipes' integrities prior to repurposing Ash Pond 2 as a new service water basin.

4.0 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 and with the requirements of 40 CFR 257.73(d).
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: October 14, 2021

Seal:



Th. Dehlin
10/14/2021
Exp. 11/30/2021

5.0 REFERENCES

1. Illinois Pollution Control Board. "Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments." 35 Ill. Adm. Code 845. Accessed October 12, 2021.
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 12, 2021.
3. Google Earth Pro v7.3.0.3832. Accessed October 12, 2021.
4. Geosyntec Consultants. "Structural Stability and Factor of Safety Assessment, Ash Pond 2, Joliet 29 Station." October 2016.
5. Geosyntec Consultants. "Annual Inspection Report, Ash Pond 2, Joliet 29 Station." January 18, 2016.
6. Geosyntec Consultants. "Annual Inspection Report, Ash Pond 2, Joliet 29 Station." October 16, 2017.
7. Civil & Environmental Consultants, Inc. "Annual Inspection Report, Ash Pond 2, Joliet Station." October 16, 2018.
8. Civil & Environmental Consultants, Inc. "Annual Inspection Report, Ash Pond 2, Joliet Station." October 16, 2019.
9. Civil & Environmental Consultants, Inc. "Annual Inspection Report, Ash Pond 2, Joliet Station." October 9, 2020.
10. Geosyntec Consultants. "History of Construction, Ash Pond 2, Joliet 29 Station." October 2016.
11. Sargent & Lundy. "2021 Safety Factor Assessment for Ash Pond 2." S&L Project No. 12661-121. October 2021.

**APPENDIX A: 2016 ASH POND 2 STRUCTURAL STABILITY
ASSESSMENT**

