

# MWVG

Midwest Generation, LLC

## Joliet 29 Generating Station

# 2023 Inflow Design Flood Control System Plan for Ash Pond 2

**Revision 0**

**October 13, 2023**

**Issue Purpose: Use**

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## TABLE OF CONTENTS

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<b>Table of Contents</b> .....	<b>i</b>
<b>1.0 Purpose &amp; Scope</b> .....	<b>1</b>
1.1 Purpose.....	1
1.2 Scope.....	1
<b>2.0 Inputs</b> .....	<b>2</b>
<b>3.0 Assumptions</b> .....	<b>3</b>
<b>4.0 Methodology</b> .....	<b>3</b>
<b>5.0 Hydrologic &amp; Hydraulic Assessment</b> .....	<b>3</b>
5.1 Summary of 2022 Hydrologic & Hydraulic Calculations .....	3
5.2 Changes to Inputs for 2022 Hydrologic & Hydraulic Calculations .....	4
5.2.1 Changes in Ash Pond Operations & Mean Annual Precipitation Depth .....	4
5.2.2 Changes in Ash Pond Topography.....	4
5.2.3 Changes to Inflow Design Flood Event.....	5
5.3 Updated Hydrologic & Hydraulic Assessment .....	5
5.3.1 Methodology .....	5
5.3.2 Results .....	6
<b>6.0 Conclusions</b> .....	<b>6</b>
<b>7.0 Certification</b> .....	<b>7</b>
<b>8.0 References</b> .....	<b>8</b>
<b>Appendix A: 2016 Federal Inflow Design Flood Control System Plan for Ash Pond 2</b>	

## **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 845.510(c)(1), MWG must prepare an annual inflow design flood control system plan documenting how the inflow design flood control system for Ash Pond 2 has been designed and constructed to meet the hydrologic and hydraulic capacity requirements for CCR surface impoundments promulgated by 35 Ill. Adm. Code 845.510.

This report documents the 2023 inflow design flood control system plan prepared in accordance with the Illinois CCR Rule by Sargent & Lundy (S&L) on behalf of MWG for Ash Pond 2 at Joliet 29. This report:

- Lists the inputs and assumptions used to determine whether Ash Pond 2 can manage the inflow design flood,
- Discusses the methodology used to prepare the 2023 inflow design flood control system plan,
- Summarizes the results of the 2022 hydrologic and hydraulic calculations performed to support the conclusion of whether Ash Pond 2 meets the hydrologic and hydraulic requirements for CCR surface impoundments promulgated by the Illinois CCR Rule,
- Evaluates potential changes to the inputs used in the 2022 hydrologic and hydraulic calculations to determine whether new or updated calculations are warranted, and
- Provides the results of the hydrologic and hydraulic calculations used to determine whether Ash Pond 2 can manage the inflow design flood.

### **1.2 SCOPE**

In addition to being regulated under the Illinois CCR Rule, Joliet 29's 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." 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. However, the scope of this 2023 inflow flood control system plan is strictly limited to demonstrating compliance with the Illinois CCR Rule. Pursuant to 40 CFR

257.82(c)(4), the next inflow design flood control system plan for demonstrating compliance with the Federal CCR Rule is not required until 2026, five years after the last periodic plan was completed (2021).

## **2.0 INPUTS**

### **Inflow Design Flood Control System**

The inflow design flood control system for Ash Pond 2 is documented in the pond's initial federal inflow design flood control system plan, which was prepared by Geosyntec Consultants in October 2016 (Ref. 3). This plan is provided in its entirety in Appendix A.

### **Inflow Design Flood Event**

Per its 2023 hazard potential classification assessment (Ref. 4), Ash Pond 2 is classified as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1). Therefore, the inflow design flood event used in this hydrologic and hydraulic assessment of Ash Pond 2 is based on the 1,000-year storm (Ref. 1, § 845.510(a)(3)). Per the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 (Ref. 5), the precipitation depth for the 1,000-year, 24-hour storm event at the Joliet 29 site is 14.2 inches.

### **Site Topography**

Topographic data for Ash Pond 2 and the surrounding areas was obtained from an aerial survey performed by Aero-Metric, Inc. in 2008 (Ref. 6).

### **Aerial Images**

Historical and recent aerial images of the Station and surrounding areas were obtained from Google Earth Pro (Ref. 7).

### **Ash Pond Conditions**

The operating and physical conditions for Ash Pond 2 were based on observations made by S&L during a site visit on September 14, 2023, discussions with MWG personnel, the history of construction prepared for the CCR surface impoundment in accordance with 40 CFR 257.73(c) (Ref. 8), and the 2022 annual inspection report prepared for the CCR surface impoundment in accordance with 35 Ill. Adm. Code 845.540(b) (Ref. 9). The area-capacity curve for the pond was obtained from the aforementioned history of construction (Ref. 8).

### **Mean Annual Precipitation Depth**

The mean annual precipitation depth for the site was obtained from NOAA's "Summary of Monthly Normals, 1991-2020" (Ref. 10) for a monitoring station at the Brandon Road Lock and Dam in Joliet, Illinois, which is approximately 1.5 miles northeast of the Station. Per this NOAA dataset, the mean annual precipitation depth at the site is 38.0 inches.

### **3.0 ASSUMPTIONS**

There are no assumptions in this document that require verification.

### **4.0 METHODOLOGY**

The inputs for the latest hydrologic and hydraulic calculations performed for Ash Pond 2, which were completed in October 2022, were reviewed to determine if any changes have occurred since these calculations were completed. Identified changes were then evaluated to determine if updates to these calculations were warranted. If no changes were identified, or if identified changes were determined to have no impact to the results and conclusions of these calculations, then the latest hydrologic and hydraulic calculations performed for Ash Pond 2 were considered to still be valid for this 2023 inflow design flood control system plan.

### **5.0 HYDROLOGIC & HYDRAULIC ASSESSMENT**

#### **5.1 SUMMARY OF 2022 HYDROLOGIC & HYDRAULIC CALCULATIONS**

The latest hydrologic and hydraulic calculations for Joliet 29's Ash Pond 2 were completed in October 2022. The inputs, methodology, and results of these calculations are documented in the pond's 2022 inflow design flood control system plan (Ref. 11). As stated in the 2022 plan, these calculations were performed by conservatively assuming (1) no rainfall abstraction (*i.e.*, the full design precipitation depth over the pond's catchment area was assumed to enter the pond) and (2) that the surface water elevation in the pond at the time of the design storm event was based on the 4.5 feet of surface water observed in the pond in September 2022 plus 1 year's worth of direct precipitation and stormwater run-on to account for additional stormwater inflow to the pond until closure construction activities commence. It was noted that the 1-year duration was more applicable than the 1.5 years assumed in 2021 because MWG submitted a closure construction permit application to the Illinois EPA in January 2022. These assumptions led to a design operating water level of 527.7 feet above mean sea level (amsl)

Based on the preceding design inputs and assumptions, the surface water elevation in Ash Pond 2 after the 1,000-year flood design event was calculated to be 529.7 feet amsl. Ultimately, the results of the 2022 assessment indicated that water entering the pond during the inflow design flood event would not discharge through the pond's outlet weir (elevation 532.85 feet amsl) or overtop the pond's dikes (535 amsl). The surface water elevation in Ash Pond 2 following the design event was estimated to be 3.15 feet below the pond's outlet weir and 5.3 feet below the pond's dike. Based on these results, it was concluded that the pond has adequate hydraulic capacity to retain the 1,000-year flood event without water discharging from the pond or overtopping the pond's dikes and was therefore in conformance with 35 Ill. Adm. Code 845.510(a).

## **5.2 CHANGES TO INPUTS FOR 2022 HYDROLOGIC & HYDRAULIC CALCULATIONS**

The following subsections summarize the evaluation conducted to determine if changes to the inputs used in the latest hydrologic and hydraulic calculations for Ash Pond 2 have occurred since the calculations were completed in 2022 that warrant updating the calculations.

### **5.2.1 CHANGES IN ASH POND OPERATIONS & MEAN ANNUAL PRECIPITATION DEPTH**

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. Accordingly, the Station ceased sending all process and wastewater streams to Ash Pond 2, effectively isolating the pond. 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 most recent 2022 annual inspection report (Ref. 9), there is no CCR remaining in Ash Pond 2. During S&L's site visit in September 2023, no CCR and approximately 6.3 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). In January 2022, MWG submitted a closure construction permit application to the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule. Closure construction activities will commence at the pond upon receipt of the closure construction permit from the Illinois EPA.

As noted in Section 5.1, the initial surface water elevation for Ash Pond 2 that was assumed for evaluating the pond's hydraulic capacity was based on the surface water elevation observed by S&L in September 2022 plus 1 year's worth of direct precipitation and stormwater run-on to account for additional stormwater inflow to the pond until closure construction activities commence. As documented in the pond's 2022 inflow design flood control system plan (Ref. 11), the mean annual precipitation depth for the site was taken as 38.0 inches per NOAA's "Summary of Monthly Normals, 1991-2020" for the monitoring station at the Brandon Road Lock and Dam (Ref. 5).

Although the operating conditions at Ash Pond 2 have not changed since the latest hydrologic and hydraulic calculations were prepared in 2022, the initial surface water elevation at the time of the design storm event may increase based on the water elevation observed by S&L during the aforementioned September 2023 site visit. This change warrants updating the 2022 hydrologic and hydraulic calculations for this 2023 inflow design flood control system plan.

### **5.2.2 CHANGES IN ASH POND TOPOGRAPHY**

Based on visual observations made by S&L during the September 2023 site visit, review of the 2022 annual inspection report (Ref. 9), and reviews of Google Earth aerial images (Ref. 7), there have been no significant

modifications to Ash Pond 2's embankments (mass excavations, mass fill placement, *etc.*) since the latest hydrologic and hydraulic calculations were completed in 2022. Therefore, the topographic data collected for the site in 2008 (Ref. 6) and the area-capacity curves documented in Ash Pond 2's history of construction (Ref. 8) remain valid for use in this 2023 assessment.

### **5.2.3 CHANGES TO INFLOW DESIGN FLOOD EVENT**

Per the pond's 2023 hazard potential classification assessment (Ref. 4), Ash Pond 2 is classified as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1), the same hazard potential classification the pond was assigned in 2022. Therefore, the inflow design flood event for Ash Pond 2 remains the 1,000-year storm (Ref. 1, § 845.510(a)(3)). As documented in the pond's 2022 inflow design flood control system plan (Ref. 11), the precipitation value for the 1,000-year, 24-hour storm event used in the latest hydrologic and hydraulic calculations completed for Ash Pond 2 was 14.2 inches per NOAA's Atlas 14. As stated in Section 2.0, NOAA's 1,000-year, 24-hour precipitation value for the Joliet site remains 14.2 inches. Therefore, the inflow design flood event used in the 2022 hydrologic and hydraulic calculations is unchanged and remains valid for use in this 2023 assessment.

## **5.3 UPDATED HYDROLOGIC & HYDRAULIC ASSESSMENT**

Although there have been no significant modifications to Ash Pond 2 and no changes to the pond's inflow design flood event since the latest hydrologic and hydraulic calculations were prepared in 2022, a basis for the initial surface water elevation for the pond has changed. As discussed in Section 5.2.1, the water elevation observed in the pond during S&L's September 2023 site visit was approximately two feet higher than the water level observed in 2022. This change warrants an update of the hydrologic and hydraulic calculations to confirm Ash Pond 2 has adequate hydraulic capacity to retain the 1,000-year flood event without water discharging from the pond or overtopping the pond's dikes.

The following subsections summarize the methodology used to conduct and the results of the updated hydrologic and hydraulic calculations for Ash Pond 2.

### **5.3.1 METHODOLOGY**

Similar to the 2022 hydrologic and hydraulic calculations, the design initial water level for Ash Pond 2 was based on 6.3 feet of water observed in Ash Pond 2 during S&L's September 2023 site visit plus 1 year's worth of direct precipitation and stormwater run-on to account for a period of time until closure construction activities commence. Ash Pond 2 is perched, thereby limiting stormwater entering the pond during storm events to direct precipitation and stormwater run-on from the access roads on the pond's dikes. Evaporation out of the pond was conservatively omitted, and no rainfall abstraction was considered (*i.e.*, the full design

precipitation depth over Ash Pond 2's catchment area was assumed to enter the pond during the inflow design flood event); both of these assumptions are conservative.

After determining the design initial surface water elevation in Ash Pond 2 for this assessment, the inflow flood volume into Ash Pond 2 from the 1,000-year, 24-hour storm event was calculated to determine the rise in the pond's water level. The new surface water elevation was then compared to the pond's outlet weir elevation (EL. 532.85 feet amsl) and berm elevation (EL. 535.00 feet amsl) to verify that Ash Pond 2 could manage direct precipitation and stormwater run-on from the 1,000-year, 24-hour storm event without water discharging through the pond's outlet weir or overtopping the pond's dikes.

### 5.3.2 RESULTS

Table 5-1 summarizes the results from the hydrologic and hydraulic calculations performed for Ash Pond 2 (Ref. 12). Based on these results, water entering Ash Pond 2 during the inflow design flood event will not discharge through the pond's outlet weir or overtop the pond's dikes. The surface water elevation in the pond after the design event was estimated to be 1.65 feet below the pond's outlet weir and 3.8 feet below the pond's dike.

**Table 5-1 – Summary of Hydrologic & Hydraulic Assessment Results for Ash Pond 2**

CCR Surface Impoundment	Illinois Hazard Potential Classification	Inflow Design Flood	Maximum Surface Water Elevation	Outlet Weir Elevation	Pond Crest Elevation
Ash Pond 2	Class 2	1,000 Year	531.2 feet	532.85 feet	535.00 feet

## 6.0 CONCLUSIONS

Based on the hydrologic and hydraulic calculations performed for Ash Pond 2 (Ref. 12), the pond has adequate hydraulic capacity to retain the 1,000-year flood event without water discharging from the pond or overtopping the pond's dikes. Therefore, Ash Pond 2 is able to collect and control the inflow design flood event specified in 35 Ill. Adm. Code 845.510(a)(3).



## 7.0 CERTIFICATION

I certify that:

- This inflow design flood control system plan was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.510.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: October 13, 2023

Seal:



## 8.0 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. Geosyntec Consultants. "Inflow Design Flood Control System Plan, Ash Pond 2, Joliet 29 Station." October 2016.
4. Sargent & Lundy. "2023 Hazard Potential Classification Assessment for Ash Pond 2." Rev. 0. S&L Project No. A12661.172. October 2023.
5. National Oceanic and Atmospheric Administration. "Point Precipitation Frequency Estimates." NOAA Atlas 14, Volume 2, Version 3.
6. Aero-Metric, Inc. Aerial Survey of Joliet 29 Generating Station Dated June 17, 2008.
7. Google Earth Pro v7.3.0.3832. Accessed September 28, 2023.
8. Geosyntec Consultants. "History of Construction, Ash Pond 2, Joliet 29 Station." October 2016.
9. Civil & Environmental Consultants, Inc. "Annual Inspection Report, Ash Pond 2, Joliet Station." October 14, 2022.
10. National Oceanic and Atmospheric Administration. "Summary of Monthly Normals, 1991-2020." Station: Joliet Brandon Rd Dm, IL US USC00114530.
11. Sargent & Lundy. "2022 Inflow Design Flood Control System Plan for Ash Pond 2." Rev. 0. S&L Project No. 12661-150. October 14, 2022.
12. Sargent & Lundy. "Ash Pond 2 Hydraulic Capacity Calculation." S&L Calc. No. 12661-172-C-001. Rev. 0. S&L Project No. A12661.172. October 2023.

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**APPENDIX A: 2016 FEDERAL INFLOW DESIGN FLOOD  
CONTROL SYSTEM PLAN FOR ASH POND 2**

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