MWG

Midwest Generation, LLC

Powerton Generating Station

2023 Inflow Design Flood Control System Plan for Ash Surge Basin, Bypass Basin, & Former Ash Basin

Revision 0

October 13, 2023

Issue Purpose: Use

Project No.: A12661.174

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1.0 PURPOSE & SCOPE

1.1 PURPOSE

The Ash Surge Basin, Bypass Basin, and Former Ash Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" 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 845.510(c)(1), MWG must prepare an annual inflow design flood control system plan documenting how the inflow design flood control systems for the Ash Surge, Bypass, and Former Ash Basins have 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 the Ash Surge, Bypass, and Former Ash Basins at Powerton. This report:

- Lists the inputs and assumptions used to determine whether the Ash Surge, Bypass, and Former Ash Basins 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 2021 hydrologic and hydraulic calculations performed to support the conclusions of whether the Ash Surge, Bypass, and Former Ash Basins meet the hydrologic and hydraulic requirements for CCR surface impoundments promulgated by the Illinois CCR Rule.
- Evaluates potential changes to the design inputs used in the 2021 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 the Ash Surge, Bypass, and Former Ash Basins can manage the inflow design flood.

1.2 SCOPE

In addition to being regulated under the Illinois CCR Rule, Powerton's Ash Surge Basin, Bypass Basin, and Former Ash Basin 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 Ash Surge, Bypass, and Former Ash Basins 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 2022 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 Systems

The inflow design flood control systems for the Ash Surge and Bypass Basins are documented in the basins' 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.

The inflow design flood control system for the Former Ash Basin is documented in the basin's initial federal inflow design flood control system plan, which was prepared by Geosyntec Consultants in May 2018 (Ref. 4). This plan is provided in its entirety in Appendix B.

Inflow Design Flood Event

Per their 2023 hazard potential classification assessment (Ref. 5), the Ash Surge, Bypass, and Former Ash Basins are classified as Class 2 CCR surface impoundments pursuant to 35 Ill. Adm. Code 845.440(a)(1). Therefore, the inflow design flood event used in this hydrologic and hydraulic assessment of the Ash Surge, Bypass, and Former Ash Basins is based on the 1,000-year storm (Ref. 1, § 845.510(a)(3)). Per the National Oceanic and Atmospheric Administration's Atlas 14 (Ref. 6), the precipitation depth for the 1,000-year, 24-hour storm event at the Powerton site is 9.00 inches.

Site Topography

Topographic data for the Ash Surge Basin, Bypass Basin, and surrounding areas was obtained from an aerial survey performed by Aero-Metric, Inc. in 2008 (Ref. 7). Topographic data for the Former Ash Basin and surrounding areas was obtained from a survey performed by Ridgeline Consultants in 2016 (Ref. 8).

Aerial Images

Historical and recent aerial images of the Station and surrounding areas were obtained from Google Earth Pro (Ref. 9).

Ash Basin Conditions

The operating and physical conditions for the Ash Surge, Bypass, and Former Ash Basins were based on observations made by S&L during a site visit on September 20, 2023, discussions with MWG personnel, the histories of construction prepared for the CCR surface impoundments in accordance with 40 CFR 257.73(c) (Refs. 10 and 11), and the most recent annual inspection reports prepared for the CCR surface impoundments in accordance with 35 Ill. Adm. Code 845.540(b) (Refs. 12 and 13).

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 the Ash Surge Basin, Bypass Basin, and Former Ash Basin, which were completed in October 2021, 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 the Ash Surge Basin, Bypass Basin, and Former Ash Basin were considered to still be valid for this 2023 inflow design flood control system plan.

5.0 HYDROLOGIC & HYDRAULIC ASSESSMENT

5.1 SUMMARY OF 2021 HYDROLOGIC & HYDRAULIC CALCULATIONS

The latest hydrologic and hydraulic calculations for Powerton's Ash Surge Basin, Bypass Basin, and Former Ash Basin were completed in October 2021. The inputs, methodology, and results of these calculations are documented in the basins' 2021 inflow design flood control system plan (Ref. 15). As stated in the 2021 plan, these calculations were performed by conservatively assuming no rainfall abstraction (*i.e.*, the full design precipitation depth over a basin's catchment area was assumed to enter the basin). Moreover, it was conservatively assumed that the surface water elevations in the Ash Surge and Bypass Basins at the time of the design storm event were at the basins' respective maximum design operating levels. Finally, it was conservatively assumed that the surface water elevation in the Former Ash Basin at the time of the design storm event was at 450.00 feet above mean sea level (amsl), four feet higher than the maximum surface water elevation recorded in the basin's annual inspection reports that had been completed through October 2021.

The 2021 hydrologic and hydraulic assessment for the Ash Surge and Bypass Basins evaluated whether the basins could contain the inflow design flood without surface water overflowing into their emergency spillway structures at EL. 466.00 feet amsl and EL. 466.75 feet amsl, respectively. Indeed, the assessment concluded that water entering the basins during the inflow design flood event would not overflow into the basins' emergency spillway structures. The water levels in the Ash Surge and Bypass Basins following the design event were estimated to be 0.12 foot and 0.29 foot, respectively, below their corresponding emergency spillway structures. Meanwhile, the freeboards were estimated to be 2.12 feet and 1.54 feet in the Ash Surge Basin and the Bypass Basin, respectively. Based on these results, it was concluded that the basins have

adequate hydraulic capacities to retain the 1,000-year flood event without water overflowing into the basins' emergency spillway structures or overtopping the basins' dikes. Therefore, the basins were determined to be in conformance with 35 Ill. Adm. Code 845.510(a).

Similarly, the 2021 hydrologic and hydraulic assessment for the Former Ash Basin evaluated whether the basin's North and South Ponds could contain the inflow design flood without surface water overtopping the ponds' embankments, which have approximate crest elevations of EL. 455.00 feet amsl and EL. 458.00 feet amsl, respectively. Indeed, the assessment concluded that water entering the ponds during the inflow design flood event would not overtop the ponds' dikes. The freeboards for the North and South Ponds following the design event were estimated to be 4.13 feet and 6.77 feet, respectively. Based on these results, it was concluded that the ponds have adequate hydraulic capacities to retain the 1,000-year flood event without water overtopping the ponds' dikes, and, thus, the Former Ash Basin was determined to be in conformance with 35 Ill. Adm. Code 845.510(a).

5.2 CHANGES TO INPUTS FOR 2021 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 the Ash Surge Basin, Bypass Basin, and Former Ash Basin have occurred since the calculations were completed in 2021 that warrant updating the calculations.

5.2.1 CHANGES IN ASH BASIN OPERATIONS

In early October 2020, Powerton took the Bypass Basin out of service for routine cleaning. During a site visit in September 2021, it was noted that most of the CCR previously stored in the Bypass Basin had been removed and minimal surface water remained. During subsequent site visits by S&L in September 2022 and September 2023, it was noted that almost all of the CCR previously stored in the Bypass Basin had been removed and minimal surface water remained. MWG currently plans to retrofit the Bypass Basin with a new composite liner system and a new leachate collection and removal system (LCRS). Retrofit construction activities will commence at the basin upon receipt of a retrofit construction permit from the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule.

Powerton continues to operate the Ash Surge Basin to manage the Station's ash dewatering bin effluent and various non-CCR wastestreams in accordance with 40 CFR 257.103(f)(1). Operating conditions at this basin have not changed since the latest hydrologic and hydraulic calculations were prepared in 2021.

Finally, the Former Ash Basin is an inactive CCR surface impoundment and, therefore, is not used by the Station to manage any of Powerton's wastestreams. However, the basin still collects stormwater from direct precipitation and run-off from adjacent areas. Per the basin's July 2022 annual inspection report (Ref. 13), the maximum surface water elevation in the basin's North and South Ponds between the 2021 and 2022

annual inspections was estimated to be approximately EL. 446 feet amsl. Per the basin's July 2023 annual inspection report (Ref. 14), the maximum water depth observed was estimated to be 7.6 feet. Using the area-capacity curve provided for the basin in its history of construction (Ref. 11), the maximum surface water elevation for the basin was approximately 440 feet amsl.

Based on the preceding discussion, the operating conditions at the Ash Surge, Bypass, and Former Ash Basins have not changed since the latest hydrologic and hydraulic calculations were prepared in 2021. Moreover, the maximum surface water elevation observed in the Former Ash Basin between 2021 and 2023 (approximately 446 feet amsl) is less than the surface water elevation assumed for the Former Ash Basin prior to the inflow design flood (450 feet amsl). Because the 2021 hydrologic and hydraulic calculations were based on conservative assumptions regarding the surface water elevations in the basins, there have been no significant changes to the operations of the Powerton ash basins that warrant updating the 2021 hydrologic and hydraulic calculations.

5.2.2 CHANGES IN ASH BASIN TOPOGRAPHY

Based on visual observations made by S&L during a site visit on September 20, 2023, reviews of the latest annual inspection reports (Refs. 12 and 13), and reviews of Google Earth aerial images (Ref. 9), there have been no significant modifications to the Ash Surge, Bypass, and Former Ash Basins' embankments (mass excavations, mass fill placement, *etc*.) since the latest hydrologic and hydraulic calculations were completed in 2021. Therefore, the topographic data collected for the site in 2008 and 2016 (Refs. 7 and 8) and the area-capacity curves documented in the basins' histories of construction (Refs. 10 and 11) that were used in these calculations are unchanged and remain valid for use in this 2023 assessment.

5.2.3 CHANGES TO INFLOW DESIGN FLOOD EVENT

Per the basins' 2023 hazard potential classification assessment (Ref. 5), the Ash Surge, Bypass, and Former Ash Basins are classified as Class 2 CCR surface impoundments pursuant to 35 Ill. Adm. Code 845.440(a)(1), the same hazard potential classifications the basins were assigned in 2021. Therefore, the inflow design flood event for the basins remains the 1,000-year storm (Ref. 1, § 845.510(a)(3)). As documented in the basins' 2021 inflow design flood control system plan (Ref. 15), the precipitation value for the 1,000-year, 24-hour storm event used in the latest hydrologic and hydraulic calculations completed for the Ash Surge, Bypass, and Former Ash Basins was 9.00 inches per NOAA's Atlas 14. As stated in Section 2.0, NOAA's 1,000-year, 24-hour precipitation value for the Powerton site remains 9.00 inches. Therefore, the inflow design flood event used in the 2021 hydrologic and hydraulic calculations is unchanged and remains valid for use in this 2023 assessment.

5.3 RESULTS

There have been no significant modifications to the Ash Surge, Bypass, and Former Ash Basin and no changes to the basin's inflow design flood event since the latest hydrologic and hydraulic calculations were prepared in 2021. Therefore, the results and conclusions documented for the Ash Surge, Bypass, and Former Ash Basin's inflow design flood control systems in the 2021 inflow design flood control system plan (Ref. 15) remain valid.

Table 5-1 summarizes the results from the hydrologic and hydraulic calculations performed for the Ash Surge, Bypass, and Former Ash Basins in 2021. Based on these results, water entering the Ash Surge and Bypass Basins during the inflow design flood event will not overflow into the basins' emergency spillway structures. The water levels in the Ash Surge and Bypass Basins following the design event were estimated to be 0.12 foot and 0.29 foot, respectively, below their corresponding emergency spillway structures. Meanwhile, the freeboards in the Ash Surge and Bypass Basins following the design event were estimated to be 2.12 feet and 1.54 feet, respectively. In addition, water entering the Former Ash Basin during the inflow design flood event will not overtop the North Pond's or South Pond's dikes. The freeboards in the North and South Ponds following the design event were estimated to be 4.13 feet and 6.77 feet, respectively.

Table 5-1 – Summary of Hydrologic & Hydraulic Assessment Results for Ash Surge Basin, Bypass Basin, & Former Ash Basin

CCR Surface Impoundment	Ash Surge Basin	Bypass Basin	Former Ash Basin, North Pond	Former Ash Basin, South Pond
IL Hazard Potential Classification	Class 2	Class 2	Class 2	Class 2
Inflow Design Flood	1,000 Year	1,000 Year	1,000 Year	1,000 Year
Maximum Surface Water EL.	465.88 feet	466.46 feet	450.87 feet	451.23 feet
Emergency Spillway EL.	466.00 feet	466.75 feet	N/A	N/A
Basin's Crest / Rim EL.	468.00 feet	468.00 feet	455.00 feet	458.00 feet

6.0 CONCLUSIONS

Based on the results in Table 5-1, the Ash Surge Basin, Bypass Basin, and Former Ash Basin have adequate hydraulic capacities to retain the 1,000-year flood event without water overflowing the basins' emergency spillway structures (Ash Surge and Bypass Basins only) or overtopping the basins' dikes. Therefore, the Ash Surge Basin, Bypass Basin, and Former Ash Basin are 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:

Thomas Dehlin
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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.
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7. Aero-Metric, Inc. Aerial Survey of Powerton Generating Station Dated June 19, 2008.
8. Ridgeline Consultants. Aerial Survey of Former Ash Basin Dated February and March 2016.
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12. Civil & Environmental Consultants, Inc. “Annual Inspection Report, Ash Surge Basin and Ash Bypass Basin, Powerton Station.” October 25, 2022.
13. Civil & Environmental Consultants, Inc. “Annual Inspection Report, Powerton Station - Former Ash Basin.” July 13, 2022.
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APPENDIX A: 2016 FEDERAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR ASH SURGE & BYPASS BASINS

APPENDIX B: 2018 FEDERAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR FORMER ASH BASIN