

# MWVG

Midwest Generation, LLC

**Powerton Generating Station**

## 2023 Inflow Design Flood Control System Plan for Metal Cleaning Basin

**Revision 0**

**October 13, 2023**

**Issue Purpose: Use**

**Project No.: A12661.174**

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

[www.sargentlundy.com](http://www.sargentlundy.com)



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## 1.0 PURPOSE

The Metal Cleaning Basin at Midwest Generation, LLC's (MWG) Powerton Generating Station ("Powerton" or the "Station") is a basin that is regulated as an existing coal combustion residual (CCR) surface impoundment under the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundment." 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 inflow design flood control system plan documenting how the inflow design flood control systems for the Metal Cleaning Basin have been designed and constructed to meet the hydrologic and hydraulic capacity requirements for CCR surface impoundment 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 Metal Cleaning Basin at Powerton. This report:

- Lists the inputs and assumptions used to determine whether the Metal Cleaning Basin 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 March 2022 hydrologic and hydraulic calculations performed to support the conclusion of whether the Metal Cleaning Basin 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 March 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 the Metal Cleaning Basin can manage the inflow design flood.

## 2.0 INPUTS

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

Powerton primarily uses the Metal Cleaning Basin for temporarily storing gas-side boiler cleaning wash water prior to treatment in the Station's Metal Cleaning Treatment System for the removal of dissolved metals and suspended solids. As shown on the as-built construction plans of the Metal Cleaning Basin in Appendix A, which depict how the basin was lined with its existing high-density polyethylene geomembrane liner circa 2011, wash water from the Station enters the basin via three concrete aprons along the basin's southern embankment. Effluent from the basin overflows a concrete weir wall at the northern end of the basin and flows into a 30-in.-diameter reinforced concrete pipe that discharges into a sump north of and adjacent to the

basin. The top of the sump is level with the top of the basin's dikes. Finally, the Metal Cleaning Basin does not have an emergency spillway.

### **Inflow Design Flood Event**

Per the basin's 2023 hazard potential classification assessment (Ref. 2), the Metal Cleaning Basin 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 the Metal Cleaning Basin 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. 3), 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 Metal Cleaning Basin and the surrounding areas was obtained from Sheet No. C-020 in Appendix A.

### **Metal Cleaning Basin Conditions**

The physical conditions for the Metal Cleaning Basin are based on observations made by S&L during a site visit on September 20, 2023, discussions with MWG personnel, the most recent annual inspection report prepared for the basin in accordance with 35 Ill. Adm. Code 845.540(b), and the as-built construction plans in Appendix A.

## **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 Metal Cleaning Basin, which were completed in March 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 the Metal Cleaning 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 2022 HYDROLOGIC & HYDRAULIC CALCULATIONS**

The latest hydrologic and hydraulic calculations for Powerton’s Metal Cleaning Basin were completed in March 2022. The inputs, methodology, and results of these calculations are documented in the basin’s March 2022 inflow design flood control system plan (Ref. 5). As stated in the March 2022 plan, these calculations were performed by conservatively assuming that the surface water elevation in the basin at the time of the design storm event was 2.5 feet higher than the basin’s normal operating level (EL. 462.00 feet above mean sea level (amsl)) to account for unanticipated transient discharges into the basin. In addition, the analysis conservatively assumed that the basin’s outlet pipe was full at the time of the storm event and, therefore, the Metal Cleaning Basin would need to contain the inflow design flood without water overtopping the basin’s dikes (EL. 467.00 feet amsl). The results of this March 2022 assessment indicated that water entering the basin during the inflow design flood event would not overtop the basin’s dikes. Moreover, because the sump downstream of the Metal Cleaning Basin’s outlet pipe has the same height as the basin, water will not overtop the sump following the design event.<sup>1</sup> The freeboard in the basin during the design event was estimated to be 3.85 feet. Based on these results, it was concluded that the basin has adequate hydraulic capacity to retain the 1,000-year flood event without water overtopping the basin’s dikes and was therefore in conformance with 35 Ill. Adm. Code 845.510(a).

### **5.2 CHANGES TO INPUTS FOR MARCH 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 calculation for the Metal Cleaning Basin have occurred since the calculations were completed in March 2022 that warrant updating the calculations.

#### **5.2.1 CHANGES IN BASIN OPERATIONS**

The operating conditions at the Metal Cleaning Basin described in Section 2.0 have not changed since the latest hydrologic and hydraulic calculations were prepared in March 2022. Thus, there have been no significant changes to the operations of this basin that warrant updating the March 2022 hydrologic and hydraulic calculations.

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<sup>1</sup> In this scenario, it is conservatively assumed that the pumps in the Metal Cleaning Basin’s sump are offline. Therefore, the water level in the sump will equalize with the water level in the Metal Cleaning Basin following the design event.

### **5.2.2 CHANGES IN BASIN TOPOGRAPHY**

Based on visual observations made by S&L during a site visit on September 20, 2023, review of the 2023 annual inspection report (Ref. 6), and reviews of Google Earth aerial images (Ref. 4), there have been no significant modifications to embankments for the Metal Cleaning Basin (mass excavations, mass fill placement, *etc.*) since the latest hydrologic and hydraulic calculations were completed in March 2022. Therefore, the topographic data (Sheet No. C-020 in Appendix A) 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 basin's 2023 hazard potential classification assessment (Ref. 2), the Metal Cleaning Basin 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 remains the 1,000-year storm (Ref. 1, § 845.510(a)(3)). As documented in the basin's March 2022 inflow design flood control system plan (Ref. 5), the precipitation value for the 1,000-year, 24-hour storm event used in the latest hydrologic and hydraulic calculations completed for the Metal Cleaning Basin 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 March 2022 hydrologic and hydraulic calculations is unchanged and remains valid for use in this 2023 assessment.

## **5.3 RESULTS**

Based on the preceding subsections, there have been no significant modifications to the Metal Cleaning Basin and no changes to the basin's inflow design flood event since the latest hydrologic and hydraulic calculations were prepared in March 2022. Therefore, the results and conclusions documented for the Metal Cleaning Basin's inflow design flood control systems in the March 2022 inflow design flood control system plan remain valid.

Table 5-1 summarizes the results from the hydrologic and hydraulic calculations performed for the Metal Cleaning Basin. Based on these results, water entering the Metal Cleaning Basin during the inflow design flood event will not overtop the basin's dikes. The water level in the Metal Cleaning Basin during the design event was estimated to be 3.85 feet below the basin's dikes.

**Table 5-1 – Summary of Hydrologic & Hydraulic Assessment Results for the Metal Cleaning Basin**

CCR Surface Impoundment	Illinois Hazard Potential Classification	Inflow Design Flood	Maximum Surface Water Elevation	Basin Crest Elevation
Metal Cleaning Basin	Class 2	1,000 Year	463.15 feet	467.00 feet

## 6.0 CONCLUSIONS

Based on the results in Table 5-1, the Metal Cleaning Basin has adequate hydraulic capacity to retain the 1,000-year flood event without water overtopping the basin's dikes. Therefore, the Metal Cleaning Basin 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. Civil & Environmental Consultants, Inc. "Hazard Potential Classification Assessment Report, Metal Cleaning Basin, Powerton Station." CEC Project No. 302-771.0323. June 2023.
3. National Oceanic and Atmospheric Administration. "Point Precipitation Frequency Estimates." NOAA Atlas 14, Volume 2, Version 3.
4. Google Earth Pro v7.3.0.3832. Accessed October 13, 2023
5. Sargent & Lundy. "2022 Inflow Design Flood Control System Plan for Metal Cleaning Basin." S&L, Rev. 0. S&L Project No. 12661-130. March 2022.
6. Civil & Environmental Consultants, Inc. "Annual Inspection Report, Metal Cleaning Basin, Powerton Station." June 2023.



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**APPENDIX A – 2011 AS-BUILT CONSTRUCTION PLANS**

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