

# MWG

Midwest Generation, LLC  
Powerton Generating Station

## 2021 Structural Stability Assessment for Ash Surge Basin, Bypass Basin, & Former Ash Basin



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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 845.450(a), MWG must conduct and complete a structural stability assessment that documents whether the design, construction, operation, and maintenance of the Ash Surge, Bypass, and Former Ash Basins are consistent with recognized and generally accepted engineering practices for the CCR surface impoundments' storage capacities.

The Ash Surge, Bypass, and Former Ash Basins 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." It should be noted that the Former Ash Basin is regulated under the Federal CCR Rule as an "inactive CCR surface impoundment," while it is regulated as an "existing CCR surface impoundment" under the Illinois 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 the Ash Surge, Bypass, and Former Ash Basins 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 the Ash Surge, Bypass, and Former Ash Basins at Powerton.

### 1.2 SCOPE

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, 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 the Ash Surge, Bypass, and Former Ash Basins are based on visual observations made during a site visit by S&L on September 7, 2021; discussions with MWG personnel; historical and recent aerial images obtained from Google Earth Pro (Ref. 3); and the following documents:

- Initial structural stability assessment for the Ash Surge and Bypass Basins (Ref. 4),
- Annual inspection reports for the Ash Surge and Bypass Basins (Refs. 5 through 9),
- History of construction for the Ash Surge and Bypass Basins (Ref. 10),
- Initial structural stability assessment for the Former Ash Basin (Ref. 11),
- Annual inspection reports for the Former Ash Basin (Refs. 12 through 16), and
- History of construction for the Former Ash Basin (Ref. 17).

The initial structural stability assessment for the Ash Surge and Bypass Basins, which was completed in October 2016, is included in its entirety in Appendix A. The initial structural stability assessment for the Former Ash Basin, which was completed in April 2018, is included in its entirety in Appendix B.

In early October 2020, Powerton took the Bypass Basin out of service for routine cleaning. During the September 2021 site visit, it was noted that most of the CCR previously stored in the Bypass Basin had been removed and minimal surface water remained in the basin. 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 basin's initial structural stability assessment was completed in 2016. MWG plans to either retrofit the Ash Surge Basin with a new composite liner system and a new LCRS or close and subsequently repurpose the basin as a new low volume waste basin. Finally, the Former Ash Basin is regulated by the Federal CCR Rule as 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. During the basin's most recent annual inspection in July 2021 (Ref. 16), the volumes of water impounded in the basin's North and South Ponds were estimated to be 9.7 acre-feet and 22.8 acre-feet, respectively.

## 2.2 ASH SURGE & BYPASS BASINS

### 2.2.1 STABLE FOUNDATIONS & ABUTMENTS

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

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

### 2.2.2 SLOPE PROTECTION

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

The upstream slopes of the Ash Surge and Bypass Basins are lined with high-density polyethylene (HDPE) geomembrane. A layer of gravel has also been installed on a second geomembrane liner around the perimeter of the Ash Surge Basin near the crests of the basin's upstream slopes. These forms of cover protect the upstream slopes of the basins' dikes against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown.

Slope protection for the downstream slopes of the Ash Surge and Bypass Basin consists of either the HDPE geomembrane liner of an adjacent surface impoundment or vegetative cover. Both forms of cover protect the downstream slopes of the basins' dikes against surface erosion, wave action, and adverse effects of sudden (rapid) drawdown. As of the date of this structural stability assessment, the vegetation along the Ash Surge Basin's downstream slopes is less than 12-inches tall and no woody vegetation is present. During the September 2021 site visit, vegetation greater than 12 inches and woody vegetation were observed along portions of the Bypass Basin's downstream slopes. In accordance with 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.

### **2.2.3 DIKE COMPACTION**

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

As documented in the Ash Surge and Bypass Basins' initial and 2021 safety factor assessments (Refs. 4 and 18), the basins' dikes are sufficiently compacted to withstand the range of loading conditions in the CCR surface impoundments.

### **2.2.4 SPILLWAYS**

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

The Ash Surge Basin has an emergency spillway structure located at the northeast corner of the basin. Similarly, the Bypass Basin has an emergency overflow riser pipe located at the northeast corner of the basin. However, as documented in the basins' 2021 inflow design flood control system plan (Ref. 19), both basins are capable of containing the design flood event (1000-year, 24-hour storm) without discharging water from their respective emergency spillway structures. Therefore, the capacities of these spillways were not evaluated for this 2021 assessment.

### **2.2.5 EMBEDDED HYDRAULIC STRUCTURES**

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

There are four pipes that underlie or pass through the Ash Surge Basin's dikes that convey wastewater to or from the Ash Surge and Bypass Basins. Meanwhile the Bypass Basin has three discharge pipes that pass through the basin's dikes. The locations of these pipes are shown on Figure 2 of the basins' initial structural stability assessment in Appendix A. As documented in the initial assessment, visual surveillance of the pipes passing through the Ash Surge and Bypass Basins' dikes was performed in May 2016. No significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris that may negatively affect the basins were identified during the surveillance program.

No similar pipe 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 the September 2021 site visit. Moreover, since the Bypass Basin has been taken out of service and had minimal surface water remaining in it as of the September 2021 site visit, the Bypass Basin's pipes that pass through or underlie the Ash Surge and Bypass Basins' dikes are not expected to convey

water again until the basin has been retrofitted with a new composite liner system and a new LCRS. Therefore, it is recommended that the Station conduct a visual surveillance program to confirm the Bypass Basin's discharge pipes are in good, working condition and are free of significant material defects that could impact the pipes' integrities as part of the retrofit construction activities for the basin. It is also recommended that the Station conduct a similar visual surveillance program for the Ash Surge Basin's discharge pipes prior to retrofitting the basin or repurposing it as a new low volume waste basin.

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

As documented in the Ash Surge and Bypass Basins' initial safety factor assessment (Ref. 4), the results of which were revalidated in their 2021 safety factor assessment (Ref. 18), the structural stabilities of the basins' downstream slopes are maintained during low pool conditions at each of the basins that are adjacent to the Ash Surge and Bypass Basins. These basins are:

- Metal Cleaning Waste Basin,
- East Roof and Yard Runoff Basin,
- Limestone Basin, and
- Former Ash Basin.

The Ash Surge and Bypass Basins' initial safety factor assessment also concluded that the structural stabilities of the basins' downstream slopes are maintained during sudden (rapid) drawdown conditions at the East Roof and Yard Runoff Basin and the Former Ash Basin. Because the Metal Cleaning Waste Basin is lined with an HDPE geomembrane, a sudden (rapid) drawdown condition was determined to not be an applicable loading condition for the basins since the Metal Cleaning Waste Basin's liner precludes the infiltration of water into the Ash Surge and Bypass Basin dikes. A sudden (rapid) drawdown condition was also not evaluated in the Limestone Basin since the basin is not used as a part of Station operations, only contains minimal surface water (if any) from direct precipitation, and does not have an outlet structure that could create a sudden (rapid) drawdown condition for the Ash Surge Basin's eastern dike.

Based on reviews of the Ash Surge and Bypass Basins' annual inspection reports (Refs. 5 through 9) and Google Earth aerial images (Ref. 3), there have been no significant modifications to the Metal Cleaning Waste Basin, East Roof and Yard Runoff Basin, Limestone Basin, and Former Ash Basin since the Ash Surge and Bypass Basins' initial structural stability assessment was completed. Therefore, the conclusions documented therein regarding the stability of the basins' dikes during low pool and sudden (rapid) drawdown conditions (where applicable) at the identified basins remain valid for this 2021 assessment (see Appendix A).

## 2.3 FORMER ASH BASIN

### 2.3.1 STABLE FOUNDATIONS & ABUTMENTS

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

The Former Ash Basin is comprised of one earthen dike along its northern edge (“northern dike”) and is effectively incised into the adjacent topography elsewhere. The basin does not have any abutments. Detailed information on the soils supporting the Former Ash Basin’s dike is provided in the basin’s initial structural stability assessment in Appendix B. Based on reviews of the basin’s annual inspection reports (Refs. 11 through 16) and Google Earth aerial images (Ref. 3), there have been no significant modifications to the Former Ash Basin’s geometry since its initial structural stability assessment was completed. Therefore, the details of the soils supporting the Former Ash Basin’s northern dike and corresponding conclusions documented in the basin’s initial structural stability assessment remain valid for this 2021 assessment (see Appendix A).

### 2.3.2 SLOPE PROTECTION

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

Slope protection for the upstream slopes of the Former Ash Basin consists of vegetation which protects the basin’s interior slopes from surface erosion, wave action, and the adverse effects of sudden (rapid) drawdown. Similarly, the downstream slopes of the basin’s northern dike are vegetated which offers protection from surface erosion. It is unknown whether the established vegetation provides adequate protection from wave action during a flood event at the Illinois River and/or Lost Creek or from sudden (rapid) drawdown conditions.

During the September 2021 site visit, vegetation greater than 12 inches was observed along portions of the pond’s interior slopes and the northern dike’s downstream slopes. Very dense, woody vegetation was also prevalent within the basin and along its slopes due to how long the basin has been inactive.

### 2.3.3 DIKE COMPACTION

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

As documented in the Former Ash Basin’s initial and 2021 safety factor assessments (Refs. 20 and 18), an engineering analysis to calculate the safety factors for the basin’s northern dike could not be performed given the lack of necessary information due to the construction age of the basin. Therefore, it is unknown whether the basin’s northern dike was sufficiently compacted to withstand the range of loading conditions in the CCR surface impoundment.



#### **2.3.4 SPILLWAYS**

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

The Former Ash Basin does not have spillways. As documented in the basin's 2021 inflow design flood control system plan (Ref. 19), the basin is capable of containing the design flood event (1000-year, 24-hour storm) without a spillway.

#### **2.3.5 EMBEDDED HYDRAULIC STRUCTURES**

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

No hydraulic structures are known to underlie the base of the Former Ash Basin or pass through the basin's northern dike.

#### **2.3.6 LOW POOL & RAPID DRAWDOWN STABILITY**

***(35 Ill. Adm. Code 845.450(a)(7); 40 CFR 257.73(d)(1)(vii))***

As previously stated, an engineering analysis to calculate the safety factors for the Former Ash Basin's northern dike could not be performed given the lack of necessary information due to the construction age of the basin. Therefore, it is unknown whether the basin's northern dike was designed and constructed to maintain structural stability during low pool and sudden (rapid) drawdown conditions when inundated by flooding at the Illinois River and/or Lost Creek.

### **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 for the Ash Surge and Bypass Basins:

- Mow vegetation that is greater than 12-inches tall along the Bypass Basin's downstream slopes,
- Remove woody vegetation near the Bypass Basin in accordance with 35 Ill. Adm. Code 845.430(b)(4),
- Conduct a visual surveillance program to verify that the Bypass Basin's discharge pipes are in good, working condition and are free of significant material defects that could compromise the pipes' integrities during retrofit construction activities for the Bypass Basin, and
- Conduct a visual surveillance program to verify that the Ash Surge Basin's discharge pipes are in good, working condition and are free of significant material defects that could compromise the pipes' integrities prior to retrofitting the basin or repurposing it as a new low volume waste basin.

Given the noted deficiencies in available information for the Former Ash Basin which preclude verifying the basin's northern dike has adequate slope protection, material compaction, and stability, it is unknown whether the Former Ash Basin was designed and constructed in accordance with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. Consequently, it is recommended that the Station continue with its plans to close the Former Ash Basin in accordance with the closure criteria promulgated by the Illinois and Federal CCR Rules.

#### 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

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**APPENDIX A: 2016 ASH SURGE & BYPASS BASINS  
STRUCTURAL STABILITY ASSESSMENT**

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**APPENDIX B: 2018 FORMER ASH BASIN STRUCTURAL  
STABILITY ASSESSMENT**

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