

MWVG

Midwest Generation, LLC

Powerton Generating Station

2023 Hazard Potential Classification Assessment for Ash Surge Basin, Bypass Basin, & Former Ash Basin



Revision 0

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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 845.440(a)(1), MWG must conduct and complete an annual hazard potential classification assessment that documents the hazard potential classifications for the Ash Surge Basin, Bypass Basin, and Former Ash Basin in accordance with the hazard potential classifications defined in 35 Ill. Adm. Code 845.120.

This report documents the 2023 hazard potential classification assessment conducted and completed 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 in the 2023 hazard potential classification assessment,
- Lists and compares the definitions for the hazard potential classifications for CCR surface impoundments promulgated by the Illinois CCR Rule and by the U.S. Environmental Protection Agency's regulations for CCR surface impoundments,
- Discusses the methodology used to conduct the 2023 hazard potential classification assessment,
- Provides the 2023 hazard potential classifications for the Ash Surge, Bypass, and Former Ash Basins in accordance with 35 Ill. Adm. Code 845.440(a)(1).

1.2 SCOPE

In addition to being regulated under the Illinois CCR Rule, Powerton's 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." Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the Ash Surge Basin, Bypass Basin, and Former Ash Basin 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 hazard potential classification assessment is strictly limited to demonstrating compliance with the Illinois CCR Rule. Pursuant to 40 CFR 257.73(f)(3), the next hazard potential classification assessment for demonstrating compliance with the Federal CCR Rule will be completed in 2026, five years after the last federal assessment was completed (2021).

2.0 INPUTS

Hazard Potential Classifications

The Illinois CCR Rule (Ref. 1, § 845.120) defines “hazard potential classification” as “the possible adverse incremental consequences that result from the release of water or stored contents due to failure of the diked CCR surface impoundment or mis-operation of the diked CCR surface impoundment or its appurtenances.” The Illinois CCR Rule (Ref. 1, § 845.440(a)(1)) requires a CCR surface impoundment be designated as either a Class 1 CCR surface impoundment or a Class 2 CCR surface impoundment. Per 35 Ill. Adm. Code 845.120, the two Illinois hazard potential classifications are defined as follows:

- *Class 1 CCR surface impoundment* means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.
- *Class 2 CCR surface impoundment* means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

The Federal CCR Rule (Ref. 2, § 257.53), has the same definition for “hazard potential classification” as the Illinois CCR Rule. However, the Federal CCR Rule has three hazard potential classifications instead of the two designations promulgated by the Illinois CCR Rule. Per 40 CFR 257.53, the three federal hazard potential classifications are defined as follows:

- *High hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.
- *Low hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment owner’s property.
- *Significant hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

Per the preceding sets of definitions for the federal and Illinois hazard potential classifications, a high hazard potential CCR surface impoundment per the Federal CCR Rule is the same as a Class 1 CCR surface impoundment per the Illinois CCR Rule. Similarly, a CCR surface impoundment that is classified as a low or significant hazard potential per the Federal CCR Rule is considered to be a Class 2 CCR surface impoundment per the Illinois CCR Rule.

A CCR surface impoundment’s hazard potential classification is not a reflection of the probability of a hypothetical failure event associated with the surface impoundment. Hazard potential classifications are not contingent upon a CCR surface impoundment’s structural stability; they only classify the potential impacts

should a hypothetical failure occur. For example, a well-maintained CCR surface impoundment with appropriate factors of safety may be classified as a Class 1 hazard potential solely because a loss of human life would be probable if a hypothetical failure event did occur. Instead, the structural integrity of a CCR surface impoundment and its potential for failure are evaluated and documented in the structural stability and safety factor assessments prepared pursuant to 35 Ill. Adm. Code 845.450 (Ref. 5) and 35 Ill. Adm. Code 845.460 (Ref. 6), respectively.

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).

Impacted Areas

Areas impacted by hypothetical failures at different breach points of the Ash Surge, Bypass, and Former Ash Basins were obtained from the basins' initial federal hazard potential classification assessments (Refs. 3 and 4), the dike breach analysis conducted in 2016 for the Ash Surge Basin's eastern dike (Ref. 9), and the dike breach inundation map included in for the Ash Surge and Bypass Basins' Emergency Action Plan (Ref. 10). The inputs, assumptions, and methodology utilized to identify areas impacted by failures at each of the basins' dikes were evaluated to determine whether any updates to these analyses were warranted.

Appendix A provides the initial federal hazard potential classification assessment conducted by Geosyntec Consultants in 2016 for the Ash Surge and Bypass Basins. Meanwhile, Appendix B provides the initial federal hazard potential classification assessment conducted by Civil & Environmental Consultants, Inc. in 2018 for the Former Ash Basin.

Aerial Images

Historical and recent aerial images of the Station and surrounding areas were obtained from Google Earth Pro (Ref. 11).

Property Boundaries

Boundaries for the Station's property and adjacent properties were obtained from the geographic information system (GIS) for Tazewell County, Illinois (Ref. 12).

100-Year Floodway & Floodplain

Delineations for the floodway and floodplain for the 1% annual chance flood ("100-year flood") at and downstream from the Powerton site were obtained from the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) for the subject area (Ref. 13).

Ash Pond Conditions

The operating and physical conditions for the Ash Surge, Bypass, and Former Ash Basins were based on discussions with MWG personnel and on the annual inspection reports prepared for the three CCR surface impoundments in accordance with 40 CFR 257.83(b) and 35 Ill. Adm. Code 845.540(b) (Refs. 14 through 27).

Illinois & Midland (I&M) Railroad

Information on the Illinois & Midland (I&M) Railroad, which is owned by Genesee & Wyoming, Inc. (G&W), was obtained from G&W's website for the railroad (Ref. 28), as well as information published on Union Pacific's website (Ref. 29).

3.0 ASSUMPTIONS

There are no assumptions in this document that require verification.

4.0 METHODOLOGY

As documented in last year's hazard potential classification assessment, the 2022 hazard potential classifications assigned to the Ash Surge, Bypass, and Former Ash Basins were based on the initial federal hazard potential classifications assigned to the three basins pursuant to the Federal CCR Rule after it was determined that the bases for the initial federal hazard potential classifications were still valid. Accordingly, the bases for the Ash Surge, Bypass, and Former Ash Basins' initial federal hazard potential classifications as documented within their respective initial federal hazard potential classification assessments were re-evaluated to determine if any changes have occurred since the initial assessments were completed. Identified changes were then evaluated to determine if the basins' 2022 hazard potential classifications warrant adjustments. Where no changes were noted for a given input, or where identified changes were determined to have no impact to the results and conclusions of the initial federal hazard potential classification assessment, the previous evaluation of that input was considered to still be valid for this 2023 assessment.

In instances where changes to one or more factors used as the bases for the initial hazard potential classifications were identified (*e.g.*, downstream development that was not present in 2016), hypothetical dike breaches were considered at each of the three CCR surface impoundments to evaluate the impacts that a release of CCR and CCR wastewater would have on the identified factor(s). These hypothetical dike breaches were evaluated regardless of potential causes and/or apparent dike stability. When evaluating a hypothetical dike breach at a subject CCR surface impoundment, the solid waste materials in the given CCR surface impoundment were conservatively considered as an equivalent volume of liquid, and the CCR surface impoundment was assumed to be entirely filled with liquid.

When evaluating the downstream impacts from a hypothetical dike breach at a CCR surface impoundment, the primary consideration examined was whether a loss of human life is probable under the given hypothetical failure scenario. Loss of human life is the critical aspect of the Class 1 hazard potential classification. If a loss of human life is unlikely to occur, then the CCR surface impoundment was not considered to be a Class 1 hazard potential and was instead classified as a Class 2 hazard potential.

5.0 ASSESSMENT

5.1 SUMMARY OF 2022 HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

The previous hazard potential classification assessment for the Ash Surge, Bypass, and Former Ash Basins was completed on October 14, 2022. Ultimately, the 2022 hazard potential classifications for the Ash Surge, Bypass, and Former Ash Basins were based on the initial federal hazard potential classifications that were assigned to all three basins after it was determined that the bases for the initial federal hazard potential classifications were still valid. Per the initial federal hazard potential classification assessments for the Ash Surge, Bypass, and Former Ash Basins, all three basins were classified as significant hazard potential CCR surface impoundments pursuant to 40 CFR 257.53. Based on the comparison between the Federal and Illinois CCR Rules' definitions for hazard potential classifications in Section 2.0, a significant hazard potential CCR surface impoundment under the Federal CCR Rule is the equivalent of a Class 2 CCR surface impoundment under the Illinois CCR Rule. Therefore, the Ash Surge, Bypass, and Former Ash Basins were classified as Class 2 CCR surface impoundments in the 2022 hazard potential classification assessment.

5.2 SUMMARY OF INITIAL FEDERAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENTS

The initial federal hazard potential classification assessment for the Ash Surge and Bypass Basins was completed in October 2016 and is included in its entirety in Appendix A. This assessment evaluated the potential consequences of hypothetical dike failures for both basins. A quantitative dike breach analysis was also conducted for the southern portion of the Ash Surge Basin's east dike, which was determined to pose the most risk to human life amongst the eight dikes between the two basins. This 2016 dike breach analysis also assumed the Ash Surge Basin was at capacity at the time of the hypothetical failure. Ultimately, these 2016 assessments concluded that the worst-case, hypothetical failure at the Ash Surge and Bypass Basins would not result in a probable loss of human life due to the lack of occupied buildings near the CCR surface impoundments. However, it was determined that hypothetical failures at each of these two CCR surface impoundments could result in environmental damage to Lost Creek and the Illinois River. Therefore, the Ash Surge and Bypass Basins were classified as significant hazard potential CCR surface impoundments.

The initial federal hazard potential classification assessment for the Former Ash Basin was completed in April 2018 and is included in its entirety in Appendix B. This assessment evaluated the potential

consequences of hypothetical dike failures at each of the exterior dikes for the basin's two impoundment areas, the North Pond and the South Pond. Potential dike failure scenarios were not considered for the South Pond because the pond's perimeter was determined to be effectively incised into the adjacent ground surface. Ultimately, the 2018 assessment concluded that a failure along the North Pond's perimeter dike would not result in a probable loss of human life but could cause wastewater to be released into the Illinois River. Consequently, the Former Ash Basin was classified as a significant hazard potential CCR surface impoundment.

5.3 CHANGES IN BASES FOR INITIAL FEDERAL HAZARD POTENTIAL CLASSIFICATIONS

Because the 2022 hazard potential classifications assigned to the Ash Surge, Bypass, and Former Ash Basins are based on the analyses performed in 2016 and 2018 pursuant to the Federal CCR Rule, this 2023 assessment re-evaluates the bases for all three basins' initial federal hazard potential classifications to determine if any changes have occurred since the initial assessments were completed that warrant adjusting the basins' 2022 hazard potential classifications.

5.3.1 CHANGES IN ASH POND OPERATIONS & EMBANKMENT GEOMETRY

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 a subsequent site visit by S&L in September 2022, 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 basin's initial federal hazard potential classification assessment was conducted in 2016. MWG currently plans to retrofit the Ash Surge Basin with a new composite liner system and a new LCRS after the Bypass Basin has been retrofitted upon receipt of a retrofit construction permit from the Illinois EPA in accordance with Subpart B of the Illinois CCR Rule.

Finally, the Former Ash Basin is regulated by the Illinois 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 2023 (Ref. 27), the total volume of water impounded in the Former Ash Basin was estimated to be 20 acre-feet.

Of the three CCR surface impoundments, only the operating conditions at the Bypass Basin have changed since the initial federal hazard potential classification assessments were completed for the three basins. As previously mentioned in Section 5.2, the Bypass Basin's 2016 federal hazard potential classification assessment examined hypothetical breach scenarios assuming the basin was at capacity; therefore, the operating condition assumed for the initial assessment is conservative for the basin's current operating condition. Therefore, it is not necessary to re-evaluate the surface water elevation used to conduct the initial federal hazard potential classification assessment for the Bypass Basin. Because the operating conditions at the Ash Surge and Former Ash Basins have not changed since their initial federal hazard potential classification assessments were completed, there is no basis to re-evaluate the surface water elevations for this 2023 assessment.

Based on reviews of the annual inspection reports (Refs. 14 through 27) and Google Earth aerial images (Ref. 11), there have been no significant modifications to the Ash Surge, Bypass, and Former Ash Basins (mass excavations, major embankment modifications, *etc.*) since the initial federal hazard potential classification assessments were completed in 2016 and 2018. Therefore, there is no basis to re-evaluate the embankment geometry for this 2023 assessment.

5.3.2 CHANGES IN SITE TOPOGRAPHY

Based on reviews of the annual inspection reports (Refs. 14 through 27) and Google Earth aerial images (Ref. 11), there have been no significant modifications to the ground surfaces (mass excavations, mass fill placement, *etc.*) adjacent to the Ash Surge, Bypass, and Former Ash Basins or within the dike breach impact areas since the initial hazard potential classification assessments were completed. Therefore, the topographic data collected for the site in 2008 (Ref. 7) and 2016 (Ref. 8) remains valid for use in this 2023 assessment.

5.3.3 CHANGES IN DOWNSTREAM PROPERTY DEVELOPMENTS

Based on reviews of Google Earth aerial images (Ref. 11) and the Tazewell County, Illinois GIS (Ref. 12), no new buildings, roads, or rail lines have been constructed within the dike breach impact areas identified in the initial federal hazard potential classification assessments since assessments were conducted in 2016 and 2018. Thus, there is no basis to re-evaluate the potential impacts to the areas downstream of the Ash Surge, Bypass, and Former Ash Basins for this 2023 assessment.

5.4 2023 ANNUAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

Other than the change in the operational status of the Bypass Basin, there have been no significant modifications to the Ash Surge, Bypass, and Former Ash Basins; no significant modifications to the topography adjacent to and downstream of the CCR surface impoundments; and no significant buildings, roads, or rail lines that have been constructed in the areas downstream of the CCR surface impoundments that would be impacted by a hypothetical dike breach. Therefore, the initial federal hazard potential classification assessments completed in 2016 and 2018 for these three CCR surface impoundments remain valid. In addition, the 2016 dike breach analysis for the southern portion of the Ash Surge Basin's eastern dike still represents the worst-case failure scenario for the Ash Surge and Bypass Basin dikes since the Ash Surge Basin has 18 times more storage capacity than the Bypass Basin (Ref. 18, Tables 1 and 2) and, at approximately 9-foot tall, the Ash Surge Basin's southern dike is the tallest of the basin's four dikes.

In addition to the lack of human-occupied buildings downstream of the CCR surface impoundments, it was further noted that the only transport corridors that would be impacted by a hypothetical failure at either of the Ash Surge, Bypass, and Former Ash Basins are the Station's coal yard rail loop between the Former Ash Basin's North and South Ponds and the I&M Railroad line southeast of the CCR surface impoundments. A review of publicly available information on the I&M Railroad published by its owner, Genesee & Wyoming, Inc., and by Union Pacific indicated that trains traveling along the rail line predominately carry coal and agricultural commodities and do not provide public transportation services. Therefore, a loss of human life along the identified rail lines would be unlikely as a result of a hypothetical failure or mis-operation at the Ash Surge, Bypass, or Former Ash Basins.

Based on the preceding observations, the significant hazard potential classifications assigned to the Ash Surge, Bypass, and Former Ash Basins in 2016 and 2018 pursuant to the Federal CCR Rule and the bases for these assignments remain valid for this 2023 assessment. A loss of human life is unlikely to result from a hypothetical failure at these three CCR surface impoundments, but potential offsite environmental damage could occur to Lost Creek and the Illinois River. As discussed in Section 2.0, a CCR surface impoundment classified as a significant hazard potential per the Federal CCR Rule is considered to be an Illinois Class 2 CCR surface impoundment. Therefore, the Ash Surge, Bypass, and Former Ash Basins remain classified as Class 2 CCR surface impoundments pursuant to 35 Ill. Adm. Code 845.440(a)(1). However, this is not a reflection of the potential for the impoundments to fail. The 2023 annual safety factor assessment conducted pursuant to 35 Ill. Adm. Code 845.460 (Ref. 6) shows that the Ash Surge and Bypass Basins are stable under design operating conditions. Moreover, no visual signs of distress that could be indicative of dike instability were observed during the September 20, 2023, condition assessment performed by S&L in support of the basins' 2023 annual structural stability assessment under 35 Ill. Adm. Code 845.450 (Ref. 5). Finally, as noted in both assessments, MWG is closing the Former Ash Basin given the lack of necessary information available to perform these assessments due to the construction age of the basin.

6.0 CONCLUSIONS

This assessment re-evaluated the factors and design inputs used as the bases for the initial federal hazard potential classification assessment completed in 2016 and 2018 pursuant to the Federal CCR Rule for Powerton’s Ash Surge, Bypass, and Former Ash Basins. It was determined that no significant operational or physical changes to the CCR surface impoundments and no new downstream developments have occurred within the last seven years that would necessitate changing any of the basins’ initial federal hazard potential classifications. Therefore, because the 2022 Illinois hazard potential classifications for all three basins were based on their initial federal hazard potential classifications, the 2022 Illinois hazard potential classifications assigned to the Ash Surge, Bypass, and Former Ash Basins and the bases for these assignments remain valid for 2023.

Table 6-1 presents the 2023 hazard potential classifications assigned to the Ash Surge, Bypass, and Former Ash Basins at Powerton in accordance with 35 Ill. Adm. Code 845.440(a)(1).

Table 6-1 – 2023 Illinois Hazard Potential Classification for the Ash Surge Basin, Bypass Basin, & Former Ash Basin at the Powerton Generating Station

CCR Surface Impoundment	2023 Illinois Hazard Potential Classification
Ash Surge Basin	Class 2
Bypass Basin	Class 2
Former Ash Basin	Class 2

However, as noted above, the 2023 hazard potential classifications for the Ash Surge, Bypass, and Former Ash Basins do not reflect the probability of a hypothetical failure event associated with the basins and are not contingent upon the basins’ structural stability. Indeed, the 2023 annual safety factor assessment conducted pursuant to 35 Ill. Adm. Code 845.460 (Ref. 6) shows that the Ash Surge and Bypass Basins are structurally stable under design operating conditions. Moreover, no visual signs of distress that could be indicative of dike instability were observed during S&L’s September 20, 2023, condition assessment performed in support of the basins’ 2023 annual structural stability assessment under 35 Ill. Adm. Code 845.450 (Ref. 5). Finally, as noted in both assessments, MWG is closing the Former Ash Basin given the lack of necessary information available to perform these assessments due to the construction age of the basin.

7.0 CERTIFICATION

I certify that:

- This hazard potential classification assessment was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.440.
- 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

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**APPENDIX A: 2016 ASH SURGE & BYPASS BASIN FED.
HAZARD POTENTIAL CLASSIFICATION ASSESSMENT**



**APPENDIX B: 2018 FORMER ASH BASIN FEDERAL
HAZARD POTENTIAL CLASSIFICATION ASSESSMENT**

