MWG

Midwest Generation, LLC

Joliet 29 Generating Station

2024 Hazard Potential Classification Assessment for Ash Pond 2

Revision 0

October 13, 2024

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Sargent & Lundy

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EXECUTIVE SUMMARY

This report presents the 2024 hazard potential classification assessment for Ash Pond 2 at Midwest Generation, LLC's (MWG) Joliet 29 Generating Station ("Joliet 29" or the "Station"). Pursuant to 35 Ill. Adm. Code 845.440(a)(1), this annual assessment, prepared by Sargent & Lundy (S&L) on behalf of MWG, documents the hazard potential classification for Ash Pond 2 in accordance with the hazard potential classifications defined in 35 Ill. Adm. Code 845.120.

Per last year's hazard potential classification assessment, Ash Pond 2 was designated as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1), which is the equivalent of a significant hazard potential CCR surface impoundment under 40 CFR 257.53, after it was determined that the bases for the initial federal hazard potential classification assigned to the pond in 2016 in accordance with 40 CFR 257.73(a)(2) were still valid. Accordingly, to complete this assessment, S&L re-evaluated the bases of the initial federal hazard potential classification assigned to Ash Pond 2 to determine (1) if any changes have occurred since the initial assessment was completed and (2) whether identified changes warrant adjusting the pond's 2023 hazard potential classification. Where no changes were noted for a given input, or where identified changes were determined to have no impact on the results or conclusions of the initial federal hazard potential classification assessment, the previous evaluation of that input was considered to still be valid for this 2024 hazard potential classification assessment.

Since the conversion of Joliet 29's coal-fired units to natural gas, Ash Pond 2 has been out of service and has not been used to manage any process or wastewater streams. In April 2021, MWG filed a notice of intent to close Ash Pond 2 and subsequently submitted a closure construction permit application to Illinois EPA in January 2022. There is no CCR remaining in Ash Pond 2, and the Station actively removes stormwater from the pond to maintain relatively low operating levels. Accumulated rainwater was removed in June 2024 to a depth of approximately six inches. Due to the accumulation of rainwater over the past several months, the current water level in the pond is 1.8 feet.

Currently, the only water entering Ash Pond 2 is direct precipitation (i.e., rain or snow) and run-off from the crests of the ponds' dikes. Therefore, the pond's original design conditions used for the 2016 hypothetical dike breach analyses performed in support of the pond's initial federal hazard potential classification assessment is very conservative for the pond's current operating conditions. Otherwise, no other significant changes to Ash Pond 2 or to downstream developments were identified in this 2024 hazard potential classification assessment.

Based on the preceding observations, the bases for the initial federal significant hazard potential classification assigned to Ash Pond 2 in accordance with 40 CFR 257.73(a)(2) have either not changed or

are conservative under current conditions. Per the analyses performed in support of the 2016 federal hazard potential classification assessment, a loss of human life is unlikely to result from a hypothetical failure under the CCR surface impoundment's original design conditions, but potential offsite damage could occur at the Des Plaines River. Because a CCR surface impoundment classified as a significant hazard potential is considered to be an Illinois Class 2 CCR surface impoundment, Ash Pond 2 is classified as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1) under its original design capacity. However, MWG is currently updating the 2016 dike breach analysis to account for the pond's reduced operating capacity and corresponding reductions in impacts to downstream areas caused by a hypothetical dike breach at the pond. This evaluation will be provided in a subsequent revision to this hazard potential classification assessment.

Ash Pond 2's classification as a Class 2 CCR surface impoundment is not a reflection of the potential for the impoundment to fail. The 2024 annual safety factor assessment conducted pursuant to 35 Ill. Adm. Code 845.460 shows that Ash Pond 2 is stable under design operating conditions. Moreover, no visual signs of distress that could be indicative of dike instability were observed during the September 26, 2024, condition assessment performed by S&L in support of the pond's 2024 annual structural stability assessment under 35 Ill. Adm. Code 845.450.

Table ES-1 presents the 2024 hazard potential classification assigned to Joliet 29 Ash Pond 2 under its original design capacity in accordance with 35 Ill. Adm. Code 845.440(a)(1).

Table ES-1 – 2024 Illinois Hazard Potential Classifications for Ash Pond 2 at the Joliet 29 Generating Station

CCR Surface Impoundment	2024 Illinois Hazard Potential Classification
Ash Pond 2	Class 2

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 845.440(a)(1), MWG must conduct and complete an annual hazard potential classification assessment that documents the hazard potential classification for Ash Pond 2 in accordance with the hazard potential classifications defined in 35 Ill. Adm. Code 845.120.

This report documents the 2024 hazard potential classification assessment conducted and completed 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 in the 2024 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 2024 hazard potential classification assessment,
- Provides the 2024 hazard potential classifications for Ash Pond 2 in accordance with 35 Ill. Adm. Code 845.440(a)(1).

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 2024 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. 3) and 35 Ill. Adm. Code 845.460 (Ref. 4), respectively.

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).

Impacted Areas

Areas impacted by a hypothetical failure at Ash Pond 2 were obtained from the pond's initial federal hazard potential classification assessment (Ref. 5), the dike breach analysis conducted in 2016 for the pond's southern dike (Ref. 7), and the dike breach inundation map included in Ash Pond 2's Emergency Action Plan (Ref. 8). The inputs, assumptions, and methodology utilized to identify areas impacted by failures at each of the pond's 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 Ash Pond 2.

Aerial Images

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

Property Boundaries

Boundaries for the Station's property and adjacent properties were obtained from the geographic information system (GIS) for Will County, Illinois (Ref. 10).

100-Year Floodway & Floodplain

Delineations for the floodway and floodplain for the 1% annual chance flood ("100-year flood") at and downstream from the Joliet 29 site were obtained from the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) for the subject area (Ref. 11).

Ash Pond Conditions

The operating and physical conditions for Ash Pond 2 were based on the following inputs:

- Observations made during a site visit by S&L on September 26, 2024.

- Discussions with MWG personnel.
- The annual inspection reports prepared for the CCR surface impoundment in accordance with 40 CFR 257.83(b) and 35 Ill. Adm. Code 845.540(b) (Refs. 13 through 20).
- The weekly inspection reports prepared in accordance with 35 Ill. Adm. Code 845.540(a) since the 2023 hazard potential classification assessment was issued (Ref. 24).

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 2023 hazard potential classification assigned to Ash Pond 2 was based on the initial federal hazard potential classification assigned in 2016 pursuant to the Federal CCR Rule after it was determined that the bases for the initial federal hazard potential classification was still valid. Accordingly, the bases for Ash Pond 2's initial federal hazard potential classification as documented within the pond's initial federal hazard potential classification assessment were re-evaluated to determine if any changes have occurred since the initial assessment was completed. Identified changes were then evaluated to determine if the pond's 2023 hazard potential classification warrants an adjustment. 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 2024 assessment.

In instances where changes to one or more factors used as the bases for the initial hazard potential classification were identified (*e.g.*, downstream development that was not present in 2016), hypothetical dike breaches were considered at the CCR surface impoundment 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 Ash Pond 2, the solid waste materials in the 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 Ash Pond 2, 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 Ash Pond 2 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 2023 HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

The previous hazard potential classification assessment for Ash Pond 2 was completed on October 13, 2023. Ultimately, the 2023 hazard potential classification for Ash Pond 2 was based on the initial federal hazard potential classification that was assigned to the pond in 2016 after it was determined that the bases for the initial federal hazard potential classification were still valid. Per the initial federal hazard potential classification assessment for Ash Pond 2, the pond was classified as a significant hazard potential CCR surface impoundment 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, Ash Pond 2 was classified as a Class 2 CCR surface impoundment in the 2023 hazard potential classification assessment.

5.2 SUMMARY OF INITIAL FEDERAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

The initial federal hazard potential classification assessment for Ash Pond 2 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 the pond. A quantitative dike breach analysis was also conducted for the pond's southern dike which was determined to pose the most risk to human life due its height, its proximity to occupied buildings, and the adjacent topography sloping towards occupied buildings and the Des Plaines River. The 2016 dike breach analysis also assumed that Ash Pond 2 was at capacity at the time of the hypothetical failure.

Per Figures 2 and 3 in Appendix A, the 2016 dike breach analysis concluded that the flood released through a hypothetical breach in Ash Pond 2's southern dike could impact six Station buildings, of which three are considered to be occupied building and the remaining three are considered to be unoccupied buildings. The 2016 dike breach analysis also concluded that the combination of the estimated flood velocity and depth at each occupied building is within the U.S. Department of the Interior, Bureau of Reclamation's (USBR) "Low Danger Zone" (see Figure 4 in Appendix A). In its "Downstream Hazard Classification Guidelines" (Ref. 12), the USBR states that if the depth-velocity combination of a hazard (*e.g.*, flood) for a given area plots within the "Low Danger Zone," "the number of lives-in-jeopardy associated with possible downstream hazards is assumed to be zero." In other words, floods plotting within the USBR's "Low Danger Zone" are unlikely to

cause a probable loss of human life. Therefore, the initial federal hazard potential classification assessment concluded that a failure of Ash Pond 2's southern dike would not result in a probable loss of human life.

Although a hypothetical failure at Ash Pond 2 was determined to not cause a probable loss of human life, it was also determined that wastewater released from such a breach would flow into the Station's Intake Canal, thereby impacting the Des Plaines River. Therefore, Ash Pond 2 was classified as a significant hazard potential CCR surface impoundment.

5.3 CHANGES IN BASES FOR INITIAL FEDERAL HAZARD POTENTIAL CLASSIFICATION

Because the 2023 hazard potential classification assigned to Ash Pond 2 is based on the analysis performed in 2016 pursuant to the Federal CCR Rule, this 2024 assessment re-evaluates the bases for the pond's initial federal hazard potential classification to determine if any changes have occurred since the initial assessment was completed that warrant adjusting the pond's 2023 hazard potential classification.

5.3.1 CHANGES IN ASH POND OPERATIONS & EMBANKMENT GEOMETRY

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. 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 a closure construction permit from the Illinois EPA.

As documented in the pond's most recent 2023 annual inspection report (Ref. 20), there is no CCR remaining in Ash Pond 2. In addition, the Station is actively taking measures to limit the water level in the pond. Per the weekly inspection reports prepared in accordance with 35 Ill. Adm. Code 845.540(a) since the 2023 hazard potential classification assessment was issued (Ref. 24), the Station pumped water out of the pond in June 2024 to a depth of approximately 6 inches. Since July 24, the water level in Ash Pond 2 has been maintained at around 2 feet. Indeed, during S&L's site visit on September 26, 2024, no CCR and approximately 1.8 feet of water were visually observed in Ash Pond 2. The Station will continue to periodically dewater Ash Pond 2 to maintain relatively low operating levels.

As previously mentioned in Section 5.1, Ash Pond 2's 2016 federal hazard potential classification assessment examined hypothetical breach scenarios assuming the pond was at capacity. Currently, the only water entering Ash Pond 2 is direct precipitation (i.e., rain or snow) and run-off from the crests of the pond's dikes. Moreover, the Station is actively limiting the amount of stormwater that can accumulate in the pond. Therefore, the assumed operating condition used for the initial assessment is very conservative for the pond's current operating condition.

Based on reviews of the annual inspection reports (Refs. 13 through 20) and Google Earth aerial images (Ref. 9), there have been no significant physical modifications to Ash Pond 2 (mass excavations, major embankment modifications, *etc*.) since the initial federal hazard potential classification assessment was completed in 2016. Therefore, there is no basis to reevaluate the embankment geometry for this 2024 assessment.

5.3.2 CHANGES IN SITE TOPOGRAPHY

Based on reviews of the annual inspection reports (Refs. 13 through 20) and Google Earth aerial images (Ref. 9), there have been no significant modifications to the ground surfaces (mass excavations, mass fill placement, *etc*.) adjacent to Ash Pond 2 or within the dike breach impact areas since the initial federal hazard potential classification assessment was completed in 2016. Therefore, the topographic data collected for the site in 2008 (Ref. 6) remains valid for use in this 2024 assessment.

5.3.3 CHANGES IN DOWNSTREAM PROPERTY DEVELOPMENTS

Based on reviews of Google Earth aerial images (Ref. 9) and the Will County, Illinois GIS (Ref. 10), and on observations made during S&L's site visit in September 2024, two new buildings were constructed within the dike breach impact areas identified in the initial federal hazard potential classification assessment. These buildings are identified as Buildings 14 and 15 on the updated Site Building Occupancy Map in Appendix B and are unoccupied. In addition, Joliet 29's two electric generating units, Units 7 and 8, were retired in September 2023, so the main power building, identified as Building 10, is now classified as an unoccupied building. Finally, Buildings 7 and 12 have been demolished since the 2016 analysis. However, because none of these developments include the addition of occupied buildings within the delineated dike breach areas shown in Appendix A, it is not necessary to reevaluate the potential impacts to the areas downstream of Ash Pond 2 for this 2024 assessment.

5.3.4 CHANGES IN USBR DEPTH-VELOCITY FLOOD DANGER LEVELS

The USBR has not updated the depth-velocity flood danger level relationships presented in its "Downstream Hazard Classification Guidelines" (Ref. 12) since the initial federal hazard potential classification assessment

for Ash Pond 2 was completed in 2016. Therefore, there is no basis to reevaluate the danger levels assigned to the occupied buildings identified within the inundation area downstream of Ash Pond 2's southern dike following a hypothetical breach.

5.4 2024 HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

Per the preceding evaluation, there have been no significant modifications to Ash Pond 2's embankments and no significant modifications to the topography adjacent to and downstream of the CCR surface impoundment since the initial federal hazard potential classification assessment was completed in 2016. Since then, two unoccupied buildings have been constructed downstream of the CCR surface impoundment, the main power building is now classified as unoccupied since the retirement of the Station's electric generating units, and the two structures in the vicinity of Ash Pond 2 have been demolished. However, no occupied buildings within the delineated dike breach area for the pond has been added since the 2016 analysis.

There have also been no changes to the USBR's depth-velocity flood danger level relationships, which were used in the 2016 federal hazard potential classification assessment. Moreover, the Federal Energy Regulatory Commission's *Engineering Guidelines for the Evaluation of Hydropower Projects* (Ref. 21), which references FEMA's *Federal Guidelines for Dam Safety* (Ref. 22), states that "the consequences of failure are not expected to cause a probable loss of human life when incremental effects on downstream structures are approximately two feet or less." FEMA's *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures* (Ref. 23) also states that an incremental rise in flood depth of two feet or less caused by a dike breach is not considered to be a concern to human life. These two federal guidelines further support the conclusion that the loss of human life at the two occupied buildings is not probable given the initial breach analysis results show the estimated flood depths at these buildings are less than two feet. In addition, the 2016 dike breach analysis for Ash Pond 2's southern dike still represents the worst-case failure scenario amongst the pond's three dikes. However, the Station has implemented operational changes that reduce the pond's operating capacity to a volume substantially less than its original design capacity, which reduces the potential impacts to downstream areas during a hypothetical dike breach. Therefore, the results of the 2016 dike breach analysis are conservative for the pond's current operating conditions.

Based on the preceding observations, the bases for the initial federal significant hazard potential classification assigned to Ash Pond 2 in accordance with 40 CFR 257.73(a)(2) have either not changed since 2016 or are conservative under current conditions. At its original design capacity, a loss of human life is unlikely to result from a hypothetical failure at this CCR surface impoundment, but potential offsite environmental damage could occur to the Des Plaines 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, Ash Pond 2 is classified as a Class 2 CCR surface impoundment pursuant to 35 Ill. Adm. Code 845.440(a)(1) under its original design capacity. However, MWG is currently updating the 2016 dike breach analysis to account for the pond's reduced operating capacity and corresponding reductions in impacts to downstream areas caused by a hypothetical dike breach at the pond. This evaluation will be provided in a subsequent revision to this hazard potential classification assessment.

Ash Pond 2's classification as a Class 2 CCR surface impoundment is not a reflection of the potential for the impoundment to fail. The 2024 annual safety factor assessment conducted pursuant to 35 Ill. Adm. Code 845.460 (Ref. 4) shows that Ash Pond 2 is stable under design operating conditions. Moreover, no visual signs of distress that could be indicative of dike instability were observed during the September 26, 2024, condition assessment performed by S&L in support of the pond's 2024 annual structural stability assessment under 35 Ill. Adm. Code 845.450 (Ref. 3).

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 pursuant to the Federal CCR Rule for Joliet 29's Ash Pond 2. It was determined that no significant physical changes to the CCR surface impoundment and no new downstream developments within the dike breach inundation areas have occurred within the last eight years that would necessitate changing the pond's initial federal hazard potential classification. However, the Station has implemented water level controls that reduce the pond's operating capacity to a volume substantially less than its original design capacity, which reduces the potential impacts to downstream areas during a hypothetical dike breach at the pond's southern dike. MWG is currently updating the 2016 dike breach analysis to account for this reduction in the pond's operating capacity. This evaluation will be provided in a subsequent revision to this hazard potential classification assessment.

Based on the results of this hazard potential classification assessment, the bases for the initial federal significant hazard potential classification assigned to Ash Pond 2 under its original design operating capacity in accordance with 40 CFR 257.73(a)(2) have either not changed since 2016 or are conservative under current conditions. At its original design capacity, a loss of human life is unlikely to result from a hypothetical failure at this CCR surface impoundment, but potential offsite environmental damage could occur to the Des Plaines River. Therefore, because the 2023 Illinois hazard potential classification for Ash Pond 2 was based on its 2016 federal hazard potential classification, the 2023 Illinois hazard potential classification assigned to Ash Pond 2 under its original design capacity, and the bases for this assignment, remain valid for 2024.

Table 6-1 presents the 2024 hazard potential classifications assigned to Joliet 29 Ash Pond 2 under its original design capacity in accordance with 35 Ill. Adm. Code 845.440(a)(1).

Table 6-1 – 2024 Illinois Hazard Potential Classifications for Ash Pond 2 at the Joliet 29 Generating Station

CCR Surface Impoundment	2024 Illinois Hazard Potential Classification
Ash Pond 2	Class 2

However, as noted above, the 2024 hazard potential classification for Ash Pond 2 does not reflect the probability of a hypothetical failure event associated with the pond and is not contingent upon the pond's structural stability. Indeed, the 2024 annual safety factor assessment conducted pursuant to 35 Ill. Adm. Code 845.460 (Ref. 4) shows Ash Pond 2 is 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 26, 2024, condition assessment performed in support of the pond's 2024 annual structural stability assessment under 35 Ill. Adm. Code 845.450 (Ref. 3).

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 Dehlin Date: 10/13/2024

Seal:

Digitally signed by Thomas Dehlin
Date: 2024.10.13 11:26:29-05'00'

8.0 REFERENCES

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APPENDIX A: 2016 FEDERAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT FOR ASH POND 2

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HAZARD POTENTIAL CLASSIFICATION ASSESSMENT
ASH POND 2
JOLIET 29 STATION
OCTOBER 2016

This initial hazard potential classification assessment (HPCA) addresses the requirements of §257.73(a)(2) of the Coal Combustion Residuals (CCR) regulations, Code of Federal Regulations Title 40, Part 257 for Ash Pond 2 at the Joliet 29 Station (Site) in Joliet, Illinois. The CCR regulations were published in the Federal Register on 17 April 2015 and became effective as of 19 October 2015. The Site is currently a gas-fired power station, owned and operated by Midwest Generation, LLC (Midwest Generation). The Station previously operated as a coal-fired power station through March 2016.

Ms. Jane Soule, P.E., of Geosyntec, prepared this HPCA in accordance with §257.73(a)(2). Mr. Robert White reviewed this report in accordance with Geosyntec's peer review policy.

Summary

Based on the results of the analysis provided in this report, Ash Pond 2 is classified as a significant hazard potential CCR surface impoundments because a failure would not result in probable loss of life, but could result in economic and environmental losses.

1. Regulation Requirements - §257.73(a)(2)

According to the Preamble of the CCR regulations (page 21377), "a hazard potential classification provides an indication of the potential for danger to life, development, or the environment in the event of a release of CCR from a surface impoundment." This classification is not an assessment of the likelihood of a release or failure, but rather an evaluation of the potential impacts if one were to occur. Per §257.73(a)(2), "the owner or operator must document the hazard potential of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment or a low hazard potential surface impoundment." The assessment must include certification from a qualified professional engineer stating that the initial hazard potential classification (and each subsequent periodic classification) was conducted in accordance with these requirements. Section 257.53 provides the following definitions for hazard potential classifications:

- A high hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life;

- A 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; and
- A 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.

Based on the definitions contained in §257.53, a demonstration that an impoundment does not qualify for either a low or high hazard potential classification results in a hazard classification of significant by default.

2. Site Plan

The Site is bounded on the north by U.S. Route 6 and on the south by the Des Plaines River. Because of geographic constraints, the watershed area for the Site is limited.

A Site Plan identifying the Pond and key Site elements, including buildings and other surface waters, is shown in Figure 1. Ash Pond 2 is east of the main powerblock building and approximately 400 feet north of the Site's intake canal which connects to the Des Plaines River. Pond 1 is located west of Ash Pond 2 and has embankment crest elevations consistent with those of Ash Pond 2 (approximately 535 feet Mean Sea Level [MSL]). A surface water collection pond is located south of Ash Pond 2. The Site slopes southward from a maximum elevation of approximately 540 feet MSL along the northern perimeter to elevations of approximately 508 to 514 feet MSL along the banks of the inlet canal to the south.

Based on site observations and a review of available construction documents, Ash Pond 2 was constructed with elevated embankments on the south, east, and west perimeters. There are no embankments on the north side of the pond where existing ground elevations generally increase to the north and a 5-foot high, non-structural berm exists between Ash Pond 2 and US route 6. Due to these topographic constraints, run-on to the Pond is generally limited to the embankment crests and access road along the north of the embankment. The Pond capacity and embankment height are shown in Table 1 below.

Table 1: Estimated Capacity and Maximum Height

Estimated Capacity	45.0 acre-feet
Estimated Maximum Embankment Height	19 feet

3. Pond Failure Impact Evaluation

In order to classify the hazard potential of the Pond, impacts of a potential failure must be evaluated. Due to the proximity of the Pond to the Site's inlet canal, which is connected to the Des Plaines River, potential failure of the southern embankment of the Pond could result in environmental losses resulting from discharge of CCR and/or CCR-laden water to a water of the United States. This potential impact excludes the Pond from a low hazard classification.

The next step in classification is to evaluate the potential for failure or mis-operation to cause loss of human life by modeling the most critical breach scenario. Figure 1 identifies the location of buildings in the vicinity of the Pond, including both occupied and unoccupied buildings[1]. Occupied buildings, including the main power block, are located approximately 300 feet to 800 feet south and west of the Pond; no occupied buildings are located east of the Pond within the potential impact area. Potential failure modes were evaluated to determine the location of a breach with the greatest potential impact on human life. Failure of the western embankment of Ash Pond 2 (directly adjacent to Pond 1) is not anticipated to instigate a failure of the Pond 1 embankments, as the embankment crests for Pond 1 and Ash Pond 2 are at similar elevations. Based on visual observation of site topographic conditions and the location of nearby buildings, a breach of the southern embankment of the Pond could result in a potential impact on human life. As such, the modeled embankment breach scenario assumes that the breach would occur in the southern embankment. Detailed modeling, discussed below, was used to assess the impact of a potential failure of the southern embankment.

3.1 Southern Embankment Failure Modeling

Breach modeling was performed for a scenario where the Pond is at full capacity prior to embankment failure and downstream depressions or other surface water collection ponds within the impact area are full and not capable of containing additional flow (flood conditions failure scenario). As discussed in Section 2, run-on to the Pond is limited and inflow is generally limited to direct precipitation. Therefore, modeling of the Probable Maximum Precipitation (PMP) or other precipitation frequency event was not performed as the inflow of the precipitation event is minimal compared to the capacity of the Pond.[2]

---

[1] Building identification numbers used in this report were generated for reference purposes only and may not correspond to identifications names or numbers utilized at the Site. Buildings are assumed to be occupied if there is at least one human occupant for a minimum of 12 hours per day.

[2] The total volume of direct precipitation from PMP event during the estimated duration of the failure (less than 24 minutes) is minimal compared with the volume that would be released during a failure.

HEC-HMS Version 4.1 (HEC-HMS, 2013) modeling software was used to estimate the breach hydrographs which are plots of the rate of flow over time. A FLO-2D model (FLO-2D, 2009) was then used to estimate flow depth and velocity resulting from the selected hydrograph. The results of the modeling are described below. Details of the modeling methods and procedures are provided in Geosyntec (2016).

The calculated maximum flow depth and maximum velocity from the Pond breach modeling are shown in Figures 2 and 3, respectively. The results of the FLO-2D model show that flow through the modeled breach travels from Ash Pond 2 toward the south, southeast, and southwest with a majority of the flow heading southwest. Flow from the Pond eventually reaches the inlet canal to the south. Buildings impacted by Ash Pond 2 failure include Building 8, 9, 10 (occupied) and Buildings 7, 11, and 12 (unoccupied). Table 2 below summarizes the estimated water depths and velocities for the building impacted by the Ash Pond 2 failure.

Table 2: Estimated Water Depths and Velocities near Buildings

Building	Estimated Maximum Flow Depth (feet)	Estimated Maximum Flow Velocity (fps)
Building 8 (Occupied)	1.2	1.3
Building 9 (Occupied)	1.1	1.8
Building 10 (Occupied)	0.5	1.4
Building 7 (Unoccupied)	2.1	9.1
Building 11 (Unoccupied)	1.3	2.9
Building 12 (Unoccupied)	3.2	15.3

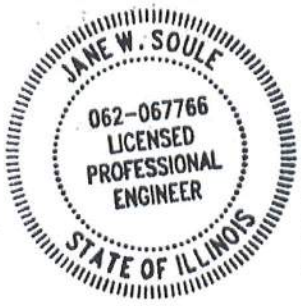
4. Hazard Classification Assessment

A CCR surface impoundment is classified as having a high hazard potential if failure or mis-operation will probably cause loss of human life. Guidelines for evaluating potential loss of life during flood conditions are provided in USBR (1988). Figure 4, adapted from USBR (1988), presents a relationship between danger to human life and flood flow depth and velocity for a house-type structure. Figure 4 presents the modeled depth-velocity combinations for the occupied buildings within the impact zone. As seen on Figure 4, the modeled results indicate that the occupied buildings are considered to be within the 'low danger zone' which corresponds to zero lives seriously in danger from that particular scenario (USBR, 1988).

Based on the results of the analysis provided in this report, Ash Pond 2 is classified as a significant hazard potential surface impoundment because its failure would not result in probable loss of life, but could result in impacts to the Des Plaines River, creating potential economic loss and environmental damage.

5. Limitations and Certification

This hazard potential classification assessment report was prepared to comply with §257.73(a)(2) of the Code of Federal Regulations Title 40, Part 257, Subpart D, and was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.



Jane W. Soule, P.E.
Illinois Professional Engineer No. 062-067766
Expiration Date: 11/30/2017

6. References

FLO-2D, 2009. *FLO-2D Basic,* FLO-2D Software, Inc., Arizona 2009.

Geosyntec, 2016. Ash Pond 2 – Hazard Potential Classification Assessment Embankment Breach Analysis, Joliet 29 Station, Joliet, Illinois, October.

HEC-HMS, 2013. HEC-HMS Hydrologic Modeling System – User's Manual, Version 4.0, U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC), Davis, California, December 2013.

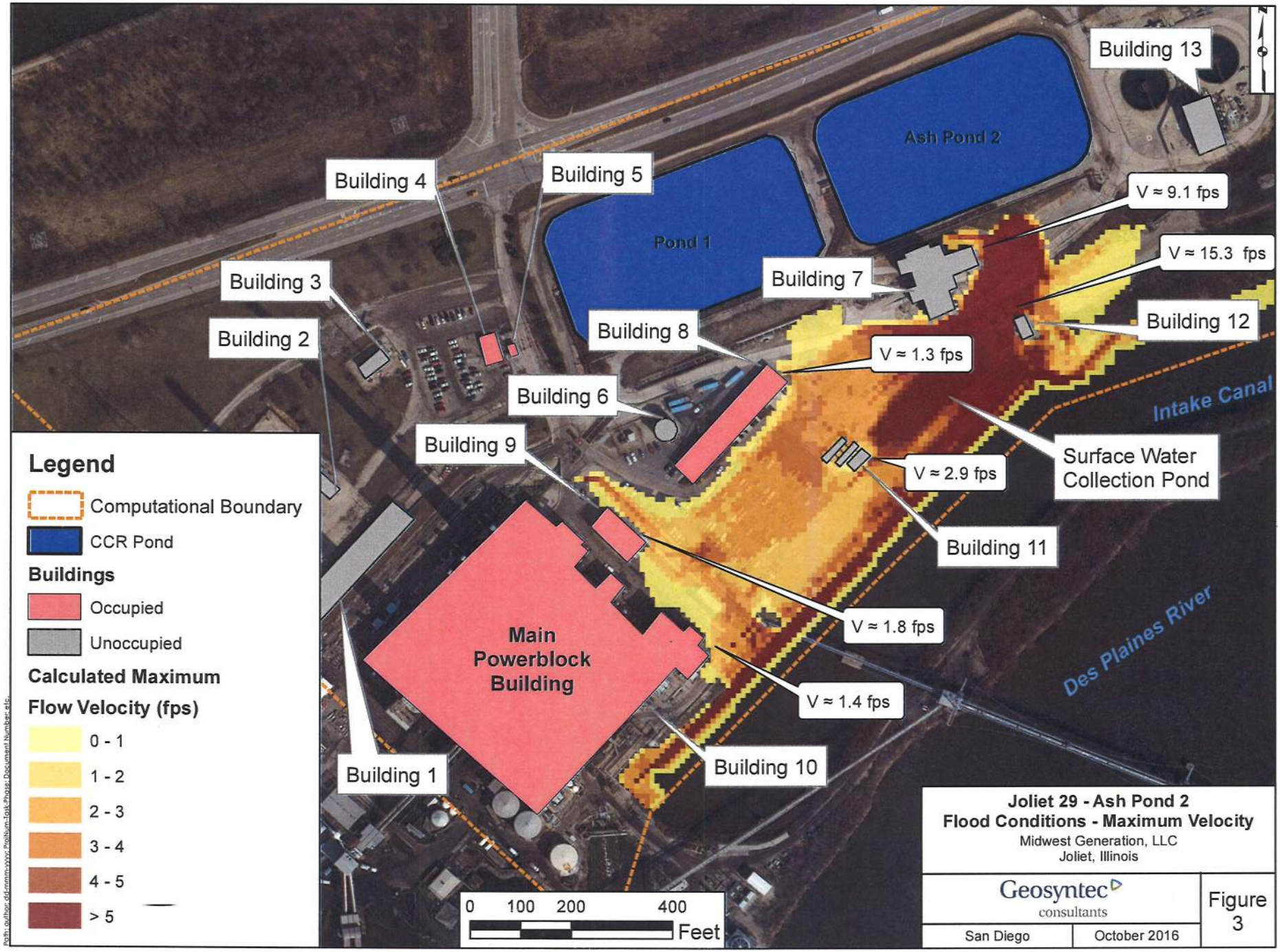
United States Department of the Interior, Bureau of Reclamation (USBR), 1988. Downstream Hazard Classification Guidelines, ACER Technical Memorandum No. 11.

Attachments

Figure 1 – Site Map
Figure 2 – Ash Pond 2 Flood Conditions – Maximum Flow Depth
Figure 3 – Ash Pond 2 Flood Conditions – Maximum Velocity
Figure 4 – Estimated Flood Danger Levels


Building 5
Building 4
Building 3
Building 2
Building 1
Ash Pond 2
Pond 1
Building 13
Building 7
Building 12
Building 8
Building 6
Intake Canal
Surface Water Collection Pond
Building 11
Main Powerblock Building
Building 9
Des Plaines River
Building 10
Legend
Buildings
Occupied
Unoccupied
0 100 200 400
Feet
Site Map
Ash Pond 2 - Joliet 29
Midwest Generation, LLC
Joliet, Illinois
Geosyntec consultants
San Diego
October 2016
Figure 1

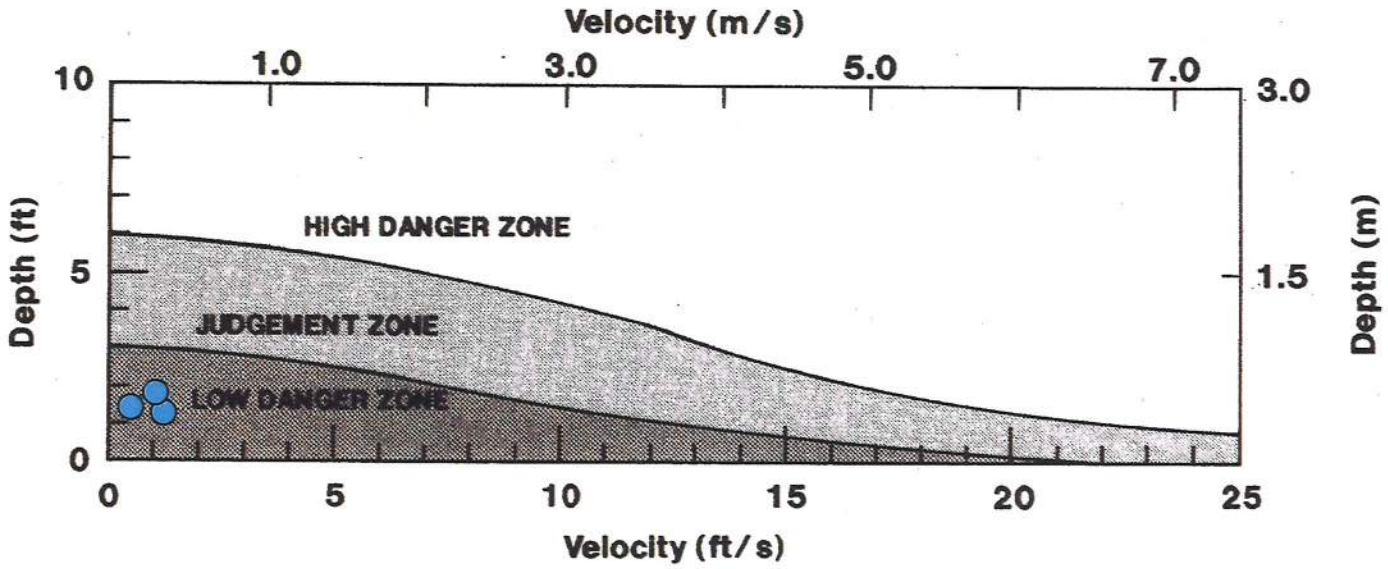

Building 13
Ash Pond 2
Building 4
Building 5
Pond 1
V ≈ 9.1 fps
V ≈ 15.3 fps
Building 3
Building 7
Building 12
Building 8
V ≈ 1.3 fps
Building 2
Building 6
Intake Canal
Building 9
Surface Water Collection Pond
V ≈ 2.9 fps
Building 11
Main Powerblock Building
V ≈ 1.8 fps
Des Plaines River
V ≈ 1.4 fps
Building 1
Building 10
Legend
Computational Boundary
CCR Pond
Buildings
Occupied
Unoccupied
Calculated Maximum Flow Depth (feet)
0.0 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
> 5.0
0 100 200 400
Feet
Joliet 29 - Ash Pond 2
Flood Conditions - Maximum Flow Depth
Midwest Generation, LLC
Joliet, Illinois
Geosyntec consultants
San Diego
October 2016
Figure 2


Building 13
Ash Pond 2
Building 4
Building 5
Pond 1
V ≈ 9.1 fps
V ≈ 15.3 fps
Building 3
Building 7
Building 2
Building 8
Building 12
V ≈ 1.3 fps
Building 6
Intake Canal
Building 9
Surface Water Collection Pond
V ≈ 2.9 fps
Building 11
Main Powerblock Building
V ≈ 1.8 fps
Des Plaines River
V ≈ 1.4 fps
Building 1
Building 10
Legend
Computational Boundary
CCR Pond
Buildings
Occupied
Unoccupied
Calculated Maximum Flow Velocity (fps)
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
> 5
0 100 200 400
Feet
Joliet 29 - Ash Pond 2
Flood Conditions - Maximum Velocity
Midwest Generation, LLC
Joliet, Illinois
Geosyntec consultants
San Diego
October 2016
Figure 3

HIGH DANGER ZONE – Occupants of most houses are in danger from floodwater.

JUDGEMENT ZONE – Danger level is based upon engineering judgement.

LOW DANGER ZONE – Occupants of most houses are not seriously in danger from flood water.



● = Predicted maximum velocity and depth of water at occupied buildings resulting from potential failure of Ash Pond 2.

Adapted from Figure 2, USBR (1988), for houses/buildings built on foundations.

Estimated Flood Danger Levels
Ash Pond 2 - Joliet 29
Midwest Generation, LLC
Will County, Illinois

Geosyntec consultants

San Diego | October 2016

Figure 4

APPENDIX B: 2024 SITE BUILDING OCCUPANCY MAP

HOLD INFORMATION	
NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	10-11-2024	FOR USE

ISSUE PURPOSE:	USE
SPECIFICATION:	N/A
PROJECT NO.:	12661-188

CAD FILE NAME:	JOL-CSK-03.DGN
PREPARED BY:	S. MORALES / J. CHAVEZ
REVIEWED BY:	T. DEHLIN
APPROVED BY:	--

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.

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55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603-5780

MWG
Midwest Generation, LLC

PROJECT

JOLIET GENERATING
STATION 29
2024 HAZARD POTENTIAL
CLASSIFICATION ASSESSMENT

DRAWING TITLE

SITE BUILDING OCCUPANCY MAP

DRAWING NUMBER	REVISION
12661-188-JOL-CSK-001	0

SHEET 1 OF 1

LEGEND

- OCCUPIED BUILDING
- UNOCCUPIED BUILDING

NOTES

1. AERIAL IMAGE IS FROM GOOGLE EARTH PRO V7.3 AND MAY NOT BE REPRESENTATIVE OF CURRENT SITE CONDITIONS.
2. BUILDING NUMBERS ARE FOR REFERENCE PURPOSES ONLY AND MAY NOT CORRESPOND TO THE BUILDING NAMES OR NUMBERS ASSIGNED BY / USED AT THE STATION.
3. BUILDINGS ARE CONSIDERED TO BE OCCUPIED IF AT LEAST ONE HUMAN OCCUPANT IS PRESENT IN THE BUILDING FOR AT LEAST 12 HOURS PER DAY.

REFERENCE DRAWINGS

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

PRELIMNARY
NOT FOR CONSTRUCTION

NORTH

80' 0' 80' 160'
GRAPHIC SCALE