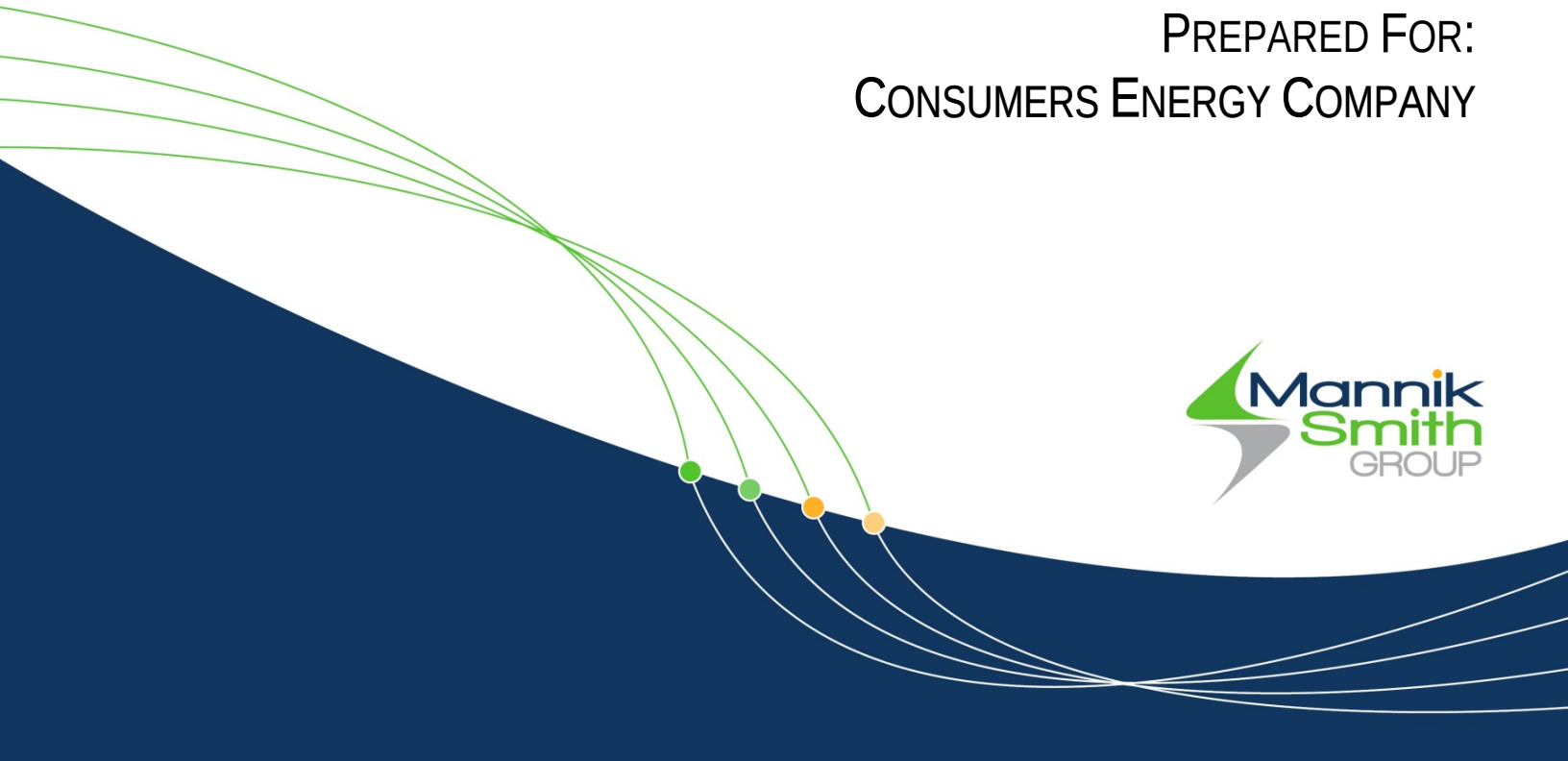
# HAZARD POTENTIAL CLASSIFICATION REPORT

## PONDS 1 & 2, JR WHITING PLANT
## ERIE, MICHIGAN

OCTOBER 13, 2016

PREPARED FOR:
CONSUMERS ENERGY COMPANY



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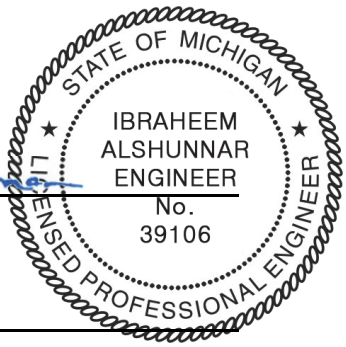
## CERTIFICATION

**Professional Engineer Certification Statement [40 CFR 257.73(a)(2)]**

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations 40 CFR Part 257.73(a)(2)), I attest that this Hazard Potential Classification is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.73(a)(2).

The Mannik Smith Group, Inc.




Ibraheem Shunnar
Signature

October 13, 2016
Date of Report Certification

Ibraheem Shunnar, PE
Name

6201039106
Professional Engineer Certification Number

## 1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) ("CCR RCRA Rule") to regulate the beneficial use and disposal of CCR materials generated at coal-fired electrical power generating complexes. In accordance with the CCR RCRA Rule, any CCR surface impoundment or CCR landfill that was actively receiving CCRs on the effective date of the CCR RCRA Rule (October 19, 2015) was deemed to be an "Existing CCR Unit" on that date and subject to self-implementing compliance standards and schedules. Consumers Energy Company (CEC) identified two CCR surface impoundments at the JR Whiting Generating Facility (JR Whiting) located in Erie, Michigan:

- Ponds 1 & 2 (Existing CCR surface impoundment)
- Pond 6 (Inactive CCR surface impoundment)

Section 257.73(a)(2) of the rule requires the owner or operator of an existing CCR surface impoundment to document the hazard potential classification of each CCR unit. Hazard potential classification means 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 hazard potential classifications include high hazard potential CCR surface impoundment, significant hazard potential CCR surface impoundment, and low hazard potential CCR surface impoundment, which are defined as follows:

- High hazard potential CCR Surface Impoundment means a diked surfaced impoundment where failure or mis-operation will probably cause loss of human life.
- 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 impacts other concerns.
- 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.

According to 257.73(a)(2)(ii), the hazard classification potential assessment must be certified by a qualified professional engineer (QPE) stating that the initial hazard potential classification and each subsequent periodic classification was conducted in accordance with the requirements of 40 CFR 257.73. The Mannik Smith Group (MSG) is submitting this Hazard Potential Classification Assessment Report (Report) to certify a significant hazard potential classification for the Ponds 1 & 2 at J.R. Whiting per 40 CFR Part 257.73(a)(2). The basis of our determination is presented in the following sections.

## 2.0 SITE DESCRIPTION AND BACKGROUND

JR Whiting is a coal-fired power generation facility located in Erie, Michigan as presented on Figure 1 – Site Location Map. JR Whiting formerly operated coal-burning baseload units but ceased electrical generation on April 15, 2016. Ponds 1 & 2, as presented in Figure 2 – General Site Plan, served two primary functions:

- Received outflow of bottom ash for primary detention and settlement
- Received intermittent sluiced fly ash and low-volume wastewater from the generating facility for detention and settlement.

The two ponds comprising the CCR surface impoundment are no longer receiving CCRs from an active power generating plant but are managing stormwater run-on (non-CCR wastewater) per the Site National Pollutant Discharge Elimination System (NPDES) Permit. The pond system is underlain by clay soils and contained by a perimeter dike which has, generally, a 20-foot wide crest and a crest elevation of about 590.1 (NAVD88). The perimeter dikes are designed and constructed of native materials and historic coal ash beneficially reutilized as fill. The crest of the dike structure is graded to allow flow of stormwater from the crest into the ponds. The elevation of water in Ponds 1 & 2 is about 584 ft. (NAVD88).

Hydraulically, Ponds 1 & 2 are interconnected by a subsurface pipe. Any discharge from Ponds 1 & 2 is combined in Pond 1 and was routed through the permitted NPDES Outfall 001B into the forebay. This discharge pipe was grouted on May 24, 2016.

Based on previous investigations including borings completed along the perimeter dike and within the ponds, the site is underlain by layers of soft to medium stiff clay underlain by layers of stiff to hard clay.

## 3.0 HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

Ponds 1 & 2 are located along the western shore of Lake Erie and are bounded to the south by the discharge channel and to the west by the west forebay which is connected to Maumee Bay. Potential dike failure may occur along the east, west and south slopes.

The CCR Impoundments at the site were assigned a low hazard potential by a study completed by AECOM. The results of the study were included in a report entitled *Potential Failure Mode Analysis (PFMA) Report, J.R. Whiting Generating Facility, Ash Dike Risk Assessment* and dated December 11, 2009. The AECOM report based its determination on the note that should a failure occur, environmental or economic losses would be generally limited to the Owner's property.

Ponds 1 & 2 were assigned a significant hazard potential by a study completed by O'Brian and Gere Engineers, Inc. for the US Environmental Protection Agency (USEPA). The results of the study were presented in a report entitled *Dam Safety Assessment of CCW Impoundments, J.R. Whiting Plant*, dated June 27, 2011. The report indicated that proximity to Lake Erie and Maumee Bay and anticipated volume of material that would be discharged upon failure as a basis for their determination.

To complete this evaluation, MSG completed a dam break analysis. In this case, a failure is assumed along the dike and the volumes of material discharged into the nearby waterbody (sluiced ash and dike material) as well as the peak flow are estimated. Dam breach parameters including the volume of material eroded and failure time (from inception to completion of breach) were estimated based on the MacDonald and Langridge-Monopolis (1984) empirical equations as presented in Prediction of Embankment Dam Breach Parameters (Wahl 1998). These parameters are both a function of the storage volume and height of the dam. From these parameters, the final breach dimensions were estimated based on the geometry of the dam and assumed side slope of breach. Table 1 summarizes the basic dimensions and estimated breach parameters of the impoundment.

| Table 1<br>Dam Embankment and Breach Parameter Summary | |
|---|---|
| Parameter | Ponds 1 and 2 |
| Crest elevation (ft.) | 590.0 |
| Water level at dam breach – 1000-year event (ft.) | 590.0 |
| Base elevation of breach (ft.) | 574.0 |
| Dam break volume (ac-ft.) | 149.77 |
| Peak discharge (cfs) | 4,000 |
| Breach development time (min) | 8.4 |

If a release of stored water due to failure or mis-operation were to occur, the dam break analysis predicts that water and/or stored content would discharge into the west forebay and then the Maumee Bay. It is anticipated that the water level in the forebay will rise and discharge into Maumee Bay. Similar conditions may occur if the dam break occurs along the south or east dikes. No probable loss of human life, economic loss, or disruption of lifeline facilities is expected during this scenario; however, environmental impacts/damages may not be limited to the surface impoundment owner's property. As a result, the Ponds 1 & 2 impoundment at JR Whiting have been rated a significant hazard potential classification.

MSG notes that while the ponds have been designated as a significant hazard under the classification system, results of the factor of safety assessment and all structural assessments for the ponds revealed that the ponds' slopes and dikes are stable and the factors of safety exceed the requirement under the CCR RCRA Rules. The site has ceased operations and discharge of new CCR into the ponds has ceased.

## 4.0 CONCLUSIONS

Ponds 1 & 2 at JR Whiting have been rated a significant hazard potential classification as a dike failure or mis-operation would result in no probable loss of human life, but could cause environmental damage that would not be limited to the surface impoundment owner's property. The significant hazard potential classification was determined on the basis that failure or mis-operation of the pond may result in a flood wave propagation from the existing CCR surface impoundment into the Maumee Bay or Lake Erie and potentially release CCR into these waterbodies.

Significant hazard potential classification assessments for existing CCR surface impoundments provide the design inflow criterion of the 1000-year flood event in the inflow design flood control system and the structural stability assessment required in 40 CFR 257.82 and 40 CFR 257.73, respectively. Additionally, it also requires that an emergency action plan be developed as required in 40 CFR 257.73.

This initial hazard potential classification certification must be placed in the Operating Record in accordance with 257.105(f) and must be made available on the facility's publicly accessible internet site in accordance with 257.107(f).

## 5.0 REFERENCES

AECOM, 2009. *Potential Failure Mode Analysis (PFMA) Report, J.R. Whiting Generating Facility, Ash Dike Risk Assessment.*

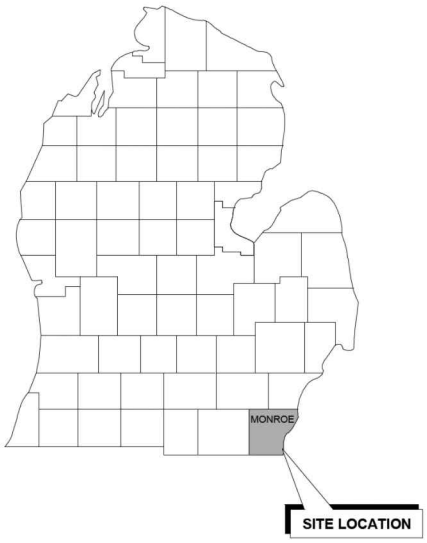
EPA (Environmental Protection Agency). 2015. *Disposal of Coal Combustion Residuals from Electric Utilities*; Final Rule. 40 CFR Part 257. Effective Date October 19, 2015.

MacDonald, Thomas C., and Jennifer Langridge-Monopolis. 1984. *Breaching Characteristics of Dam Failures. Journal of Hydraulic Engineering*, vol. 110, no. 5, p. 567-586.

O'Brian and Gere Engineers, Inc., 2011, *Dam Safety Assessment of CCW Impoundments, J.R. Whiting Plant*.

Wahl, Tony L. 1998. *Prediction of Embankment Dam Breach Parameters – A Literature Review and Needs Assessment*. DSO-98-004. US Department of Interior. Bureau of Reclamation, Dam Safety Office.

# FIGURES





MONROE COUNTY

NOT TO SCALE

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FIGURE 1

SITE LOCATION MAP

PONDS 1 & 2
JR Whiting Generating Facility
Erie, Monroe County, Michigan

| DATE | DRAWN BY | DESIGNED BY | PROJECT NO. |
|---|---|---|---|
| 9/30/2016 | RAR | ISS | C1790015 |

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FIGURE 2

GENERAL SITE PLAN

PONDS 1 & 2
JR Whiting Generating Facility
Erie, Monroe County, Michigan

| DATE | DRAWN BY | DESIGNED BY | PROJECT NO. |
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