Emergency Action Plan for Coal Combustion Residuals Units

B. C. Cobb Facility

Prepared for
Muskegon Environmental Redevelopment Group, LLC

June 2021

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Emergency Action Plan for Coal Combustion Residuals Units at B. C. Cobb Facility

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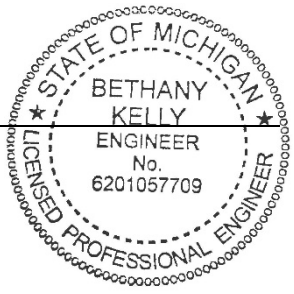
Certifications

I hereby certify that this emergency action plan complies with the provisions of Title 40 of the Code of Federal Regulations Section 257.73 (40CFR§257.73) and in accordance with standard engineering practice, including consideration of applicable industry standards. Further, I hereby certify this plan was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Michigan.

Bethany Kelly
PE #: 6201057709

June 28, 2021
Date



Acronyms

CEC	Consumers Energy Company
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EAP	Emergency Action Plan
EPA	Environmental Protection Agency
ICS	Incident Command System
BCC	B. C. Cobb
MERG	Muskegon Environmental Redevelopment Group, LLC

1 Introduction

The B. C. Cobb (BCC) facility, located in Muskegon, Michigan (refer to Figure 1), and owned by Muskegon Environmental Redevelopment Group, LLC (MERG), stores coal combustion residuals (CCR) in surface impoundments. Two of BCC's CCR surface impoundments (CCR units), Ponds 0-8 and Bottom Ash Pond, have been classified as "significant hazard potential CCR surface impoundments" (Golder, 2016a and Golder, 2016b). Therefore, pursuant to the United States Environmental Protection Agency's (EPA) 40 CFR Part 257 (specifically 40CFR§257.73(a)(3)(i)), this facility must prepare and maintain a written Emergency Action Plan (EAP). The purpose of the EAP is to define emergencies related to CCR surface impoundments, define responsible persons, and define notification procedures in the event of an emergency. The EAP must be completed and placed in the facility's operating record no later than April 17, 2017. 40CFR§257.73(a)(3)(i)) requires that the owner or operator of the CCR Unit (EPA 2015):

A. Define the events or circumstances involving the CCR unit that represent a safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner;

B. Define responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the CCR unit;

C. Provide contact information of emergency responders;

D. Include a map which delineates the downstream area which would be affected in the event of a CCR unit failure and a physical description of the CCR unit; and

E. Include provisions for an annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders.

The EAP provides MERG with a pre-planned and organized method to identify and implement a response to a safety emergency related to the CCR units. The impoundments are bounded on the west by Cedar Creek, the north branch of the Muskegon River as it empties into Muskegon Lake, and on the south by the generation facility's cooling water discharge channel. The generation facility no longer discharges water or CCR material to the impoundments. Only precipitation on the impoundments contributes to the volume of water in the impoundments.

Dewatering and ash excavation within the CCR units were initiated in April 2020 and ash removal is expected to be completed in the fall of 2021. Removal began on the north side of the facility (starting with Ponds 0 and 1) and is continuing south. The perimeter dikes will remain in-place during ash removal. Interior berms will remain in place until excavation progresses between adjacent ponds.

1.1 CCR Units

The two CCR units with significant hazard potential classifications, the Bottom Ash Pond and Ponds 0-8, are bounded by internal and perimeter dikes. The internal and perimeter dikes were built from material excavated during pond construction. As the facility expanded, bottom ash and concrete debris (especially on the perimeter dikes at the west and southwest of the ponds) were added to increase the storage capacity and reinforce the dikes (AECOM, 2009). Rip rap also protects the dikes from wave erosion from Muskegon Lake. In accordance with 40CFR§257.73(a)(3)(i)(D) and to provide context for failure detection and response actions, these two CCR units are described in more detail in the following sections.

1.1.1 Bottom Ash Pond

The Bottom Ash Pond was completed as part of the initial construction of the generating facility. When the generating facility was in operation, CCR and water was sluiced to the Bottom Ash Pond. The Bottom Ash Pond effluent gravity flowed to Ponds 5 and 6. When the plant was in operation, bottom ash was dredged weekly from the Bottom Ash Pond and deposited in Pond 0 to dewater prior to dry disposal upland (AECOM 2009). In recent years the dredged ash was sold as a beneficial reuse material.

The normal freeboard was approximately 3 feet during plant operation. Water level within the pond varies with total storage capacity estimated at 11,630 CY (AECOM, 2009).

1.1.2 Ponds 0-8

Ponds 0-8 were completed as part of the initial construction of the facility. When the generating facility was in operation, the Bottom Ash Pond effluent gravity flowed to Ponds 5 and 6, then to Ponds 1 through 4. Fly ash was formerly sluiced to Ponds 7 and 8. Effluent from Ponds 0-8 discharges to the plant discharge channel at outfall 001B (AECOM, 2009).

Normal freeboard for the ponds varied from 1.5 to 3 feet during plant operation. Water level in the ponds vary, with total storage volume estimated at 273,000 CY for the CCR unit (AECOM, 2009).

The outfall structure consists of 24-inch HDPE inflow and outflow pipes which convey water through a concrete box, which contains a flume to measure water flow, and discharges to the plant discharge channel (AECOM, 2009).

2 Safety Emergency

For purposes of this EAP, a safety emergency would occur if one or both of the subject CCR units failed or if failure were imminent. While the magnitude or severity of such a safety emergency might vary, the EAP was prepared with conservative assumptions that a catastrophic failure of the CCR units occurred.

Therefore, an immediate response according to the EAP is conservative to protect the anticipated affected area. Additional actions after the initial response (cleanup, investigation, repairs, etc.) would be geared toward the actual conditions of the emergency and are, therefore, not prescribed in this EAP.

2.1 Events or Circumstances Which Represent a Safety Emergency

A safety emergency occurs in the event of failure of the CCR unit or if observed conditions represent imminent failure of the CCR unit as determined by a professional engineer from HDR Engineering in consultation with Qualified Personnel at the facility (Qualified Person as defined in 40CFR§257.53: a person trained to recognize specific appearances of structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit by visual observation). Imminent failure will be determined based on knowledge of the CCR unit construction and the failure modes evaluated in the Potential Failure Mode Analysis performed for the facility (AECOM, 2009).

Potential failure modes include a physical dike failure (i.e., uncontrolled seepage causing internal dike erosion and dike breach), overtopping and erosion of the dike (due to a significant storm event, unusually vigorous wave action from Muskegon Lake, etc.), and/or slope or seepage-driven instability associated with ash removal and dewatering.

Failure induced by uncontrolled earthwork, such as excavation at the toe of slope, placement of excess load on side slopes or slope crests, and/or heavy equipment activity, may present a more likely current failure mode due to the active work on the ponds. MERG is reducing this risk by conducting routine inspections of work areas, frequent review of cut grades, and employing operators who have been trained and have significant experience in CCR material removal.

2.2 Detection Procedures

The CCR units are periodically inspected for structural and operational conditions by a Qualified Person in adherence with 40CFR§257.83(a)(1) and 257.84(a)(1). Weekly inspections are completed to monitor and document the physical condition of the CCR units. In these inspections, the Qualified Person conducts a visual evaluation for conditions such as vegetation, beaching, bulging, depressions, cracking, breakout of new seepage or boils, erosion rilling and gullies, sloughing and sliding, or unnatural settlement (CEC, 2015). Observations are reviewed by MERG; if conditions of potential concerns are observed they are promptly reported, after which notification and response procedures may be enacted (see Section 3.0).

Annual inspections are completed by a qualified Professional Engineer (CEC, 2015). This annual inspection also includes a review of available information, including weekly inspection reports, to understand trends

which may be apparent based on changes documented over time. Periodic assessments are also completed as required by the CCR rule. Beyond the visual indicators that are reviewed in weekly inspections, specific items inspected for include, but may not be limited to:

- New and/or uncontrolled slope erosion
- Indicators of potential slope movement such as:
    - changes in dike alignment
    - changes in dike crest elevation
    - signs of slope instability, such as cracking, bulging, sloughing, or settlement
- Whirlpool within pond
- Seepage/boils developing within the excavation areas
- Turbid discharge water
- CCR unit pond level and freeboard
- Changes in piezometer/monitoring well water levels
- Indications of seepage through dikes such as:
    - soft/saturated toe of slope
    - mid-slope water discharge
- Uncommon variation in vegetation type and density
- Impacts from construction activities:
    - Excessive rutting, pumping of soils, or development of soft foundation in berms or the excavation due to construction activities and/or combined with significant precipitation events.
    - Removal of support at the toe of the berms or base of an excavation.
    - Significant surcharge loading placed on the berms or near the top of an excavation.

Members of the public may report a condition or situation indicative of an emergency event to emergency dispatch (911); see Section 3.0.

The units are currently being reviewed for the quinquennial (every five years) structural assessment; therefore, instruments may be in place for this assessment.

2.3 Delineation of the Downstream Affected Area

According to the Hazard Potential Classification Reports (HPCRs) for Ponds 0-8 and the Bottom Ash Pond (Golder 2016a and Golder 2016b), a breach of the impoundments' external dike would result in a discharge of CCR and water to Muskegon Lake. The HPCRs therefore categorized the impoundments as significant hazards because no probable loss of human life is expected in the event of a discharge to Muskegon Lake prior to closure of the units, however, environmental damage may result which would not be limited to MERG (formerly CEC) property (Golder 2016a and Golder 2016b). In development of the EAP for BCC pursuant to 40CFR§257.73, Barr prepared Figures 2 and 3 to approximate the area which would be affected by a catastrophic discharge of CCR material and water from the impoundments.

Figure 2 presents an approximate affected area in the event of a breach from outfall 001B (the discharge point for effluent from the impoundments) and Figure 3 presents an approximate affected area in the event of a breach of the southwest corner of pond 4 which is the approximate lowest point of the ponds' external dike near the location where the discharge channel enters Cedar Creek. The affected areas presented on these figures were estimated based on the volume of stored CCR material and water which could potentially be discharged during an emergency event using conservative breach scenarios and elevation data for the adjacent areas. These volumes were estimated prior to any excavation within the ponds and represent a conservative volume of CCR material and water.

According to the HPCRs, the normal storage level of CCR material and water in the impoundments is equal to the mean lake level of Muskegon Lake. During a 1,000 year storm event, however, the CCR material and water which could potentially be discharged during a breach would be equivalent to the 1,000 year event volume of the impoundments above the mean lake level; this volume for all nine ponds is approximately 41 acre-feet (Golder, 2016a and Golder, 2016b). A conservative scenario would presume that the entirety of this volume could be discharged at once during an emergency event. Under this assumption, an affected area might include 41 acres of the area adjacent to a dam breach (assuming an inundation of 1 foot).

This is a conservative assumption since a break resulting in the instantaneous discharge of the entire maximum storage capacity from all 9 ponds would be unlikely and dewatering and ash removal is underway at the time of this EAP publication. Additionally, the rise in the level of Muskegon Lake or Cedar Creek due to an emergency associated with the impoundments would rapidly dampen as the relatively small volume of the maximum potential discharge is absorbed by the much larger surface area of Muskegon Lake and Cedar Creek.

Using the conservative inundation area and elevation data for the adjacent area (USGS, 2013 and Williams & Works, 2016) the approximate affected area shown on Figures 2 and 3 depicts the water and bottom lands in the Cedar Creek delta which would be affected by the 1 foot inundation inclusive of the 41 acre area (elevation data from digital elevation model, plus 1 foot). The edges of this area are approximate. In

addition, because the normal storage volume in the impoundments is related to the water level in Muskegon Lake, the actual affected area may have a different shape than depicted on Figures 2 and 3 due to the relative elevation differences between the lake level and elevation of bottom land and shoreline. For example, at the mean lake level noted in the HPCRs, much of the bottom land observed on the figures would be underwater and a discharge from a breach may flow differently due to a change in the lake's surface area. The primary areas affected by a breach would remain Cedar Creek and Muskegon Lake. Emergency response and notification procedures would not be expected to change from those outlined in this EAP.

3 Responsible Persons, Responsibilities, and Notification Procedures

In adherence with 40CFR§257.73(a)(3)(B), Figure 4 outlines the approach to responding to CCR unit safety emergencies. Responsible persons, their responsibilities, and the notification order are summarized on Figures 4 to provide a quick-reference document during implementation of the EAP. In the event that a long-term response action is necessary, the Initial On-Scene Commander will activate needed positions within MERG's corporate support system based upon the needs of the incident. The long-term notifications and communications are outside the context of this plan and the notification procedures defined herein.

Pursuant to 40CFR§257.73(a)(3)(C), Figure 4 also shows emergency responders, including their contact information, who will be contacted in the event of a safety emergency.

4 Annual Exercise Meeting

An annual meeting will be coordinated by MERG personnel and will include MERG representatives and local emergency responders. The MERG representatives and emergency responders included on Figure 4 will be invited to participate. This meeting may be conducted in person or virtually, as appropriate, based on current social distancing guidelines.

5 Revisions

The EAP will be reviewed, at a minimum, every five years. The current EAP, i.e. the reviewed or revised EAP, will be placed in the facility's operating record as required by 40CFR§257.105(f)(6).

6 References

AECOM, 2009. Potential Failure Mode Analysis (PFMA) Report for B. C. Cobb Generating Facility. AECOM Project No. 60100985. December 8, 2009.

Consumers Energy Company, 2015. General Administrative Procedures G-A-601 Coal Combustion Residuals Periodic Inspections, Revision 1.0. Approval Date: October 5, 2015. Implementation Date: October 19, 2015.

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Golder Associates, Inc., 2016a. Ponds 0-8 Hazard Potential Classification Assessment Report for B. C. Cobb Generating Facility. Golder Project No. 1652598. October 14, 2016.

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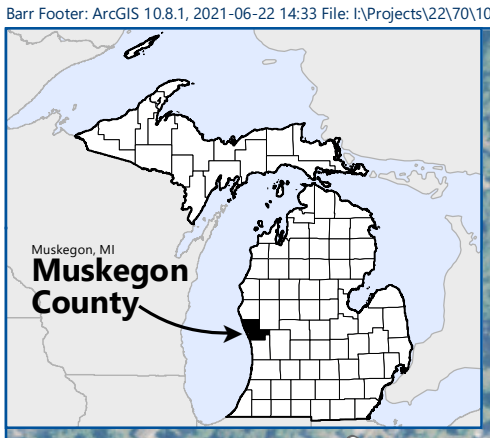
USGS, 2013. National Elevation Dataset (NED) Digital Elevation Model (DEM). Released, 2013.

Williams & Works, 2016. BC Cobb Plant - ALTA/ACSM Survey. July 29, 2016.

MERG, 2020. BC Cobb Pond 4 Transient Seepage and Stability Model. MERG. November 17, 2020.

SME, 2020. Geotechnical Evaluation Report for B.C. Cobb Ash Basin Dewatering and Dredging. SME Project Number: 083742.01. August 27, 2020.

Figures



Curtis St
Elsa St
Oscar St
Straley St
Mitzi St
Whitehall Rd
Holton Rd
Storrs St
Marquard Ave
John St
Sherman Ave
Mills Ave
Charles St
Douglas St
Nelson St
Oak Ave
Ruddiman Dr
Lake Ave
Center St
Oak Ave
M. Causeway
M. Causeway
20
20
Cedar Creek
Pond 0
Pond 1
Pond 2
Pond 3
Pond 4
Pond 5
Pond 6
Pond 7
Pond 8
Discharge Channel
Emergency Overflow Pipes
Outflow 001B
Bottom Ash Pond
Pond Excavation Stockpile Area
Plant
Intake Channel
Muskegon Lake
Muskegon River

0 500 1,000
Feet

SITE PLAN
B.C. Cobb Facility
Muskegon Environmental Redevelopment Group

FIGURE 1

Aerial Source: 2014 USDA NAIP

BARR

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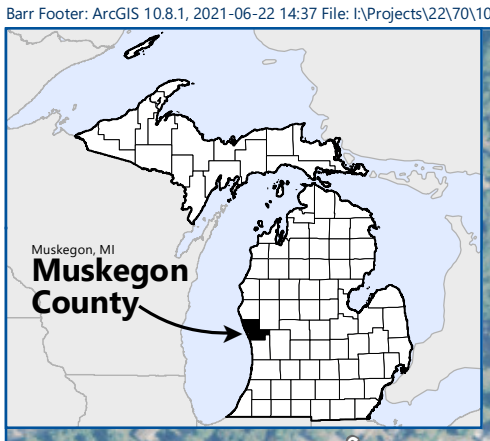

Curtis St
Elsa St
Oscar St
Straley St
Mitzi St
Whitehall Rd
Holton Rd
Storrs St
Marquard Ave
John St
Sherman Ave
Mills Ave
Charles St
Douglas St
Nelson St
Oak Ave
Ruddiman Dr
Lake Ave
Center St
Oak Ave
M. Causeway
M. Causeway
20
20
Cedar Creek
Pond 0
Pond 1
Pond 2
Pond 3
Pond 4
Pond 5
Pond 6
Pond 7
Pond 8
Discharge Channel
Emergency Overflow Pipes
Outflow 001B
Bottom Ash Pond
Pond Excavation Stockpile Area
Plant
Intake Channel
Muskegon Lake
Muskegon River

Affected Area: Potentially Impacted by CCR or Minor (<0.5') Water Level Rise

Failure Location

N

0 500 1,000

Feet

APPROXIMATE AFFECTED AREA DUE TO IMPOUNDMENT FAILURE AT OUTFALL 001B
B.C. Cobb Facility
Muskegon Environmental Redevelopment Group

FIGURE 2

Aerial Source: 2014 USDA NAIP

BARR

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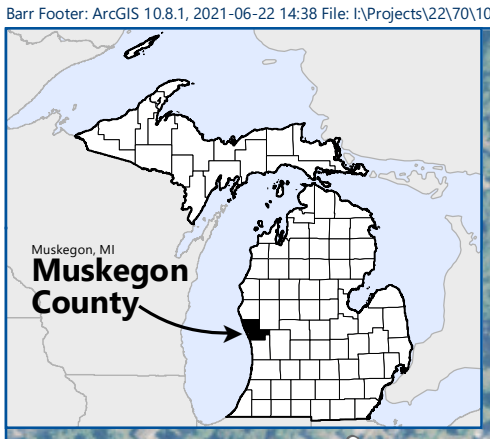

Curtis St
Elsa St
Oscar St
Straley St
Mitzi St
Whitehall Rd
Holton Rd
Storrs St
Marquard Ave
John St
Sherman Ave
Mills Ave
Charles St
Douglas St
Nelson St
Oak Ave
Ruddiman Dr
Lake Ave
Center St
Oak Ave
M. Causeway
M. Causeway
20
20
Cedar Creek
Pond 0
Pond 1
Pond 2
Pond 3
Pond 4
Pond 5
Pond 6
Pond 7
Pond 8
Discharge Channel
Emergency Overflow Pipes
Outflow 001B
Bottom Ash Pond
Pond Excavation Stockpile Area
Plant
Intake Channel
Muskegon Lake
Muskegon River

Affected Area: Potentially Impacted by CCR or Minor (<0.5') Water Level Rise

Failure Location

N

0 500 1,000

Feet

APPROXIMATE AFFECTED AREA
DUE TO IMPOUNDMENT FAILURE
AT SOUTHWEST CORNER OF POND 4
B.C. Cobb Facility
Muskegon Environmental Redevelopment Group

FIGURE 3

Aerial Source: 2014 USDA NAIP

BARR

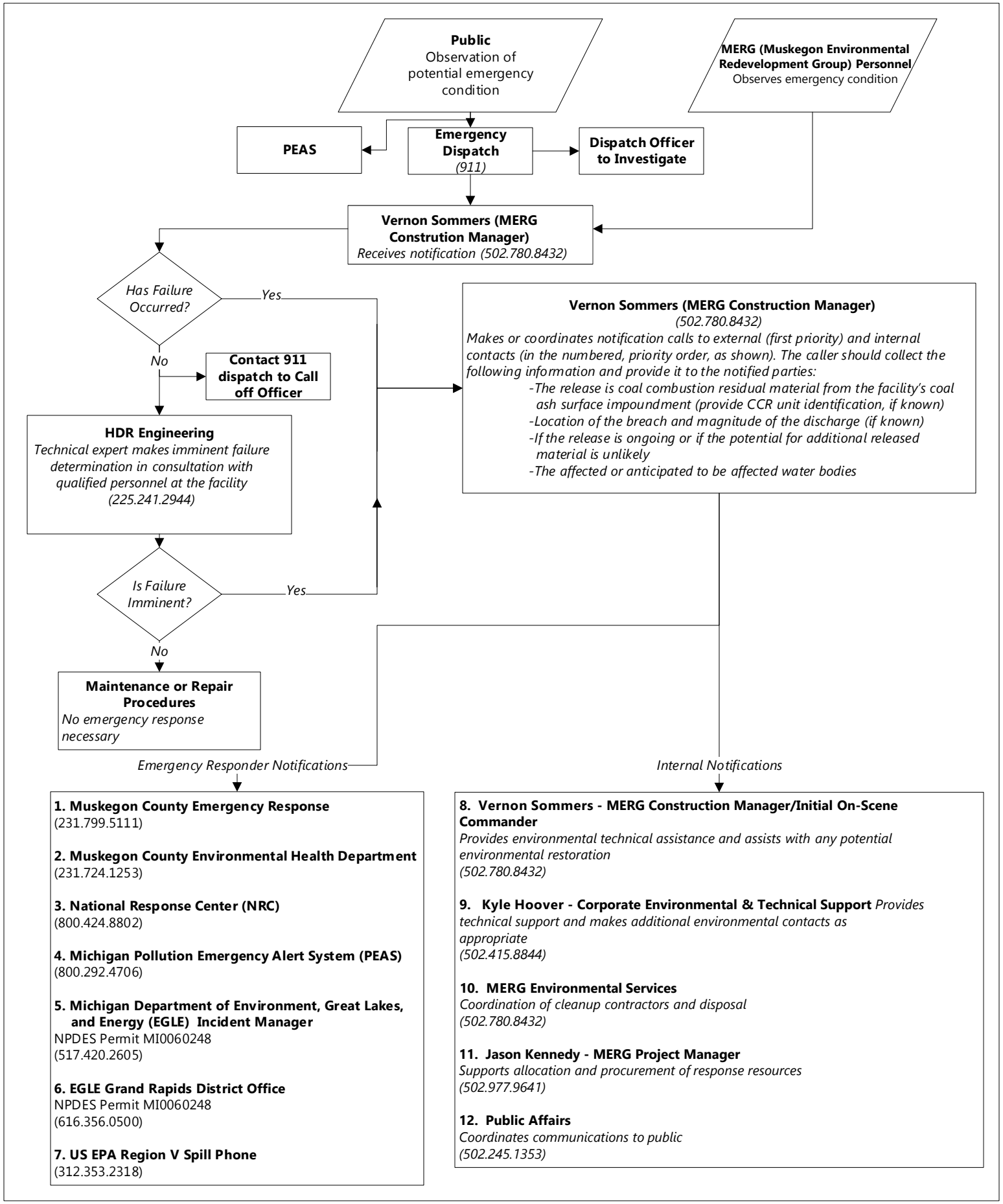

Figure 4
EMERGENCY ACTION PLAN NOTIFICATION PROCEDURE
Revised, May 4, 2021

Ponds 0-8 and Bottom Ash Pond
B.C. Cobb Facility
Muskegon, MI