
solutions and action

**Interstate Power and Light Company**
Burlington Generating Station
CCR Surface Impoundment - Emergency Action Plan
154.018.015.001
Plan issued:  April 6, 2017
Version 1.0 – Revision 0.0

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**INTERSTATE POWER AND LIGHT COMPANY**
BURLINGTON GENERATING STATION
4282 Sullivan Slough Road
Burlington, Iowa 52601

This Emergency Action Plan has been prepared to identify potential emergency conditions and specify preplanned actions to be followed to minimize loss of life, environmental damage, and property damage. To the best of my knowledge, all information contained in this document is correct, and I am authorized to implement and approve this Emergency Action Plan.

SIGNATURE: 

NAME: ROBERT S. HUSCHAK

TITLE: PLANT MANAGER

DATE: 4/7/2017

# 1. EMERGENCY RESPONSE

## 1.1 EAP Personnel and Responsibilities (§257.73(a)(3)(i)(B))

The roles and responsibilities of the personnel who discover a safety emergency event and who implement this Emergency Action Plan (EAP) are defined in Table 1-1 at the end of this section.

Contact information of EAP personnel is provided in the facility's Emergency Notification Chart.

## 1.2 EAP Activation (§257.73(a)(3)(v))

This EAP must be implemented once events or circumstances involving the Coal Combustion Residual (CCR) surface impoundment that represent a safety emergency event are detected, which may include conditions identified during inspections by a qualified person, during an annual inspection by a qualified Professional Engineer (PE), and during periodic technical assessments (e.g. structural stability assessment) of the CCR surface impoundment.

## 1.3 Safety Emergency Events (§257.73(a)(3)(i)(A))

Safety emergency events are unique to each CCR surface impoundment and, to the extent possible, are identified within this EAP. Events or circumstances that represent a safety emergency event are categorized into three levels, which are identified as follows:

- **Non-failure:** A non-failure safety emergency event level is appropriate for a safety emergency event that will not, by itself, lead to a failure, but requires investigation and notification of internal and/or external personnel. Generally, non-failure safety emergency events shall be identified and resolved in accordance with the Alliant Energy (AE) Inspection and Maintenance (I&M) Plan and Site-Specific I&M Plan.

- **Potential failure:** A potential failure safety emergency event level indicates conditions are developing at the CCR surface impoundment that could lead to a failure.
- **Imminent failure:** An imminent failure safety emergency event level indicates a CCR surface impoundment has failed, is failing, or is about to fail. Imminent failures likely involve a continuing and progressive loss of embankment material from the CCR surface impoundment.

Examples of non-failure, potential failure, and imminent failure safety emergency events are identified in Table 1-2 at the end of this section.

## 1.4 Response Action and Notification Process (§257.73(a)(3)(i)(B) and §257.73(a)(3)(i)(C))

If a potential or imminent failure safety emergency event is detected, the following steps shall be taken:

- Discoverer of the safety emergency event shall assess the area to ensure no other on-site personnel are in danger. If so, the area should be cleared **IMMEDIATELY**.
- Discoverer shall **IMMEDIATELY** notify the facility manager, or designee.
- The facility manager, or designee, shall utilize the response action and notification checklist, provided in Table 1-3 at the end of this section, in order to confirm all necessary response actions and notifications are conducted.
- The facility manager, or designee, shall document the identification, notification, and response actions of the safety emergency event per Corporate Policy ENV-107 "Environmental Incident Reporting and Tracking".

Contact information for local emergency responders, as well as local/state/federal regulators, is identified on the facility's Emergency Notification Chart.

A list of example response actions that may be taken to address a potential failure safety emergency event is provided in Table 1-4 at the end of this section.

## 1.5 Evacuation and Assembly Procedures

In the event of imminent failure, evacuation procedures may be implemented by the facility manager, or designee. Evacuation may include both on-site personnel and public that may be affected by the safety emergency event. The following steps should be taken if evacuation is necessary:

- Notify emergency responders of the imminent failure and potential impacts.
- Use on-site communication systems to instruct on-site personnel, contractors, and visitors to evacuate and assemble in the nearest designated assembly location, as identified in Figure 3.
- Conduct roll call at the assembly locations.

## 1.6 Safety Emergency Event Termination and Post-Response Action Assessment

A safety emergency event may only be terminated if a potential failure or imminent failure safety emergency event no longer poses a threat to public or on-site personnel.

Termination of a safety emergency event, for on-site personnel, shall be the responsibility of the facility manager, or designee. Termination shall only be determined once the facility manager, or designee, has consulted with the local emergency responders, AE Corporate Environmental, and other involved emergency response entities such as engineers, emergency response contractors, and local/state/federal regulators.

The local emergency responders shall be responsible for terminating the emergency response and public evacuation.

Following the termination of a safety emergency event the facility manager, or designee, in coordination with local emergency responders (if applicable), shall conduct an evaluation of the safety emergency event including all emergency response participants. At a minimum, the following should be discussed and evaluated in a post-emergency response action assessment:

- Events or conditions leading up to, during, and following the safety emergency event;
- Significant actions taken by each participant and improvements for future safety emergency events;
- All strengths and deficiencies observed in the safety emergency event management process, materials, equipment, staffing levels, and leadership; and
- Corrective actions identified and a timeline to implement assigned recommendations.

The results of the post-emergency response action assessment shall be documented per Corporate Policy ENV-107 “Environmental Incident Reporting and Tracking,” and shall be used as a basis for any necessary revisions to this EAP.

## Table 1-1. EAP Personnel and Responsibilities

| Personnel | Responsibilities |
|---|---|
| **Discoverer** | • Assess the area to ensure no on-site personnel are within the vicinity of the identified safety emergency event<br>• IMMEDIATELY notify the facility manager, or designee |
| **Facility Manager or Designee** | • Implement the EAP once a safety emergency event is detected<br>• Determine the level of the safety emergency event<br>• Notify AE Corporate Environmental and provide regular status report updates<br>• Notify local emergency responders based on the safety emergency event level and provide regular status report updates<br>• Implement response actions<br>• Document the detection, notification, and response actions per Corporate Policy ENV-107 "Environmental Incident Reporting and Tracking"<br>• Implement evacuation procedures as necessary<br>• Terminate a safety emergency event once resolved<br>• Complete a post-emergency response action assessment and document per Corporate Policy ENV-107 "Environmental Incident Reporting and Tracking"<br>• Coordinate annual meetings with local emergency responders<br>• Coordinate EAP training and exercises<br>• Review and update the EAP on an annual basis<br>• Signatory authority of the EAP and any amendments |
| **AE Corporate Environmental** | • Assist in EAP training and exercises<br>• Assist with determining the safety emergency event level<br>• Notify local, state, and federal regulators, as needed<br>• Assist with post-emergency response action assessments |

**Table 1-2. Example Safety Emergency Events**

| Event | Situation | Level |
|---|---|---|
| **Embankment Overtopping** | Elevated water level higher than the normal operating level and has the potential to overtop an embankment | **Potential** |
| | Uncontrolled release of CCR and/or CCR wastewater over the crest of an embankment | **Potential** |
| | Sudden or rapid loss of embankment material during an uncontrolled release of CCR and/or CCR wastewater from embankment overtopping or erosion | **Imminent** |
| **Seepage** | New seepage or leakage on the downstream slope of an embankment | **Non-failure** |
| | Localized seepage or boil(s) along the downstream slope of an embankment with a muddy/cloudy discharge and increasing but controllable discharge of water | **Potential** |
| | Seepage along the downstream slope of an embankment with a muddy/cloudy discharge and uncontrollable discharge of water | **Imminent** |
| **Embankment Cracking, Movement, or Deformation** | New cracks in an embankment with no seepage | **Non-failure** |
| | Visual movement/slippage of an embankment slope | **Non-failure** |
| | New longitudinal or transverse cracking along an embankment that increase with time and produces observable seepage | **Potential** |
| | Concave cracks on or near an embankment crest associated with slope movement | **Potential** |
| | Deep slides/erosion on an embankment that may extend beyond an embankment toe | **Potential** |
| | Sudden or rapid slide of an embankment slope | **Imminent** |
| **Sinkholes** | Sinkholes, or small depressions, observed on an embankment or near the toe of an embankment | **Potential** |
| | Rapidly enlarging sinkhole | **Imminent** |
| **Instruments** | Discernible or significant changes detected in instrumentation readings | **Non-failure** |
| **Seismic Activity** | Measurable seismic activity felt/reported within the surrounding community of the topographic region and resulted in no visible embankment damage | **Non-failure** |
| | Measurable seismic activity felt/reported within the surrounding community of the topographic region and resulted in visible embankment damage | **Potential** |
| | Measurable seismic activity felt/reported within the surrounding community of the topographic region and resulted in uncontrolled release of CCR and/or CCR wastewater | **Imminent** |
| **Security Threat** | Presence of unauthorized personnel that have caused damage that could adversely impact impoundment operations | **Non-failure** |
| | Sabotage or other criminal action with significant damage to an embankment or structures where the integrity is compromised and repairs are required | **Potential** |
| | Sabotage or other criminal action with significant damage to an embankment or structures where damage has resulted in uncontrolled release of CCR and/or CCR wastewater | **Imminent** |
| **Hydraulic Structure** | Debris within a hydraulic structure (i.e. pipe, manhole, channel, spillway, etc.) that may adversely affect operations | **Non-failure** |
| | Hydraulic structure which has significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or blockage that have adversely affected impoundment operations | **Potential** |

## Table 1-3. Response Action and Notification Checklist

| STEP 1. Detection and Evaluation | Yes | No |
|---|---|---|
| Did the discoverer clear the area of all on-site personnel? | ☐ | ☐ |
| Did the discoverer notify the facility manager? | ☐ | ☐ |
| Has the facility manager or designee confirmed the area was clear of all on-site personnel? | ☐ | ☐ |
| Has the facility manager or designee assessed the area and identified the cause? | ☐ | ☐ |
| Has the facility manager or designee notified AE Corporate Environmental? | ☐ | ☐ |
| Has the facility manager or designee determined the level of the safety emergency event?<br>If Yes, circle the determined level: **Non-Failure** / **Potential Failure** / **Imminent Failure**<br>*[If determined to be potential or imminent failure, utilize checklists below. A non-failure shall be resolved in accordance with the I&M Plans]* | ☐ | ☐ |
| **STEP 2. Potential Failure – Response Action and Notification** | **Yes** | **No** |
| Can on-site equipment/materials/supplies be utilized safely to address the safety emergency event? | ☐ | ☐ |
| Should local emergency responders be notified?<br>*[If yes, determine which local emergency responders. See Emergency Notification Chart for contact information]* | ☐ | ☐ |
| Should local/state/federal regulators be notified?<br>*[If yes, determine which regulators. See Emergency Notification Chart for contact information]* | ☐ | ☐ |
| Should emergency response contractors be contacted to assist with response actions?<br>*[If yes, determine which emergency response contractor based on the required response actions]* | ☐ | ☐ |
| Should an engineering assessment be completed?<br>*[If yes, determine the appropriate engineer based on the safety emergency event]* | ☐ | ☐ |
| Does the safety emergency event level require modification from potential failure to imminent failure?<br>*[If yes, utilize the imminent failure response action and notification checklist below]* | ☐ | ☐ |

## Table 1-3. Response Action and Notification Checklist (Cont.)

| STEP 3. Imminent Failure – Response Action and Notification | Yes | No |
|---|---|---|
| Have on-site personnel, contractors, and visitors been notified to evacuate the affected areas and assemble in the designated assembly locations? | ☐ | ☐ |
| Have local emergency responders been notified of the imminent failure?<br>*[See the facility Emergency Notification Chart for contact information]* | ☐ | ☐ |
| Have local/state/federal regulators been notified of the imminent failure?<br>*[See the facility Emergency Notification Chart for contact information]* | ☐ | ☐ |
| **STEP 4. Documentation and Termination** | **Yes** | **No** |
| Has the safety emergency event been addressed so that there is no longer a potential or imminent failure?<br>*[If yes, terminate the safety emergency event]* | ☐ | ☐ |
| Has a post-response action assessment of the safety emergency event been completed?<br>*[See Corporate Policy ENV-107 "Environmental Incident Reporting and Tracking" for documenting the post-response action assessment]* | ☐ | ☐ |

## Table 1-4. Example Response Action Options – Potential Failure

| Event | Description | Example Response Action Options |
|---|---|---|
| **High Water Level** | Water level is higher than normal operating level and has potential to overtop an embankment | • Inspect for signs of embankment overtopping, as well as erosion of embankment material along the crest and downstream slope.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o If operations allow, reduce or reroute storm water and/or process wastewater flows from discharging into the impoundment.<br>o If available, utilize portable water pump(s) for lowering the surface water elevation.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment. Following the assessment, implement a response plan. |
| **Embankment Overtopping** | Uncontrolled release of CCR and/or CCR wastewater over an embankment crest | • Inspect for signs of embankment erosion and for sudden or rapid loss of embankment material.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o If operations allow, reduce or reroute storm water and/or process wastewater flows from discharging into the impoundment.<br>o If available, utilize portable water pump(s) for lowering the surface water elevation.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment. Following the assessment, implement a response plan. |
| **Seepage** | Localized seepage or boil(s) along the downstream slope of an embankment with a muddy/cloudy discharge and increasing but controllable discharge of water | • Inspect for signs of depressions, seepage, sinkholes, cracking, movement, and presence/absence of muddy discharge.<br>• Demarcate the area, document the location, and take photographs. Record dimensions and relative location to existing surface features.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o Place ring of sand bags, with weir at the top, towards the natural drainage path. Contain flow in such a manner that flow rates can be measured.<br>o If necessary, stockpile fill material for later use.<br>• Collect piezometer data, surface water level elevations, and seepage flow rate data. Monitor the embankment and record any change in conditions.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment, which may include a geotechnical investigation. Following the assessment, implement a response plan. |
| **Hydraulic Structure Operational Issues** | Hydraulic structure with significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or blockage that have adversely affected operations | • Inspect the hydraulic structure for signs of deterioration, deformation, distortion, bedding deficiencies, sedimentation, or blockage<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o If surface water elevation increasing within the impoundment, and if facility operations allow, reduce or reroute storm water and/or process wastewater flows from discharging into the impoundment.<br>o If surface water elevation increasing within the impoundment, utilize portable water pump(s) for managing surface water elevation.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment. Following the assessment, implement a response plan. |
| **Seismic Activity** | Measureable seismic activity felt or reported within the surrounding community of the topographic region and resulted in visible damage | • Inspect for signs of embankment stability.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment. Following the assessment, implement a response plan. |
| **Sabotage** | Sabotage or other criminal action with significant damage to an embankment or structures and the integrity is compromised | • Contact law enforcement authorities and restrict access in area to essential emergency response personnel only.<br>• Inspect for signs of embankment stability.<br>• Demarcate the area, document the location, and take photographs.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o If necessary, lower water elevation within the impoundment.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment. Following the assessment, implement a response plan. |

## Table 1-4. Example Response Action Options – Potential Failure (Cont.)

| Event | Description | Example Response Action Options |
|---|---|---|
| **Embankment Deformation** | <u>Cracks:</u><br>Longitudinal or transverse cracking along embankment that increase with time and produces observable seepage<br><br>Concave cracks on or near an embankment crest associated with slope movement | • Inspect for signs of depressions, seepage, sinkholes, cracking, or movement.<br>• Demarcate the area, document the location, and take photographs. Record dimensions and relative location to existing surface features.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o Place buttress fill against base of downstream slope below surface feature and extending beyond visible feature limits (parallel to embankment).<br>o If necessary, place sand bags around crack area to divert storm water runoff from flowing into crack(s).<br>o If necessary, stockpile fill material for later use.<br>• Collect piezometer data, surface water level elevations, and seepage flow rate data. Monitor the embankment and record any change in conditions.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment, which may include a geotechnical investigation. Following the assessment, implement a response plan. |
| | <u>Slides/Erosion:</u><br>Deep slides/erosion on an embankment that may extend beyond an embankment toe | • Inspect for signs of depressions, seepage, sinkholes, cracking, or movement.<br>• Demarcate the area, document the location, and take photographs. Record dimensions and relative location to existing surface features.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o Re-establish the embankment slope with fill material. Place buttress fill against base of downstream slope at the slide location that extends beyond the downstream limits (perpendicular to embankment) and extending beyond visible feature limits at either end (parallel to embankment).<br>o If necessary, place sand bags around slide area to divert any storm water runoff from flowing into slide(s).<br>o If necessary, stockpile additional fill for later use.<br>• Collect piezometer data and surface water level elevations. Monitor the embankment and record any change in conditions. Consider survey monitoring.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment, which may include a geotechnical investigation. Following the assessment, implement a response plan. |
| | <u>Sinkholes:</u><br>Sinkholes, or small depressions, observed on an embankment or near the toe of an embankment | • Inspect for signs of depressions, seepage, sinkholes, cracking, or movement.<br>• Demarcate the area, document the location, and take photographs. Record dimensions and relative location to existing surface features.<br>• Utilize on-site equipment/materials/supplies to respond to the safety emergency event.<br>o Slowly lower water elevation within the impoundment.<br>o Backfill the depression with relatively clean earth fill (free of organic materials) generally even with surrounding grade and slightly mounded in the center in order to shed storm water away from the depression.<br>o If necessary, stockpile additional fill for later use.<br>• Collect piezometer data and surface water level elevations. Monitor the embankment and record any change in conditions.<br>• Contact emergency response contractor(s) to assist with emergency response actions.<br>• Contact engineer to conduct assessment, which may include a geotechnical investigation. Following the assessment, implement a response plan. |

# 2. SUPPLEMENTAL INFORMATION

This EAP has been prepared in accordance with the requirements of §257.73(a)(3) of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual (CCR Rule).

Additionally, this EAP generally follows the Federal Emergency Management Agency (FEMA) Federal Guidelines for Dam Safety, Emergency Action Planning for Dams[1] guidance document referenced within the Preamble of the CCR Rule (80 FR 21378).

## 2.1 Applicability

### 2.1.1 CCR Rule Applicability

The CCR Rule requires an owner or operator of a CCR surface impoundment that is assigned a significant or high hazard potential, per the periodic hazard potential classification assessment (§257.73(a)(2)), prepare and maintain a written EAP (§257.73(a)(3)). Additionally, the EAP must be certified by a qualified PE.

### 2.1.2 EAP Applicability

The Interstate Power and Light Company (IPL) Burlington Generating Station (BGS) in Burlington, Iowa has four existing CCR surface impoundments. In accordance with the Hazard Potential Classification Assessment - (§257.73(a)(2)), the CCR surface impoundments have been classified as follows:

[1] FEMA 64, Federal Guidelines for Dam Safety, Emergency Action Planning for Dams, July 2013

- BGS Ash Seal Pond – Significant Hazard Potential
- BGS Main Ash Pond – Significant Hazard Potential
- BGS Economizer Pond – Low Hazard Potential
- BGS Upper Ash Pond – Low Hazard Potential

This EAP has been prepared for the CCR surface impoundments at BGS that are classified as having a significant hazard potential, as identified above. CCR surface impoundments classified as having a low hazard potential are not required to have an EAP prepared, per the requirements of the CCR Rule. However, this EAP may be used for low hazard potential CCR surface impoundments as a best management practice (BMP).

## 2.2 Facility Information

BGS is located southeast of the City of Burlington, Iowa on the western shore of the Mississippi River in Des Moines County, at 4282 Sullivan Slough Road, Burlington, Iowa. BGS is a fossil-fueled electric generating station consisting of one steam electric generating unit and four combustion turbine units. Sub-bituminous coal is the primary fuel for producing steam, with the ability to use natural gas for the combustion turbines. The burning of coal produces a by-product of CCR. The CCR at BGS is categorized into three types: bottom ash, economizer ash, and precipitator fly ash.

General Facility Information:

| | |
|---|---|
| Date of Initial Facility Operations: | 1968 |
| IDNR State ID No: | 29-UDP-01-15 |
| NPDES Permit Number: | IA29-00-1-01 |
| Facility Title V Operating Permit: | 98-TV-023R1-M004 |

| | |
|---|---|
| Latitude / Longitude: | 40°44'29"N 91°07'04"W |
| Site Coordinates: | Section 29, Township 69 North, Range 02 West |
| Unit Nameplate Ratings: | Unit 1: 212 MW |

### 2.2.1 BGS Ash Seal Pond (§257.73(a)(3)(i)(D))

The BGS Ash Seal Pond is located south of the generating plant and east of the BGS Main Ash Pond. The BGS Ash Seal Pond only receives storm water runoff from the surrounding area associated with the fly ash storage silo. The BGS Ash Seal Pond also may receive facility process water, such as ash seal water, but only if there is an issue with the ash seal water pumps. The original outfall for the impoundment is sealed to prevent discharge to the Mississippi River and the CCR surface impoundment normally contains no water. Rainfall that accumulates within the CCR surface impoundment exfiltrates through the bottom of the CCR surface impoundment. A manually operated pump is available to lift storm water to the adjacent BGS Main Ash Pond, if necessary.

The surface area of the BGS Ash Seal Pond is approximately 5.7 acres and has a 12 foot embankment height along the southern embankment from the crest to the toe of the downstream slope. The interior storage height of the BGS Ash Seal Pond from the top of the CCR/sediment to the original bottom is approximately 11.5 feet. The total volume of impounded CCR within the BGS Ash Seal Pond is approximately 106,000 cubic yards.

Mis-operation or failure of the BGS Ash Seal Pond would likely result in the release of CCR to the south into the condenser discharge channel as the west, north, and east sides of the CCR surface impoundment are incised. The CCR, which would likely be carried into the Mississippi river due to the high flow rate

of the condenser discharge channel, would have the potential to be transported downstream causing economic losses and environmental damages beyond the property limits of the facility.

### 2.2.2 BGS Main Ash Pond (§257.73(a)(3)(i)(D))

The BGS Main Ash Pond is located southwest of the generating plant and west of the BGS Ash Seal Pond. The BGS Main Ash Pond receives bottom ash that is sluiced from the generating plant to the northeast corner of the BGS Main Ash Pond, where the majority of the bottom ash settles out. The bottom ash that settles out is recovered for beneficial reuse. Hydrated fly ash is also stored within the BGS Main Ash Pond area prior to being sold as aggregate material for beneficial reuse.

The water that is used to sluice the bottom ash into the BGS Main Ash Pond is routed towards the west end of the BGS Main Ash Pond. The water flows to the west along the north side of a road constructed out of bottom ash through the center of the BGS Main Ash Pond. The water flows along the north side of the road until it reaches the west end where it transitions into a ponded area in the northwest corner of the BGS Main Ash Pond. The water in the northwest corner of the BGS Main Ash Pond flows through two 15-inch diameter corrugated metal culverts with identical invert elevation under the generating plant entrance road. The water discharges into a small channel in the southwest corner of the BGS Upper Ash Pond located north of the generating plant entrance road.

The total surface area of the BGS Main Ash Pond is approximately 18.7 acres. Of the 18.7 acres, approximately 0.46 acres consists of open surface water. The BGS Main Ash Pond has a southern embankment height of approximately 11 feet

from the crest to the toe of the downstream slope. The interior storage height of the BGS Main Ash Pond from the top of the CCR/sediment to the original bottom is approximately 10.5 feet in the western portion of the CCR surface impoundment and 20 feet in the eastern portion of the CCR surface impoundment. The total volume of impounded CCR and water within the BGS Main Ash Pond is approximately 437,000 cubic yards.

Mis-operation or failure of the BGS Main Ash Pond would likely result in the release of CCR to either the west or south as the north and east sides of the CCR surface impoundment are incised. Sullivan Slough Road is located to the west of the CCR surface impoundment while a wetland identified in the U.S. Fish and Wildlife Service National Wetlands Inventory as a "Freshwater Forested/Shrub Wetland" is located to the south of the CCR surface impoundment. A release to the west has limited impact as the west embankment of the CCR surface impoundment is near the same elevation as Sullivan Slough Road. A drainage ditch located between the west embankment of the CCR surface impoundment and Sullivan Slough Road drains to the south of the CCR surface impoundment into the identified wetland area. In addition to impacting the identified wetland area, a release to the south would have the potential to impact the condenser discharge channel. The release would likely result in CCR to be carried into the Mississippi River, which would have the potential to be transported downstream causing economic losses and environmental damages beyond the property limits of the facility.

### 2.2.3 BGS Economizer Pond (§257.73(a)(3)(i)(D))

The BGS Economizer Pond is located west of the generating plant and north of the BGS Main Ash Pond. The BGS Economizer Pond receives economizer ash. The economizer ash is sluiced from the generating plant to the east end of the

BGS Economizer Pond via a 10-inch diameter polyvinyl chloride pipe. The economizer ash settles out through the water column of the BGS Economizer Pond while the water flows to the west. The water discharges from the BGS Economizer Pond through an 18-inch diameter high-density polyethylene pipe into a storm water and process water treatment channel located along the south side of the economizer embankment.

The storm water and process water treatment channel receives runoff from the surrounding generating plant. The collected storm water drains into a pump vault located at the toe of the downstream slope of the east embankment of the BGS Economizer Pond. Plant process water flows through an oil/water separator and receives influent flows from the plant floor drains and water treatment process water. After the oil/water separator, the process water discharges into the pump vault. The storm water and process water is then pumped from the vault up to the storm water and process water treatment channel. The storm water and process water treatment channel flows to the west along the south side of the economizer embankment until it discharges through an 18-inch diameter high-density polyethylene pipe located in the southwest corner of the economizer embankment. The water from the storm water and process water treatment channel discharges into a small channel in the southwest corner of the BGS Upper Ash Pond located north of the generating plant entrance road.

The surface area of the BGS Economizer Pond is approximately 0.35 acres while the economizer embankment (not including the area of the BGS Economizer Pond) is approximately 10.65 acres. The general height of the economizer embankment is approximately 13 feet from the crest to the toe of the slopes. The interior storage height of the BGS Economizer Pond from the water surface

to the original bottom is approximately 25.43 feet while the interior storage height of the economizer embankment from the top of CCR to the original bottom is approximately 27 feet. The total volume of impounded CCR and water within the BGS Economizer Pond is approximately 14,400 cubic yards while the total volume of impounded CCR within the economizer embankment is approximately 464,000 cubic yards. The total volume of impounded CCR and water within the BGS Economizer Pond and economizer embankment combined is approximately 478,400 cubic yards.

Mis-operation or failure of the BGS Economizer Pond and economizer embankment would result in the release of CCR. The BGS Upper Ash Pond is located to the north and west of the CCR surface impoundment. A release of CCR in either direction would likely be contained within the limits of the BGS Upper Ash Pond. Facility property consisting of the combustion turbines and coal pile storage area is located to the east of the CCR surface impoundment. A release of CCR to the east would engulf the area but likely be contained within the facility property limits. The primary plant access road is located to the south of the CCR surface impoundment. A release of CCR would have the potential to engulf the primary plant access road. An access road constructed atop of the BGS Upper Ash Pond north embankment would provide alternative access/egress for the facility.

### 2.2.4 BGS Upper Ash Pond (§257.73(a)(3)(i)(D))

The BGS Upper Ash Pond is located northwest of the generating plant and north of the BGS Main Ash Pond. The BGS Upper Ash Pond receives influent flows from the BGS Main Ash Pond, BGS Economizer Pond, and storm water and process water flow from the generating plant. The influent flows all discharge into a small channel located in the southwest corner of the BGS

Upper Ash Pond. The water in the channel is routed along the south side of the gravel dike of the BGS Upper Ash Pond until it discharges into the southwest corner of the BGS Upper Ash Pond water body.

The water flows through the BGS Upper Ash Pond water body to the northeast towards a 24-inch wide precast concrete Parshall flume that discharges into a concrete catch basin. The water in the catch basin flows through a 15-inch diameter polyvinyl chloride pipe and discharges into the BGS Lower Pond. Instrumentation associated with the BGS Upper Ash Pond includes a flow meter that monitors the discharge. The discharge from the concrete catch basin enters the BGS Lower Pond. The BGS Lower Pond contains the facility's National Pollution Discharge Elimination System (NPDES) Outfall 001. The water flows through the NPDES Outfall 001 hydraulic structure, which consists of a cast in place weir box.

The surface area of the BGS Upper Ash Pond is approximately 13.3 acres and has a northern embankment height of approximately 10 feet from the crest to the toe of the downstream slope. The interior storage height of the BGS Upper Ash Pond (water surface portion) is approximately 6.40 feet and the interior storage height of the CCR/sediment located outside the footprint of the water surface portion is approximately 8 feet. The total volume of impounded CCR and water within the BGS Upper Ash Pond is approximately 152,000 cubic yards.

Mis-operation or failure of the BGS Upper Ash Pond would likely result in the release of CCR to either the north or west as the south and east sides of the CCR surface impoundment are incised. The BGS Lower Pond is located to the north of the CCR surface impoundment, while a drainage ditch located west of

the CCR surface impoundment drains to the north into the BGS Lower Pond. A release of CCR to the north or west would likely be limited to the facility property, however, it would have the potential to impact a wetland identified in the U.S. Fish and Wildlife Service National Wetlands Inventory as a "Freshwater Forested/Shrub Wetland".

## 2.3 Response Action Preparedness

Preparedness for responding to a safety emergency event consists of activities and actions taken before the development of a safety emergency event. The following sub-sections summarize the various preparedness efforts conducted at the facility.

### 2.3.1 Surveillance and Monitoring (§257.73(a)(3)(i)(A))

Prompt detection and evaluation of a safety emergency event is critical to the effectiveness of this EAP, as well as to the timely emergency response. In order to detect a safety emergency event the facility has developed and implemented an I&M Plan which summarizes the applicable guidance for inspection, monitoring, and maintenance of each CCR surface impoundment. The I&M Plan follows the CCR Rule, as well as the guidance documents that the USEPA references within the Preamble of the CCR Rule.

The I&M Plan is a tool utilized by the facility in order to prevent an uncontrolled release of CCR and/or CCR wastewater into the surrounding environment. The I&M Plan identifies the factors which may affect the long-term stability of each CCR surface impoundment and recommends activities in order to maintain the integrity of each CCR surface impoundment. The I&M Plan addresses the key roles of I&M personnel, identifies operation and maintenance activities currently implemented at the facility, describes the conditions of each CCR surface

impoundment, and provides guidance on the implementation of inspection, monitoring, maintenance, recordkeeping, and training requirements in accordance with the CCR Rule.

The following sub-sections identify the various detection methods implemented at the facility in order to assist with the identification of a safety emergency event.

- **7-Day Inspections:** Each CCR surface impoundment at the facility must be examined by a qualified person in accordance with §257.83(a) of the CCR Rule. At intervals not exceeding seven days, each CCR surface impoundment is required to be visually inspected for any appearance of structural weakness or other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR surface impoundment. Additionally, discharge of all outlets of hydraulic structures which pass underneath the base of the CCR surface impoundment or through the embankment of the CCR surface impoundment are required to be visually inspected for abnormal discoloration, flow, or discharge of debris or sediment.
- **Instrumentation Monitoring:** Instrumentation supporting the operation of each CCR surface impoundment must be monitored by a qualified person in accordance with §257.83(a) of the CCR Rule. At intervals not exceeding thirty days, the instrumentation for the CCR surface impoundment is required to be monitored for proper functionality and detecting discernible or significant changes in the operation of the CCR surface impoundment.
- **Event-Related Inspections:** Event-related inspections shall be implemented and performed by a qualified person when significant events occur that could potentially affect the structural stability of each CCR surface impoundment. Examples of these events are as follows:
    - Following a storm event whose twenty-four hour rainfall event meets or exceeds the ten year storm event frequency in the surrounding area of the facility;
    - Following a strong wind-related event that may result in the overtopping of trees in the surrounding area of the facility;

- Following a seismic event that warrants concern within the surrounding community of the topographic region;
- When the water level within the CCR surface impoundment is higher than its normal operating levels and there is the possibility of embankment overtopping; and
- Following major maintenance activities that involve removal of tree stumps and roots from an embankment or the repair of animal burrows where embankment soils (not the vegetative layer) were disturbed.

- **Annual Inspections:** Annual inspections must be conducted by a qualified PE if the CCR surface impoundment has a height of five feet or more and a storage volume of twenty acre-feet or more; or the CCR surface impoundment has a height of twenty feet or more (§257.73(b), §257.73(d), and §257.83(b)).

  The purpose of the annual inspection is to ensure that the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted good engineering standards. The annual inspection of the CCR surface impoundment includes a review of available information regarding the status and condition of the CCR surface impoundment. The information reviewed includes all relevant files available in the operating record at the time of the annual inspection, as well as all relevant publicly accessible internet site entries.

  The annual inspection also includes a visual inspection of each CCR surface impoundment in order to identify signs of distress or malfunction of the CCR surface impoundment and appurtenant structures. Additionally, the visual inspection includes hydraulic structures underlying the base of the CCR surface impoundment or passing through the dikes of each CCR surface impoundment for structural integrity and continued safe and reliable operation.

### 2.3.2 Inundation Map (§257.73(a)(3)(i)(D))

This EAP identifies areas potentially impacted as a result of a failure of a CCR surface impoundment that has been classified as having a significant or high hazard potential. These areas are delineated in an inundation map (Figure 2), which identifies the probable maximum downstream limits that are likely to be

impacted by the failure of the CCR surface impoundment. The inundation map shall be used to assist the facility and local emergency responders in the event of a safety emergency event with a potential or imminent failure.

### 2.3.3 Facility Access and Response Timing

Timely implementation of this EAP, as well as coordination and communication with local emergency responders, are crucial elements in the effectiveness of the emergency response actions.

In the event of a safety emergency event, the primary method of access to the facility is by automobile (e.g. car, truck, etc.). The primary route of travel by automobile is taking Summer Street (County Highway X62) to the intersection of Sullivan Slough Road and turning south onto Sullivan Slough Road towards the facility. From Sullivan Slough Road, the facility may be accessed by either the main plant access road or by the BGS Upper Ash Pond embankment crest.

The expected response time for local emergency responders to mobilize to the facility once notified of a safety emergency event, using the primary method of access to the facility, is as follows:

- **Burlington Fire Department – Central Station** (418 Valley St., Burlington, IA 52601) – Travel time to facility approximately 11 minutes
- **Burlington Fire Department – Station 2** (2223 Summer St, Burlington, IA 52601) – Travel time to facility approximately 5 minutes
- **West Burlington Fire Department** (301 Broadway St., West Burlington, IA 52655) – Travel time to facility approximately 16 minutes
- **Burlington Police Department** (424 N 3rd St., Burlington, IA 52601) – Travel time to facility approximately 12 minutes
- **West Burlington Police Department** (122 Broadway St., West Burlington, IA 52655) – Travel time to facility approximately 17 minutes

- **Great River Medical Center** (1221 S Gear Ave., West Burlington, IA 52655) – Travel time to facility approximately 14 minutes

In the event the primary method of access is not available, an alternative method of access to the facility would be by marine vessel. The primary route of travel via marine vessel is the Mississippi River. The nearest boat launch to the facility is located approximately one mile downstream of the facility off of Sullivan Slough Road, along the Iowa side of the Mississippi River. The second nearest boat launch is located at Bluff Harbor Marina (800 N. Front Street, Burlington, IA) which is approximately five miles upstream of the facility along the Iowa side of the Mississippi River.

The response time for emergency response contractors to mobilize to the facility, once notified of a safety emergency event, will vary based on the type of safety emergency event as that determines the necessary equipment and materials required to be mobilized to the facility.

### 2.3.4 Response during Periods of Darkness

In the event of a safety emergency event during periods of darkness, the facility manager, or designee, shall utilize available on-site equipment (e.g. portable light towers) in order to properly illuminate the area where the safety emergency event is detected, as well as other crucial areas located at the facility used for assisting with emergency response actions. Additional assistance shall be provided by either the local emergency responders or emergency response contractors, as necessary, in order to effectively illuminate the various areas of the facility.

### 2.3.5 Response during Weekends and Holidays

The facility manager is typically not present at the facility on weekends or holidays. However, personnel are present at the facility at all times. In the event of a safety emergency event on a weekend or holiday, the most senior on-site facility personnel shall assume responsibility and oversee the implementation of the emergency response actions until the facility manager, or designee, arrives. Additional assistance shall be provided by either the local emergency responders or emergency response contractors, as necessary.

### 2.3.6 Response during Adverse Weather

In the event of a safety emergency event during adverse weather conditions, the facility manager, or designee, shall utilize on-site equipment, materials, and supplies (e.g. snow plow, salt, sand bags, etc.) in order to provide clear and safe access for implementing the emergency response actions. Additional assistance shall be provided by either the local emergency responders or emergency response contractors, as necessary.

### 2.3.7 Emergency Equipment, Materials, and Supplies

The facility consists of on-site equipment, materials, and supplies that may be available in order to initiate response actions during a safety emergency event. The following list identifies available on-site equipment, materials, and supplies:

- Heavy equipment which include excavators, dozers, front-end loaders, skid-steer loaders, backhoes
- Portable pumps
- Portable light towers
- Fill material which include sand, gravel, crushed stone, recycled concrete

Additional equipment, materials, and supplies shall be provided by either the local emergency responders or emergency response contractors, as necessary.

### 2.3.8 Security

Access to the facility is controlled 24 hours per day via a secure access gate. Access through the automatic security gate is controlled using magnetic card access for AE employees and through telephone calls to a Central Alarm System (CAS) for non-AE employees. A list of authorized entrants is provided to CAS.

The facility has plant personnel present 24 hours per day, 365 days per year. A chain link fence surrounds the primary operational area at the facility. Adequate lighting is present at the facility. Security cameras are present throughout the site and are observed from the control room.

## 2.4 Reviews and Amendments

The following sub-sections summarize the reviews and amendments that are required per the CCR Rule.

### 2.4.1 Reviews

The EAP shall be reviewed annually for appropriateness, accuracy, and adequacy so as to remain current. The EAP shall be promptly updated to address changes in personnel, contact information and/or significant changes to the facility or emergency response actions. A review and revision log is provided in Appendix A for documenting any revisions to the EAP. Even if no revisions are necessary, the annual review of the EAP shall be documented in Appendix A.

### 2.4.2 Amendments (§257.73(a)(3)(ii))

At a minimum, the EAP must be evaluated every five years as required per §257.73(a)(3)(ii) of the CCR Rule to ensure the information required per §257.73(a)(3)(i) of the CCR Rule is accurate.

Additional amendments to the EAP must occur as necessary whenever there is a change in conditions which substantially affect the EAP. These changes in conditions include, but are not limited to, changes in personnel, changes in emergency responder contact information, changes in a CCR surface impoundment hazard potential classification designation, or the vertical expansion of a CCR surface impoundment.

Amendments to the EAP must be certified by a qualified PE per §257.73(a)(3)(iv). Once amended, the EAP must be placed in the facility's operating record as required by §257.105(f)(6) of the CCR Rule. Amendments to the EAP shall be documented in the review and revision log in Appendix A.

## 2.5 EAP Training and Exercise

EAP training and exercises are critical components in evaluating the effectiveness of an EAP. The following sub-sections summaries the training and exercise programs implemented at the facility.

### 2.5.1 Training

Facility personnel shall receive training to ensure they are thoroughly familiar with all elements of this EAP, which will allow for the effective implementation of this EAP in order to minimize loss of life, environmental damage, and property damage in the event of a safety emergency event of a CCR surface impoundment. Training may be held in conjunction with other emergency response training at the facility.

On an annual basis, facility personnel shall be trained in their roles and responsibilities under this EAP, which include, but is not limited to, the following:

- Facility manager roles and responsibilities;
- Detection and evaluation of a safety emergency event;
- Response action preparedness;
- Implementation of notification procedures;
- Implementation of emergency response actions based on the safety emergency event level;
- Evacuation and assembly procedures; and
- Post-emergency response action assessments.

In addition to annual training, an annual meeting between the facility manager and the local emergency responders shall be conducted (257.73(a)(3)(i)(E)).

A meeting and training log is provided in Appendix B in order to document the occurrence of the annual training and annual meetings.

### 2.5.2 Exercises

At the discretion of the facility manager, training exercises may be implemented at the facility in order to enhance prevention, preparedness, and response actions. Training exercises demonstrate the EAP's effectiveness in an actual situation and demonstrates the readiness levels of key personnel. Periodic exercises result in an improved EAP as lessons learned are incorporated into EAP review and amendments. If deemed necessary, local emergency responders may also be included in training exercise activities.

Types of exercises may include discussion-based exercises, as well as operations-based exercises. Discussion-based exercises familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. Operations-based exercises validate plans, policies, agreements and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment.

Appendix C provides additional information on the types of discussion-based exercises and operations-based exercises, as well as provides recommended frequencies for each type of exercise.

## 2.6 Changes In Hazard Potential Classification (§257.73(a)(3)(iii))

### 2.6.1 Declassification

If the owner or operator of a CCR surface impoundment determines during a periodic hazard potential assessment that the CCR surface impoundment is no longer classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR surface impoundment is no longer subject to the requirement to prepare and maintain a written EAP beginning on the date the periodic hazard potential assessment documentation is placed in the facility's operating record as required by §257.105(f)(5) of the CCR Rule.

### 2.6.2 Reclassification

If a CCR surface impoundment is classified as a low hazard potential CCR surface impoundment, and the owner or operator subsequently determines that the CCR surface impoundment is properly reclassified as either a high hazard potential CCR surface impoundment or a significant hazard potential

CCR surface impoundment, then the owner or operator of the CCR surface impoundment must prepare a written EAP for the CCR surface impoundment as required by §257.73(a)(3) of the CCR Rule within six months of completing such periodic hazard potential assessment.

## 3. CERTIFICATION (§257.73(a)(3)(iv))

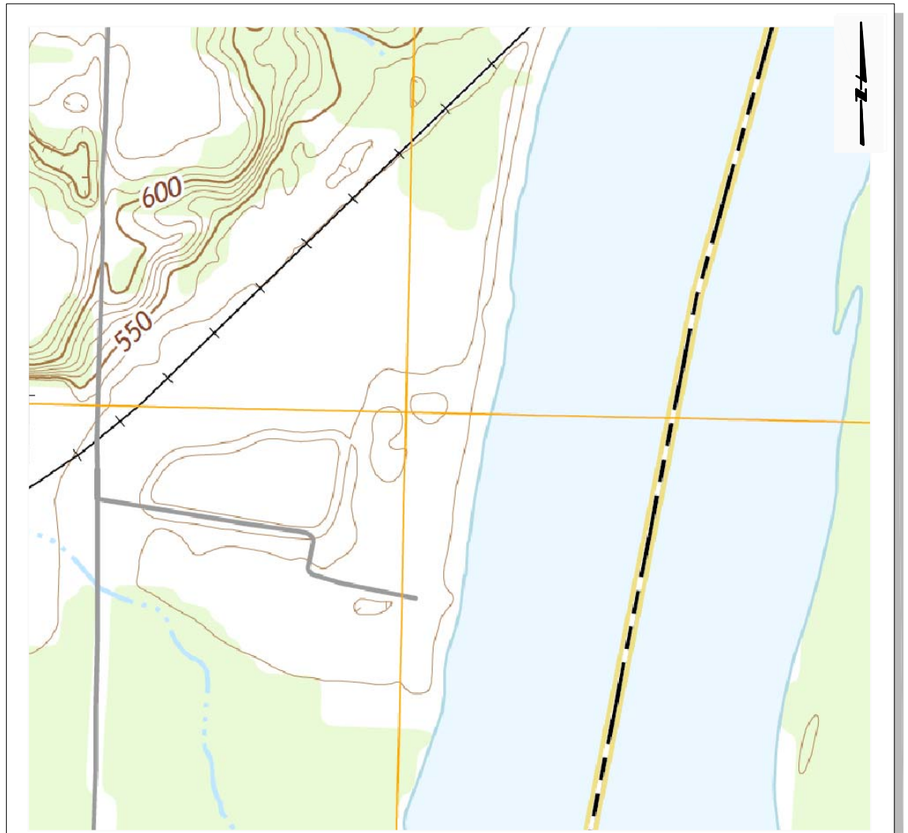
To meet the requirements of 40 CFR 257.73(a)(3), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Iowa; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.73(a)(3).

By: _____

Name: Mark Loerop

Date: April 7, 2017

## Figures




SITE TOPOGRAPHIC MAP
NOT TO SCALE


SITE AERIAL PHOTOGRAPH
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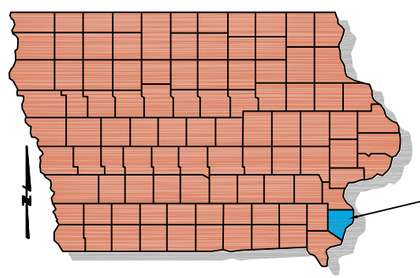


STATE OF IOWA
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| REV | DATE | BY | DESCRIPTION |
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hard hat™ SERVICES

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| SCALE: | AS SHOWN |
| DATE: | 3-27-17 |
| DRAWN BY: | JFD |
| CHKD BY: | CTS |
| APRVD BY: | MWL |

CLIENT / LOCATION

ALLIANT ENERGY–INTERSTATE POWER AND LIGHT COMPANY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION

CCR SURFACE IMPOUNDMENT – EMERGENCY ACTION PLAN
FACILITY LOCATION MAP

JOB 154.018.015.001
SHT. FIGURE 1
DWG. 154.018.015.001–D1


AERIAL VIEW
NOT TO SCALE

NOTES:

1. PER THE REQUIREMENTS OF THE CCR RULE (§257.73(A)(3)) AN INUNDATION MAP DELINEATES THE DOWNSTREAM AREAS WHICH WOULD BE AFFECTED IN THE EVENT OF A FAILURE OF A CCR SURFACE IMPOUNDMENT. THE INUNDATION MAP IDENTIFIES CRITICAL INFRASTRUCTURE AND POPULATION–AT–RISK SITES THAT MAY REQUIRE PROTECTIVE MEASURES, WARNING, AND EVACUATION PLANNING.
2. THIS INUNDATION MAP DOES NOT DELINEATE NOR IDENTIFY DOWNSTREAM AREAS WHICH WOULD HAVE POTENTIAL ENVIRONMENTAL IMPACTS IN THE EVENT OF A FAILURE OF A CCR SURFACE IMPOUNDMENT.
3. A FAILURE OF THE BGS ASH SEAL POND SOUTH EMBANKMENT, BGS MAIN ASH POND SOUTH EMBANKMENT, OR BGS MAIN ASH POND WEST EMBANKMENT IS IDENTIFIED BY THE INUNDATION AREA. THE INUNDATION AREA DOES NOT INDICATE A FAILURE OF ALL CCR SURFACE IMPOUNDMENT EMBANKMENTS SIMULTANEOUSLY.
4. THE CRITICAL INFRASTRUCTURE IDENTIFIED WITHIN THE INUNDATION AREA AT BGS IS A PORTION OF SULLIVAN SLOUGH ROAD LOCATED WEST OF THE BGS MAIN ASH POND. THERE IS NO POPULATION–AT–RISK SITES LOCATED WITHIN THE INUNDATION AREA AT BGS.

LEGEND:

INUNDATION ZONE



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hard hat SERVICES

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| SCALE: | AS SHOWN |
| DATE: | 3–27–17 |
| DRAWN BY: | JFD |
| CHKD BY: | CTS |
| APRVD BY: | MWL |

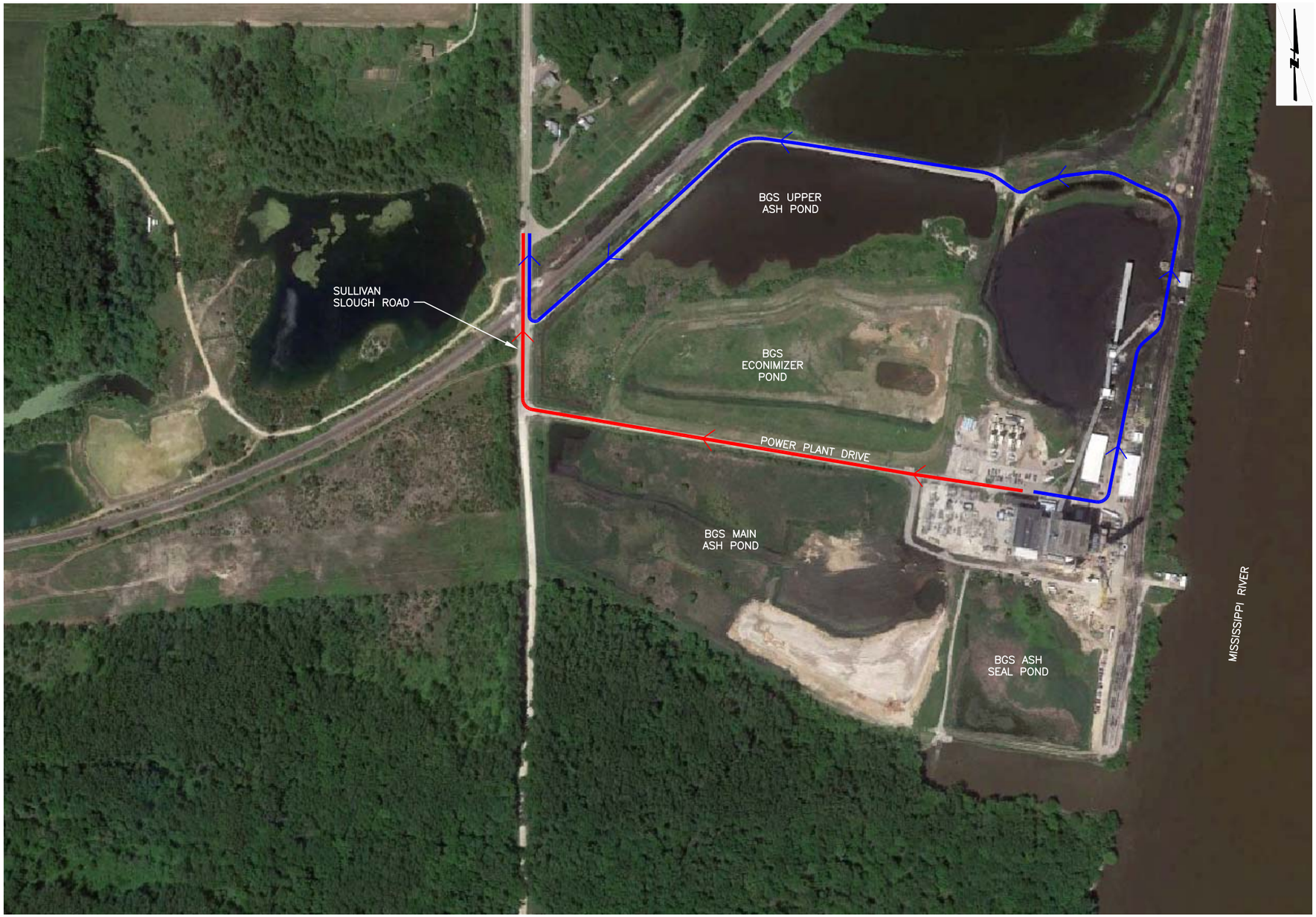
CLIENT / LOCATION

ALLIANT ENERGY–INTERSTATE POWER AND LIGHT COMPANY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION

CCR SURFACE IMPOUNDMENT – EMERGENCY ACTION PLAN
INUNDATION MAP

JOB 154.018.015.001
SHT. FIGURE 2
DWG. 154.018.015.001–D2




LEGEND:

PRIMARY EMERGENCY ACCESS/EGRESS ROUTE

ALTERNATE EMERGENCY ACCESS/EGRESS ROUTE

AERIAL VIEW
NOT TO SCALE



| REV | DATE | BY | DESCRIPTION |
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hard hat SERVICES

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|---|---|
| SCALE: | AS SHOWN |
| DATE: | 3-27-17 |
| DRAWN BY: | JFD |
| CHKD BY: | CTS |
| APRVD BY: | MWL |

CLIENT / LOCATION

ALLIANT ENERGY–INTERSTATE POWER AND LIGHT COMPANY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION

CCR SURFACE IMPOUNDMENT – EMERGENCY ACTION PLAN
EMERGENCY ACCESS/EGRESS ROUTES MAP

JOB 154.018.015.001

SHT. FIGURE 3

DWG. 154.018.015.001–D3

## Appendix A

*Review and Amendment Log*

# APPENDIX A

## Review and Amendment Log

| Date of Review/Amendment | Completed By | Comments |
|---|---|---|
| April 2017 | Mark Loerop, P.E. (Hard Hat Services) | The following items were completed:<br>• Preparation of an Emergency Action Plan (EAP), Version 1 - Revision 0, in accordance with 40 CFR §257.73(a)(3). |
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This log sheet documents all reviews and amendments made to the EAP.

Note: Amendments must be certified by a qualified PE in accordance with 40 CFR 257.73(a)(3)(iv)

## Appendix B

*Meeting and Training Log*

# APPENDIX B

## Meeting and Training Log

**Date:**_____ **Meeting Location:**_____

| ATTENDEES | | |
|---|---|---|
| NAME | TITLE | COMPANY/ORGANIZATION |
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## Appendix C

*EAP Training Exercises*

# APPENDIX C

## Training Exercises

The following information provides the various types of training exercises that may be implemented at the facility, as identified in the Federal Guidelines for Emergency Action Planning for Dams[1].

**Discussion-Based Exercises:**

Discussion-based exercises familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. The following are types of discussion-based exercises:

- Seminar: A seminar is an informal discussion designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new evacuation procedure). Seminars should include internal discussions with facility emergency management personnel as well as coordination with local emergency responders and other parties with a role in the Emergency Action Plan (EAP) implementation.
- Workshop: A workshop resembles a seminar but is used to build specific products such as a draft plan or policy. For example, a training and exercise plan workshop is used to develop a multi-year training and exercise plan.
- Tabletop Exercise: A tabletop exercise involves facility emergency management personnel discussing simulated scenarios in an informal setting. Tabletop exercises can be used to assess plans, policies, and procedures.
- Games: A game is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.

[1] FEMA 64, Federal Guidelines for Dam Safety, Emergency Action Planning for Dams, July 2013

**Operations-Based Exercises:**

Operations-based exercises validate plans, policies, agreements and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. The following are types of operational-based exercises:

- Drill: A drill is a coordinated, supervised activity usually employed to test a single operation or function, such as testing sirens and warning systems, checking available emergency resources (i.e. equipment, materials, and supplies), and conducting a call-down drill of those listed on the Emergency Notification Procedure Flowchart.
- Functional Exercise: A functional exercise examines and/or validates the coordination, command, and control between the various parties responsible for responding to a safety emergency event, such as facility emergency management personnel, AE Corporate Environmental, and local emergency responders. A functional exercise does not involve any "boots on the ground" such as first responders or emergency officials responding to an incident in real time.
- Full-Scale Exercises: A full-scale exercise involves the various parties responsible for responding to a safety emergency event, such as facility emergency management personnel, AE Corporate Environmental, and local emergency responders. The exercise involves functional response (i.e. boots on the ground) to a simulated event, such as activation of the EAP and role-playing to simulate an actual safety emergency event.

Functional and full-scale exercises are considered comprehensive exercises that provide the necessary verification, training, and practice to improve the EAP and the operational readiness and coordination efforts of all parties responsible for responding to safety emergency events at the facility. The basic difference between these two exercise types is that a full-scale exercise involves actual field movement and mobilization; in a functional exercise, field activity is simulated. The primary objectives of a comprehensive exercise (functional and full-scale) are listed below:

- Reveal the strengths and weaknesses of the EAP, including specified internal actions, external notification procedures, and adequacy of other information, such as inundation maps.
- Reveal deficiencies in resources and information available to the facility emergency management personnel and other parties responsible for responding to a safety emergency event.
- Improve coordination efforts between the facility emergency management personnel and other parties responsible for responding to a safety emergency event. Close coordination and cooperation among all responsible parties is vital for a successful response to an actual emergency.
- Clarify the roles and responsibilities of the facility emergency management personnel, local emergency responders, and all other parties involved in responding to a safety emergency event.
- Improve individual performance of the personnel who respond to the safety emergency event.
- Gain public recognition of the EAP.

**Frequency of Exercises**

The seminar, drill, tabletop exercise, and functional exercise should receive the most emphasis in an EAP exercise program. The following are recommended frequencies for these exercise types. The facility manager, in consultation with AE Corporate Environmental and local emergency responders, should determine actual frequencies appropriate for their facility.

- Seminars with local emergency responders – annually
- Drills to test the emergency notification procedures, emergency response actions, and emergency equipment / supplies / materials – annually
- Tabletop exercise – every 3 to 4 years or before functional exercises
- Functional exercise – every 5 years

A full-scale exercise should be considered when there is a need to evaluate actual field movement and deployment. When a full-scale exercise is conducted, safety is a major concern because of the extensive field activity. If the facility has the capability to conduct a full-scale exercise, a commitment should be made to schedule and conduct the entire series of exercises listed above before conducting the full-scale exercise. At least one functional exercise should be conducted before conducting a full-scale exercise. Functional and full-scale exercises also should be coordinated with other scheduled exercises, whenever possible, to share emergency management resources and reduce costs.