# Electric Energy, Inc.

## JOPPA POWER STATION
*JOPPA, MASSAC COUNTY, ILLINOIS*

# Emergency Action Plan (EAP)

**40 CFR § 257.73(a)(3)**
**Coal Combustion Residual (CCR) Impoundment**
**& Related Facilities**

- East Ash Pond (NID # IL50714)

**Revision Date: April 13, 2017**

**Qualified Professional Engineer Certification; Emergency Action Plan for the Joppa Power Station East Ash Pond.**

In accordance with 40 CFR 257.73(a)(3)(iv), the owner or operator of a CCR unit that is required to prepare a written Emergency Action Plan under 40 CFR 257.73(a)(3) must obtain a certification from a qualified professional engineer stating that the written Emergency Action Plan meets the requirements of 40 CFR 257.73(a)(3).

I, Matthew Hoy, being a Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that:

1. the information contained in this Emergency Action Plan was prepared in accordance with the accepted practice of engineering; and

2. this Emergency Action Plan meets the requirements of 40 CFR 257.73(a)(3).

SIGNATURE____________________ DATE 4/13/2017

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Fenton MO 63026-1944

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LICENSED PROFESSIONAL ENGINEER
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062-063141
STATE OF ILLINOIS

# JOPPA POWER STATION

## EMERGENCY ACTION PLAN
## CCR IMPOUNDMENT & RELATED FACILITIES

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## PART I – EAP NARRATIVE AND EXHIBITS

## 1 STATEMENT OF PURPOSE

The Joppa Power Station (Station) is located near Joppa in Massac County, Illinois. The location is shown in Figure 1-1. The Station is a coal-fired electricity producing power plant owned and operated by Electric Energy, Inc., a subsidiary of Dynegy. This Emergency Action Plan (EAP) covers the following Coal Combustion Residual (CCR) surface impoundment located at the site:

- Joppa East Ash Pond

The location of the impoundment is shown in Figure 1-2. Section 6 of this EAP includes a description of the impoundment.

The purpose of this Emergency Action Plan (EAP) is to:

1. Safeguard the lives, as well as to reduce property damage, of citizens living within potential downstream flood inundation areas of the CCR impoundment and related facilities at the Joppa Power Station.
2. Define the events or circumstances involving the CCR impoundment and related facilities at the Joppa Power Station that represent atypical operating conditions that pose a safety hazard or emergency and how to identify those conditions.
3. Define responsible persons, their responsibilities, and notification procedures in the event of a safety emergency.
4. Provide contact information of emergency responders.
5. Identify emergency actions in the event of a potential or imminent failure of the impoundment.
6. Identify the downstream area that would be affected by failure of the impoundment.
7. Provide for effective facility surveillance, prompt notification to local Emergency Management Agencies, citizen warning and notification responses, and preparation should an emergency occur.

Information provided by Dynegy was utilized and relied upon in preparation of this report.


0 3,000 6,000 Feet

1:60,000 (At original document size of 11x17)


**Notes**

1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
2. Aerial Source: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO,
3. NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User

Project Location
Latitude: 37.21438
Longitude: -88.85292
Massac County, Illinois

175605019
Prepared by RMGB on 3/29/2017
Technical Review by MM on 3/29/2017
Independent Review by MH on 3/29/2017

Client/Project
Joppa Power Station
Emergency Action Plan

Figure No.
**1-1**

Title
**Location Map**



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## Legend

CCR Surface Impoundment Boundary

0 1,000 2,000
Feet
1:20,000 (At original document size of 11x17)

**Notes**

1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
2. Aerial Source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,
3. USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community2015 NAIP Imagery



Stantec DYNEGY

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Latitude: 37.21438
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Client/Project
Joppa Power Station
Emergency Action Plan

Figure No.
**1-2**

Title
**CCR Impoundment**

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# 2 COMMUNICATION

To facilitate understanding among everyone involved in implementing this EAP, four response levels are used to identify the condition of an impoundment. These are:

**Response Levels:**

- **Level 0:** Normal conditions and routine operations, including surveillance and initial investigation of unusual conditions and effects of storm events.
- **Level 1:** Potentially hazardous condition exists, requiring investigation and possible corrective action.
- **Level 2:** Potential failure situation is developing; possible mode of failure is being assessed; corrective measures are underway.
- **Level 3:** Failure is occurring or is imminent, public protective actions are required.

The 4-Step Incident Response Process is outlined in Figure 2-1. This should be used in conjunction with the Notification Flowchart (Figure 2-2) and EAP Decision Tree (Figure 2-3). Section 4 provides guidance tables for determining Response Levels and a table providing emergency actions to be taken given various situations. Table 2-1 lists contact information for the emergency responders.

**Figure 2-1. Summary/Sequence of Tasks 4-Step Incident Response Process**

**Step 1: Detection, Evaluation, and Response Level Determination**

Sequence of Tasks:

- Notify EAP Coordinator, Station Management (Director and Engineering), and Dynegy Dam Safety Manager of unusual condition detected and confer on next steps needed.
- Conduct technical evaluation of conditions as needed.
- Determine Response Level based on evaluation. **(Table 4-1)**
- Reset Response Level as revised evaluations warrant.

**Step 2: Notification**

Sequence of Tasks:

- Notify authorities, designated personnel, and external response partners of change in Response Level, using the Notification Flowchart. **(Figure 2-2)**
- *Re-notify authorities, designated personnel, and external response partners as Response Level is changed*.

**Step 3: Emergency Actions**

Sequence of Tasks:

- Perform emergency actions with goal of saving the impoundment and minimizing impacts to life, property, and environment**. (Table 4-3)**
- Take continuous actions to include situation assessment, information sharing, remediation, and public safety advisories or warnings, as warranted.
- *Revise action plan as changes in conditions warrant*.

**Step 4: Follow-up**

Sequence of Tasks:

- Document conditions and decisions in the Emergency Incident Log.
- Notify authorities, designated personnel, and external response partners that condition is stabilized; limit incident termination declarations to conditions at the site.
- Conduct and document after-action review of incident and response.

**Figure 2-2. Notification Flowchart**

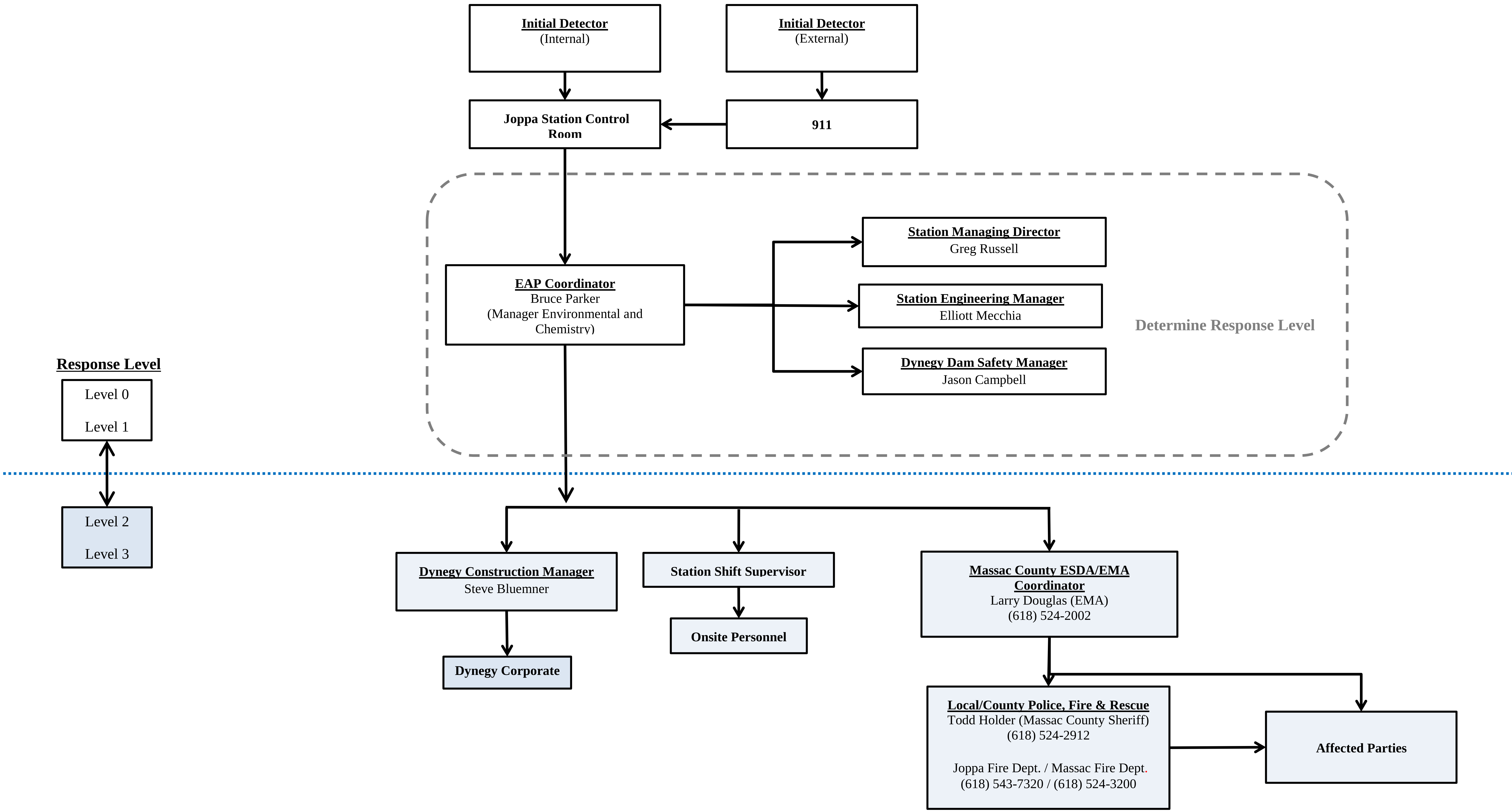

**Figure 2-3. EAP Response Process Decision Tree**

**Note:** At any given below, if failure is imminent or actively occurring **CALL 911 IMMEDIATELY** to notify emergency responders and then continue with process afterwards.

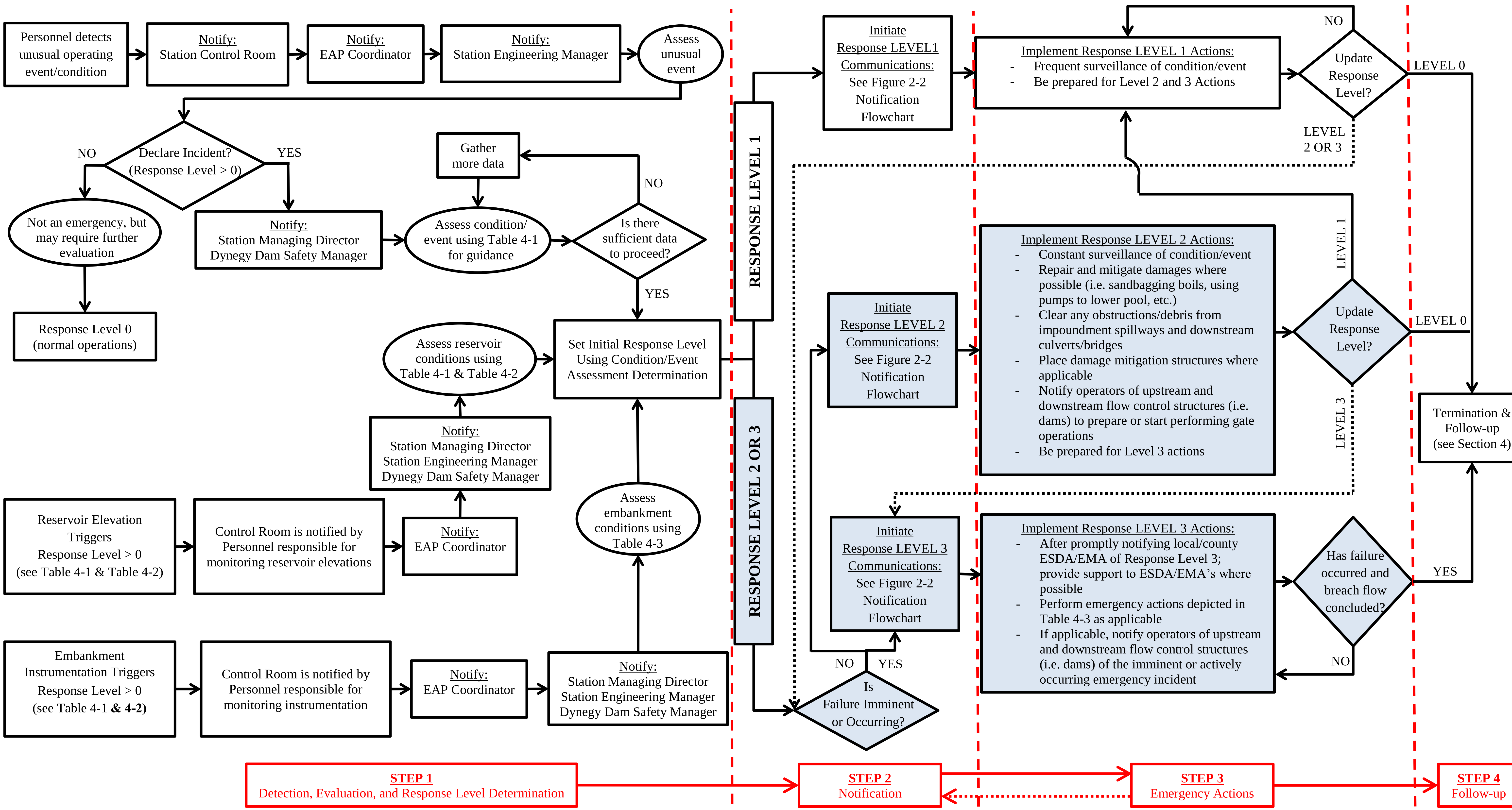

**Table 2-1. EAP Emergency Responders**

| Position / Entity | Contact Information | |
|---|---|---|
| **Internal Contacts** | | |
| **Joppa Power Station** | **Contact** | **Phone #** |
| Managing Director | Greg Russell | |
| Environmental Manager (EAP Coordinator) | Bruce Parker | (618) 543-3458 |
| Engineering Manager | Elliott Mecchia | |
| Control Room | | (618) 543-3301 |
| **Dynegy Corporate Operations** | **Contact** | **Phone #** |
| Dam Safety Manager | Jason Campbell | (618) 792-8488 |
| Construction Management | Steve Bluemner | |
| **External Contacts** | | |
| **Local/County ESDA/EMA, Police, & Fire** | **Contact** | **Phone #** |
| Massac County ESDA/EMA Coordinator | Larry Douglas | (618) 524-2002 |
| Massac County Sheriff Department | Todd Holder | (618) 524-2912 |
| Joppa Fire Department | | (618) 543-7320 |
| Massac County Fire Department | | (618) 524-3200 |
| **State Emergency Management Agencies & Organizations** | **Contact** | **Phone #** |
| IDNR-OWR Dam Safety Section Manager | Paul Mauer | (217) 782-4427 |
| Illinois Conservation Police | Gary Somers | (618) 638-6204 |
| Illinois State Police | | (309) 833-4046 |

# 3 EAP ROLES AND RESPONSIBILITIES

Table 3-1 provides a summary of the EAP roles during an emergency event.

**Table 3-1. Summary of EAP Roles**

| Entity | Role Description |
|---|---|
| **Dynegy Emergency Response Team (ERT)** | **ERT:** Dynegy personnel responsible for EAP implementation, distribution, updates/maintenance, and training activities. The *ERT* is comprised of the following roles;<br>1. **Dynegy Corporate:** Dynegy corporate entity, committee, team, or position with relevant responsibility for a given generating station.<br>2. **Station Management:** Personnel responsible for day-to-day operation and management of the Station.<br>3. **Dam Safety Manager:** Personnel that is most knowledgeable about the design and technical operation of facilities at a given Station.<br>4. **EAP Coordinator:** Personnel responsible for implementing the EAP and associated activities.<br>**Emergency Event – EAP Responsibilities**<br>1. Respond to emergencies at the Station.<br>2. Verify and assess emergency conditions.<br>3. Notify and coordinate as appropriate with participating emergency services disaster agencies or emergency management agencies (ESDA/EMA's), emergency responders, regulatory agencies, and all other entities involved or affected by this EAP.<br>4. Take corrective action at the Station.<br>5. Declare termination of emergencies at the Station. |
| **Massac County ESDA/EMA** | 1. Receive Response Level reports from *Dynegy Corporate* through *EAP Coordinator*.<br>2. Coordinate emergency response activities with local/county authorities: police, fire and rescue, etc.<br>3. Coordinate notification of public as necessary through established channels, which may include door-to-door contact.<br>4. Coordinate notification activities to affected parties within inundation areas.<br>5. Evaluate risk to areas beyond the inundation areas, communicate needs to the *Dynegy Corporate* and/or *EAP Coordinator*, and coordinate aid as appropriate.<br>6. Responsible for declaring termination of an emergency condition off-site upon receiving notification of an emergency status termination from the *Dynegy Corporate*.<br>7. If necessary, coordinate with *State ESDA/EMA*. |
| **Local/County Police, Fire & Rescue** | 1. Receive alert status reports from the *ERT* or the Massac County *ESDA/EMA*.<br>2. If necessary, notify affected parties and general public within inundation areas (see Section 7).<br>3. Render assistance to Massac County *ESDA/EMA*, as necessary.<br>4. Render assistance to *Dynegy Corporate*, and *Station Management*, as necessary. |

# 4 EAP RESPONSE

The 4-Step Incident Response Process is shown in Figure 2-1. The Decision Tree shown in Figure 2-3 provides a flowchart for the various elements of the response process. Upon reaching Step 4 of the response process (termination and follow-up), the EAP Coordinator is responsible for notifying the ESDA/EMA's that the condition of the dam/impoundment has been stabilized. The purpose of this section is to provide specific information that can be used during a response. This information is provided in the following tables:

- Table 4-1 provides guidance for determining the response level.
- Table 4-2 provide impoundment pool level trigger elevations.
- Table 4-3 lists emergency actions to be taken depending on the situation.

**Table 4-1. Guidance for Determining the Response Level**

| Event | Situation | Response Level |
|---|---|---|
| Spillway flow (see Table 4-2 for relevant elevations) | Primary spillway flow is not causing active erosion and impoundment water surface elevation is below auxiliary spillway crest elevation (if equipped). | Level 0 |
| | Impoundment water surface elevation is at or above auxiliary spillway crest elevation (if equipped). No active erosion caused by spillway flow. | Level 1 |
| | Spillway flow actively causing minor erosion that is not threatening the control section or dam/impoundment stability. | Level 2 |
| | Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise. | Level 2 |
| | Abnormal operation of the spillway system due to blockage or damage that could lead to flooding. | Level 2 |
| | Spillway flow actively eroding the soil around the spillway that is threatening the control section (e.g. undermining) or dam/impoundment stability. | Level 3 |
| | Spillway flow that is flooding people downstream. | Level 3 |
| Embankment Overtopping (see Table 4-2 for relevant elevations) | Impoundment water surface elevation at or below typical normal pool fluctuation elevation. | Level 0 |
| | Impoundment water surface elevation above typical high pool fluctuation elevation. | Level 1 |
| | Impoundment water surface elevation within 2 feet of the embankment crest elevation. | Level 2 |
| | Impoundment water surface elevation at or above embankment crest elevation. | Level 3 |
| Seepage | New seepage areas in or near the dam/impoundment with clear flow. | Level 1 |
| | New seepage areas with cloudy discharge or increasing flow rate. | Level 2 |
| | Heavy seepage with active erosion, muddy flow, and/or sand boils. | Level 3 |
| Sinkholes | Observation of new sinkhole in impoundment area or on embankment. | Level 2 |
| | Rapidly enlarging sinkhole and/or whirlpool in the impoundment. | Level 3 |
| | New cracks in the embankment greater than ¼ inch wide without seepage. | Level 1 |

**Table 4-1. Guidance for Determining the Response Level**

| Event | Situation | Response Level |
|---|---|---|
| Embankment cracking | Any crack in the embankment with seepage. | Level 2 |
| | Enlarging cracks with muddy seepage. | Level 3 |
| Embankment movement | Visual signs of movement/slippage of the embankment slope. | Level 1 |
| | Detectable active movement/slippage of the embankment slope or other related effects (tension cracking, bulges/heaves, etc.) that could threaten the integrity of the embankment. | Level 2 |
| | Sudden or rapidly proceeding slides of the embankment slopes. | Level 3 |
| Embankment Monitoring Equipment (piezometers, inclinometers, surface displacement mounts, etc.) | Instrumentation readings beyond historic normal. | Level 1 |
| | Instrumentation readings indicate the embankment is susceptible to failure. | Level 2 |
| | Instrumentation readings indicate embankment is at threshold of failure or is currently failing. | Leve 3 |
| Earthquake or other event | Measurable earthquake felt or reported on or within 100 miles of the impoundment. | Level 1 |
| | Earthquake or other event resulting in visible damage to the impoundment or appurtenances. | Level 2 |
| | Earthquake or other event resulting in uncontrolled release of water or materials from the impoundment. | Level 3 |
| Security threat | Verified bomb threat or other physical threat that, if carried out, could result in damage to the impoundment. | Level 2 |
| | Detonated bomb or other physical damage that has resulted in damage to the impoundment or appurtenances. | Level 3 |
| Sabotage/ vandalism | Damage to impoundment or appurtenance with no impact to the functioning of the impoundment. | Level 1 |
| | Modification to the impoundment or appurtenances that could adversely impact the functioning of the impoundment. This would include unauthorized operation of spillway facilities. | Level 2 |
| | Damage to impoundment or appurtenances that has resulted in seepage flow. | Level 2 |
| | Damage to impoundment or appurtenances that has resulted in uncontrolled water release. | Level 3 |

**Table 4-2. Impoundment Trigger Elevations**

| Impoundment | Embankment Crest Elevation | Auxiliary Spillway Crest Elevation | Normal Pool Fluctuation | |
|---|---|---|---|---|
| | | | Typical | High |
| Joppa East Ash Pond | 380 ft. | N/A | 374 ft. | 377 ft. |

Notes:
Estimated from DEM in GIS and USA Topo Map – Typical Embankment Crest Elevation – 380 ft

**Table 4-3. Step 3: Emergency Actions**

| Condition | Description of Condition | Action to be Taken |
|---|---|---|
| High Water Level/<br>Large Spillway Release | See Table 4-1 and Table 4-2 for elevations and triggering water levels associated with the impoundments and spillways covered by this EAP. | 1. Assess cause of increased reservoir stage, especially during fair weather conditions.<br>2. Determine Response Level.<br>3. Make proper notifications as outlined in the Figure 2-2 Notification Flowchart.<br>4. Perform additional tasks as determined through consultation with the ERT.<br>5. Make notifications if condition worsens such that downstream flooding is imminent.<br>**Response Level 0**: require enhanced surveillance 3 times per day<br>**Response Level 1**: contact internal chain of command and external response partners as necessary; inspect impoundment minimum 1 time per hour<br>**Response Level 2**: contact internal chain of command; notify ESDA/EMA's and notify external response partners. ESDA/EMA's notify affected parties.<br>**Response Level 3**: contact internal chain of command; notify ESDA/EMA's and notify external response partners. ESDA/EMA's notify affected parties of emergency incident. |
| Seepage | Localized new seepage or boil(s) observed along downstream face / toe of earthen embankment with muddy discharge and increasing but controllable discharge of water. | 1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes.<br>2. Determine Response Level.<br>3. Make proper notifications as outlined in the Figure 2-2 Notification Flowchart.<br>4. ERT (with Dam Safety Manager as lead) to determine mitigation actions. The following actions may apply:<br>a) Place a ring of sand bags with a weir at the top towards the natural drainage path to monitor flow rate. If boil becomes too large to sand bag, place a blanket filter over the area using non-woven filter fabric and pea gravel. Attempt to contain flow in such a manner (without performing any excavations) that flow rates can be measured. Stockpile gravel and sand fill for later use, if necessary.<br>b) Inspect the embankment and collect piezometer, water level and seepage flow data daily unless otherwise instructed by the Dam Safety Manager. Record any changes of conditions. Carefully observe embankment for signs of depressions, seepage, sinkholes, cracking or movement. |

**Table 4-3. Step 3: Emergency Actions**

| Condition | Description of Condition | Action to be Taken |
|---|---|---|
| | | c) Maintain continuous monitoring of feature. Record measured flow rate and any changes of condition, including presence or absence of muddy discharge.<br>5. Make notifications as outlined in the lower portion of the Notification Flowchart (Figure 2-2) if condition worsens such that failure is imminent. |
| Sabotage and Miscellaneous Other Issues | Criminal action with significant damage to embankment or structures where significant repairs are required and the integrity of the facility is compromised—condition appears stable with time. | 1. Contact law enforcement authorities and restrict all access (except emergency responders) to impoundment. Restrict traffic on embankment crest to essential emergency operations only.<br>2. Determine Response Level.<br>3. Make internal notifications as outlined in the upper portion of the Notification Flowchart (Figure 2-2).<br>4. In conjunction with the Dam Safety Manager, assess extent of damage and visually inspect entire embankment and ancillary structures for additional less obvious damage. Based on inspection results, confirm if extent of damage to various components of the impoundment warrants a revised Response Level and additional notifications.<br>5. Perform additional tasks as directed by the ERT.<br>6. Make notifications if conditions worsen. |
| Embankment Deformation | **Cracks:**<br>New longitudinal (along the embankment) or transverse (across the embankment) cracks more than 6 inches deep or more than 3 inches wide or increasing with time. New concave cracks on or near the embankment crest associated with slope movement. | 1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes.<br>2. Restrict traffic on embankment crest to essential emergency operations only.<br>3. Determine Response Level.<br>4. Make notifications as outlined in the Figure 2-2 Notification Flowchart<br>5. ERT (with Dam Safety Manager as lead) to determine mitigation actions. The following actions may apply:<br>a) Place buttress fill against base of slope immediately below surface feature. Stock pile additional fill.<br>b) Place sand bags as necessary around crack area to divert any storm water runoff from flowing into crack(s).<br>6. As directed by the Dam Safety Manager, additional inspection and monitoring of the dam may be required. Items may include; inspect the dam on a schedule determined by the engineers; collect piezometer and water level data; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.<br>7. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent. |
| Embankment Deformation (cont.) | **Slides / Erosion:**<br>Deep slide / erosion (greater than 2 feet deep) on the embankment that may also extend beyond the embankment toe but does not encroach onto the embankment crest and appears stable with time. | 1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection report.<br>2. Restrict traffic on embankment crest to essential emergency operations only.<br>3. Determine the Response Level.<br>4. Make notifications as outlined in the Figure 2-2 Notification Flowchart.<br>5. ERT (with Dam Safety Manager as lead) to determine mitigation actions. Additional actions may include the following items.<br>a) Place sand bags as necessary around slide area to divert any storm water runoff from flowing into slide(s).<br>b) Increase inspections of the dam; collect piezometer and water level data; and record any changes of condition. During inspections, |

**Table 4-3. Step 3: Emergency Actions**

| Condition | Description of Condition | Action to be Taken |
|---|---|---|
| | | carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.<br>6. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent. |
| | **Sinkholes:**<br>Small depression observed on the embankment or within 50 feet of the embankment toe that is less than 5 feet deep and 30 feet wide or which is increasing with time. | 1. Slowly open drain gates to lower pool elevation.<br>2. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos. Document location on a site plan and in inspection notes.<br>3. Restrict traffic on embankment crest to essential emergency operations only.<br>4. Determine Response Level.<br>5. Make notifications as outlined in the Figure 2-2 Notification Flowchart.<br>6. ERT (with Dam Safety Manager as lead) to determine mitigation actions. Additional actions may include the following items:<br>a) Backfill the depression with relatively clean earth fill (free of organic materials) generally even with surrounding grade and slightly mounded (6 to 12 inches higher) in the center in order to shed storm water away from the depression. Stock pile additional fill.<br>b) Increase inspections of the dam; collect piezometer and water level data daily unless otherwise instructed by engineer; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.<br>7. Make notifications as outlined in the Figure 2-2 Notification Flowchart if conditions worsen such that failure is imminent. |
| Gate Malfunction or Failure | Sluice gate damaged structurally (sabotage, debris, etc.) with uncontrolled release of water at a constant volume. Condition appears stable. | 1. Close any other gates, if open.<br>2. Determine Response Level.<br>3. Make notifications as outlined in the Figure 2-2 Notification Flowchart.<br>4. Obtain instructions from the Engineer to determine if there are other methods to stop or slow down the flow of water.<br>5. If conditions worsen such that failure is imminent, make notifications as outlined in the lower portion of the Figure 2-2 Notification Flowchart. |

# 5 PREPAREDNESS

The intent of this section is to provide information that will be utilized during a response. Established emergency supplies and locations, suppliers, and equipment are provided in Table 5-1.

A coordination meeting shall be conducted annually between representatives of the Electric Energy, Inc. and local emergency responders. This meeting may be in the form of a face-to-face meeting, tabletop exercise, or additional training regarding the EAP.

**Table 5-1. Emergency Supplies and Equipment**

| Item | On-site (Yes/No/Occasionally) | Remarks |
|---|---|---|
| Flashlights | Yes | Contact Shift Supervisor for location(s). |
| Generator | Yes | Contact Shift Supervisor for location(s). |
| Extension Cords | Yes | Contact Shift Supervisor for location(s). |
| Fire extinguishers | Yes | Contact Shift Supervisor for location(s). |
| Floodlights | Yes | Contact Shift Supervisor for location(s). |
| Backhoe | Yes | Contact Shift Supervisor for location(s). |
| Dozer | Yes | Contact Shift Supervisor for location(s). |
| Large Equipment (Rental – including excavating equipment, pumps, lighting) | No | |
| Dump Truck | Yes | Contact Shift Supervisor for location(s). |
| Pump and Hoses | Yes | Contact Shift Supervisor for location(s). |
| Sandbags and Sand | Yes | Contact Shift Supervisor for location(s). |
| Fill (Stone, aggregate, sand) | Yes | Contact Shift Supervisor for location(s). |
| Concrete/grout | No | |
| Geotextile Filter Fabric | Yes | Contact Shift Supervisor for location(s). |
| Plastic Sheeting | No | |
| Rope | Yes | Contact Shift Supervisor for location(s). |
| Personal Flotation Devices | Yes | Contact Shift Supervisor for location(s). |

# 6 FACILITY/IMPOUNDMENT DESCRIPTION

The impoundment included in this EAP is described as follows and illustrated in Figure 1-2. Table 6-1 contains additional geometric details for the impoundment.

The Joppa Power Station is located in Massac County, Illinois approximately 18 miles downstream of the confluence of the Tennessee River and the Ohio River. The plant is located on the northern bank of the Ohio River, adjacent to the village of Joppa. The East Ash Pond is located to the north of the main facility.

Joppa East Ash Pond has a surface area of approximately 103 acres with 32 acres holding water. The remaining area is filled with coal combustion residual materials. The maximum embankment height is approximately 45 feet. The crest of the pond is at approximate elevation 380 feet with a normal pool of approximately 374 feet. The East Ash Pond includes two subbasins, the north basin and south basin. There is a 24-inch corrugated metal pipe (CMP) through the central dike that connects the northern and southern subbasins to manage flow between the subbasins, which is not controlled. The southern subbasin's primary outlet structure is a 24-inch steel "T" structure connected to a 24-inch pipe that passes through the eastern embankment. The northern subbasin discharges through a 30-inch pipe that passes through the most northern embankment. Flow from the southern subbasin discharges to an open channel then through a concrete culvert under Joppa Power Station's coal-delivery railroad before discharging into the Ohio River 2,400 feet downstream of the railroad.

**Table 6-1. Station Impoundment Characteristics**

| Feature/Parameter | Joppa East Ash Pond |
|---|---|
| Maximum Embankment Height | 45 ft. |
| Length of Dam | 9100 ft. |
| Crest Width | 10 ft. |
| Crest Elevation | 380 ft. |
| Reservoir Area at Top of Dam | 103 acres |
| Storage Capacity at Top of Dam | 1077 acre-ft. |
| Primary Spillway Type | 24” Steel “T” Structure |
| Primary Spillway Crest Elevation | N/A |
| Storage Capacity at Primary Spillway Elevation | N/A |
| Reservoir Area at Normal Water Surface Elevation | N/A |
| Auxiliary Spillway Type | N/A |
| Auxiliary Spillway Crest Elevation | N/A |

Notes:
Estimated from DEM in GIS and USA Topo Map

# 7 BREACH INUNDATION MAP AND POTENTIAL IMPACTS

An inundation map for Joppa East Ash Pond potential breach scenarios is provided in this section. It is the Joppa / Massac County ESDA/EMA's responsibility to keep a current list of affected parties/properties to contact in the case of emergencies that result in Response Level 2 or 3. This list should encompass all properties within and adjacent to the probable inundation extents shown in the provided maps.

The methodology used to identify probable inundation extents for potential breach scenarios varied as a function of the impoundment size, location, surrounding topography, and surrounding structures/facilities/waterbodies.

For breach inundation mapping, the United States Army Corps of Engineers (USACE) Hydrologic Engineering Center River Analysis System (HEC-RAS), version 5.0.1, computer program was used to perform hydraulic routing calculations. The HEC-RAS breach simulation was configured as an unsteady flood routing model. A two-dimensional flood routing model was selected for simulating potential breach impacts along the embankment of the East Ash Pond.

The breach scenario evaluated for the East Ash Pond was a piping breach during the Probable Maximum Precipitation (PMP) event. The East Ash Pond is perched and inflow from the storm events would consist of rainfall falling directly on the Pond. The freeboard for the Pond is greater than the PMP volume, therefore the pool elevation for the breach scenario was the normal pool plus the volume of the PMP event (38-inch depth across 103 AC footprint). Since the PMP event does not overtop the crest of the East Ash Pond, a piping breach was evaluated instead of an overtopping breach. Six breach locations were selected around the East Ash Pond. These locations include: one to the north, two breaches to the west, one breach to the south, and two breaches to the east. The total inundation extents were a combination of the six breach scenarios.

Approximate inundation area is illustrated in Figure 7-1.



## Legend

- CCR Surface Impoundment Boundary
- Expected Breach Inundation Area

0 1,000 2,000 Feet

1:20,000 (At original document size of 11x17)

**Notes**

1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
2. Aerial Source: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO,
3. NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User



Stantec DYNEGY

Project Location
Latitude: 37.21438
Longitude: -88.85292
Massac County, Illinois

175605019
Prepared by RMGB on 3/29/2017
Technical Review by MM on 3/29/2017
Independent Review by MH on 3/29/2017

Client/Project
Joppa Power Station
Emergency Action Plan

Figure No.
**7-1**

Title
**Inundation Map**
**East Ash Pond**