

Dam Emergency Action Plan (EAP) Template

Developed by the Rhode Island Emergency Management Agency in coordination with the Rhode Island Department of Environmental Management.



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Table of Contents

Emergency Action Plan Distribution	6
Executive Summary	7
Section 1: Introduction	8
1.1 Situation.....	8
1.2 Scope.....	8
1.3 Authorities.....	8
1.3.1 Federal.....	8
1.3.2 State.....	9
1.3.3 Local.....	9
Section 2: Planning	10
2.1 Dam Description.....	10
2.2 Structure.....	11
2.3 Directions to Dam.....	11
2.4 Inundation Map.....	11
2.5 Responsibilities.....	11
2.5.1 General Responsibilities under the EAP.....	11
2.5.2 Dam Owner/Operator Responsibilities.....	11
2.5.3 <Insert City/Town Name> Responsibility (EAP Coordinator).....	12
2.5.4 <Insert City/Town Name> Emergency Management Agency Responsibilities.....	12
2.5.5 Fire Department.....	12
2.5.6 Police Department.....	13
2.5.7 Public Works Department.....	13
2.5.8 RI Department of Environmental Management Dam Safety Section.....	13
2.5.9 RI Emergency Management Agency Responsibilities.....	13
2.5.10 Local Floodplain Administrator.....	13
Section 3: Preparedness	14
3.1 Identification of Dam Failure Impact Areas.....	14
3.2 Identification of an Emergency.....	14
3.3 Emergency Operations Center.....	14
3.4 Emergency Conditions.....	14
3.4.1 Flooding.....	15
3.4.2 Erosion, Slumping/Sloughing, or Cracking of the Dam or Abutment.....	15

3.4.3	Earthquake	15
3.4.4	New Springs, Seeps, Bogs, Boils, Increased Leakage, or Sinkholes.....	17
3.4.5	Sudden Water Releases	17
3.4.6	Abnormal Instrumentation Readings.....	17
3.4.7	Malicious Human Actions (Sabotage, Vandalism, or Terrorism)	17
3.4.8	Other Problems	18
Section 4: Response		19
4.1	Response Process.....	19
4.2	Responses	23
4.2.1	Response during Periods of Darkness.....	23
4.2.2	Response during Weekends and Holidays	23
4.2.3	Response during Periods of Adverse Weather	23
4.2.4	Availability of Use of Alternate Systems of Communications.....	23
4.2.5	Dam Safety during Response Phase.....	23
4.2.6	Emergency Supplies and Information	24
4.2.7	Staging Area	24
4.3	Notification Flowcharts	25
Section 5: Plan Maintenance		28
5.1	EAP Annual Review and Revisions	28
5.2	EAP Periodic Test	28
Section 6: Acronyms and Glossary.....		29
6.1	Acronyms	29
6.2	Glossary.....	29
Section 7: References		34
Appendices.....		35
Appendix A: Location and Inundation Map		36
Appendix B: Evacuation Map		37
Appendix C: Property Owner List.....		38
Appendix D: Upstream/Downstream Dam Owners.....		39
Appendix E: Plan View of Dam.....		40
Appendix F: Profile of Principal Spillway.....		41
Appendix G: Sample Guidance for Determining Emergency Level.....		42
Appendix H: Contact Checklist		43

Appendix I: Unusual or Emergency Event Log 44

Appendix J: Dam Emergency Situation Report 46

Appendix K: Equipment and Supplies 48

Appendix L: Emergency Notification Information and Messages..... 49

Appendix M: Annual Review Checklist..... 51

Appendix N: Record of Changes 52

Appendix O: Exercising the Emergency Action Plan 53

Emergency Action Plan Distribution

An electronic copy of this plan will be disseminated to the following parties upon finalization and approval:

<u>ORGANIZATION</u>	<u>Number of Copies</u>
Dam Owner	1
Dam Operator	1
EAP Coordinator	1
Local Emergency Management Director	1
RIDEM – Office of Compliance & Inspection	1
RIEMA – Assistant Chief of Planning	1

Executive Summary

This Emergency Action Plan (EAP) defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger <Insert Dam Name> Dam. This Plan is designed to notify the appropriate public officials of possible, impending, or actual dam failure in time to take remedial action. The EAP contains notification procedures to safeguard property and the lives of citizens living, working, schooling, and recreating along <Insert River/Stream Name> in the event of a failure of <Insert Dam Name> Dam.

Section 1: Introduction

1.1 Situation

The State of Rhode Island Department of Environmental Management (RIDEM) has clear authority for classifying dams, as per the rules and regulations found in Chapter 46-19, “Inspection of Dams and Reservoirs” of Rhode Island General Laws (RIGL). Through the effort of RIDEM, a statewide assessment was completed of the hazard classification for each dam throughout the state. Utilizing a three-tiered hazard classification system which rates each dam based upon the probable consequences of failure or misoperation of the dam. This system includes:

- High Hazard –failure or misoperation will result in a probable loss of human life.
- Significant Hazard – failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety or welfare. Examples of major economic loss include but are not limited to washout of a state or federal highway, washout of two or more municipal roads, loss of vehicular access to residences, (e.g. a dead end road whereby emergency personnel could no longer access residences beyond the washout area) or damage to a few structures.
- Low Hazard –failure or misoperation results in no probable loss of human life and low economic losses.

1.2 Scope

This Emergency Action Plan:

- Establishes a monitoring system which can activate the Plan.
- Identifies officials, organizations, agencies, and their respective responsibilities for implementing the plan.
- Identifies areas, structures, facilities and roads which might be affected by dam failure.

1.3 Authorities

1.3.1 Federal

- The Robert T. Stafford Disaster Relief Act, Public Law 93-288, as amended.
- National Dam Safety Program Act, Public Law 104-303, as amended.
- National Dam Safety and Security Act of 2002, Public Law 107-310.
- National Dam Safety Program reauthorized as Public Law 109-460.
- Homeland Security Presidential Directive 7: Critical Infrastructure Identification Prioritization and Protection, 2003.

1.3.2 State

- Rhode Island General Law (RIGL) Title 30, Chapter 30-15, as amended.
- Rhode Island General Law (RIGL) Title 46, Chapter 46-19, as amended.
- Rhode Island General Law (RIGL) Title 42, Chapter 42-17.1, as amended.

1.3.3 Local

<Insert Local Law or Ordinance>

Section 2: Planning

2.1 Dam Description

Dam Name:

RI Dam ID:

National Inventory of Dams No:

Alternate Name:

Hazard Classification:

Latitude:

Longitude:

Height:

Year Completed

City/Town Location ID:

Owner(s):

Dam Operator:

Drainage Basin (sq mi):

<Insert Picture of Dam>

2.2 Structure

Describe the following:

Structural material

Length/height/other dimensions

Spillway and gate structure (if applicable)

Age of the dam

Any other important structure information, including recent repairs

Storage Volume (acre feet or gallons) – either Normal (at spillway crest) or maximum (at top of dam)

Normal Pool:

Maximum Pool:

2.3 Directions to Dam

<Insert Primary and Secondary Directions to the Dam with attention to possible wash out of roads>

2.4 Inundation Map

<Insert Number of Structures> structures appear that they would be affected by a major flood caused by a sudden breach of <Insert Name of Dam> dam. These structures are marked on the inundation map attached in Appendix A.

2.5 Responsibilities

2.5.1 General Responsibilities under the EAP

It is of extreme importance that each member of the Notification Flowchart be diligent in performing their duties. This importance is magnified under the “Dam Emergency/Dam Breach” scenarios. Notification of 9-1-1 falls primarily on the initial observer.

The general area to be evacuated or alerted is between the <Insert Dam Name> Dam and the <specified location determined by inundation maps>. The evacuation of this area shall be performed by local Police/Fire and Rescue personnel and Emergency Management Agency Officials.

The evacuation effort should be supplemented by police driving through the area broadcasting the evacuation notice. It is important to note that the number of homes and businesses affected makes contacting each individual homeowner/business impractical, and a street by street evacuation is recommended. The evacuee information will have to be updated on a periodic basis to provide up to date information. The evacuation map is located in Appendix B.

2.5.2 Dam Owner/Operator Responsibilities

During a Dam Emergency/Dam Breach Condition:

- Identify the emergency condition.

- Coordinate with <Insert City/Town Name> Emergency Management Agency Personnel and notify the RI Department of Environmental Management, Division of Compliance and Inspection, Dam Safety Section (RI-DSS).
- Implement direct emergency repairs at the <Insert Dam Name>.
- Update the Emergency status to the <Insert EMA Name> Emergency Management Agency and RI-DSS.
- Provide security measures at the dam.
- Provide technical assistance to Emergency Management Agency officials, when necessary.
- Report termination of emergency situation on-site at the dam.

In Non-Emergency Conditions, Owner/Operator must provide for:

- Routine maintenance and operations of the dam.
- Routine surveillance of the dam.

2.5.3 <Insert City/Town Name> Responsibility (EAP Coordinator)

The <City/Town> is responsible for designating an EAP Coordinator, and that person shall be responsible for EAP related activities including:

- Make and distribute document revisions.
- Establish training schedule.
- Coordinate EAP exercises.
- Review, update and distribution of the EAP, as needed.

2.5.4 <Insert City/Town Name> Emergency Management Agency Responsibilities

- Assume control and coordinate (when appropriate) all emergency actions in accordance with Public Law.
- Notify appropriate State agencies and Municipal Elected Officials.
- Periodic testing of the emergency notification procedures.

2.5.5 Fire Department

- Assist in evacuation operations and initiate the evacuation of impact areas in cooperation with Emergency Management Agency and Police Departments.
- Request mutual aid for boats and initiate rescue of trapped residents as needed.
- Activate the RI Mass Casualty Incident (MCI) Plan as needed.

2.5.6 Police Department

- Warn the public of emergency conditions at the dam.
- Secure and control access to evacuated areas.
- Assist in conducting rescue and recovery operations as required.

2.5.7 Public Works Department

- Provide engineering support.
- Provide heavy equipment and personnel.
- Perform preventative actions outlined under Section 4 Step 3 (Actions should be supervised by qualified engineer).

2.5.8 RI Department of Environmental Management Dam Safety Section

- Provide technical assistance to the dam Owner/Operator.
- Assist in the evaluation and resolution of potential emergency conditions.
- Direct the Owner/Operator to take necessary safety measures.

2.5.9 RI Emergency Management Agency Responsibilities

- Pass warning of emergency conditions at the dam to all affected municipalities.
- Provide assistance to municipalities to help fulfill the emergency responsibilities.
- Provide assistance to the affected municipalities and counties (when requested and beyond their capabilities).
- Coordinate specialized assistance.

2.5.10 Local Floodplain Administrator

- Provide basic floodplain data.
- Assist with basic damage assessments of dam failure.

Section 3: Preparedness

3.1 Identification of Dam Failure Impact Areas

Impact areas will be identified and mapped for all high hazard and significant hazard dams within the <City/Town > of <Insert City/Town Name> and included in Appendix A of this plan. In addition, all critical facilities to include special populations and essential infrastructures are to be identified. This list is to be updated annually by the <City/Town>.

3.2 Identification of an Emergency

An emergency exists when dam failure has occurred or when dam failure is imminent. Floods are a major cause of dam failure as well as seismic incidents. Investigations of dam failures have found that approximately 60 percent were caused by lack of maintenance, resulting in piping, surface erosion, slope protection damage or deterioration of outlet pipes.

Dams are to be monitored by dam owners, operators or their designee, especially during high water conditions or whenever a seismic event occurs. Conditions indicating potential failure include, but are not limited to, the following:

- Slumping or sloughing of the embankment.
- Excessive erosion on the embankment, below the spillway, or at the abutments.
- Excessive seepage or cloudy seepage through the abutments or embankments.
- Settlement or cracking in the embankment.
- Piping or boils in the embankment.
- Large cracks in the concrete spillway.
- Noticeable movement of the spillway.

3.3 Emergency Operations Center

The Emergency Operations Center (EOC) provides a central location where the <Insert CEO> and senior decision-makers will gather to provide a coordinated response. These decision makers make up the Emergency Response Team (ERT).

The EOC has been established at <Insert EOC Building Name and Address>. An alternate EOC has been established <Insert Alternate EOC Building Name and Address>.

3.4 Emergency Conditions

Listed below are some, not necessarily all, of the events which can lead directly to the failure of the dam. A brief outline of steps to take to try to stabilize the situation is included after each scenario. All decisions that are made should be in accordance within the Incident Command Structure made up with the responsible agencies defined in Section 2.5.

3.4.1 Flooding

Routing of the inflow design flood indicates that the spillway (will/won't) handle the runoff without problems. In case of a major flood event, special procedures must be taken to secure property downstream. For real-time data on daily stream conditions visit the United States Geological Survey Rhode Island website at <http://waterdata.usgs.gov/ri/nwis/rt>. If something should happen to cause the <Insert Body of Water Type> level to rise within <Insert Feet #> feet of the dam crest, or elevation <Elevation of Feet>, contact the DEM and <City/Town> Emergency Management Agency immediately to report the following:

- Current <Insert Body of Water Type> elevation and freeboard;
- Rate the <Insert Body of Water Type> is rising;
- Weather conditions - past, present, predicted;
- Discharge conditions of streams and rivers downstream;
- Downstream toe and abutments for any new seepage or abnormal (muddy flow) toe drain leakage;
- Increased seepage rate as <Insert Body of Water Type> level rises; and
- Cracks, slumping, sloughing, sliding, or other distress signals near the dam abutment or crest.

If any of the above conditions occur, implement the Notification Flowchart for Potential or Imminent Failure.

**** IF AT ANY TIME THE WATER IN THE <Insert Water Body Type> EXCEEDS THE MAXIMUM SAFE LEVEL OF OPERATION, OR ELEVATION <Insert Safe Level > FEET, AT LEAST DAILY INSPECTIONS OF THE DAM ARE REQUIRED****

3.4.2 Erosion, Slumping/Sloughing, or Cracking of the Dam or Abutment

Determine the location, size of the affected area(s) (height, width, and depth) severity, estimated seepage discharge, clear or cloudy seepage, and the <Insert Body of Water Type> and tailwater elevations. If the integrity of the dam appears to be threatened, immediately implement the Notification Flowchart for Potential or Imminent Failure.

3.4.3 Earthquake

If you have felt an earthquake, or one has been reported in the vicinity, you should:

- Immediately conduct a general overall visual inspection of the dam.
- If the dam is failing, immediately implement the instructions in the Section 4.1.3.

<Insert City/Town Name> Dam Emergency Action Plan

- If the dam is damaged to the extent that there is increased flow passing downstream, immediately implement FAILURE IMMINENT procedures.
- Otherwise, if damage has occurred, but is not judged serious enough to cause failure of the dam, quickly observe the nature, location, and extent of the damage, as well as the potential for failure. Then contact the Dam Safety Section at (401) 222-3070 or after hours contact the <Insert City/Town Name> Police Department (401) <Insert Phone #> for further instructions. A description of slides, sloughs, new or increased seepage, and sudden subsidence, including the location, extent, rate of subsidence, effects on adjoining structures, springs or seeps, <Insert Body of Water Type> elevation, prevailing weather conditions, and other pertinent facts would also be helpful.

If there is no imminent danger of dam failure (dam owner) should thoroughly inspect the following:

- The dam for cracks, settlement, or seepage.
- Abutments for possible displacement.
- Drains and/or seeps for any turbidity, cloudy or muddy water, or increased flow.
- Spillway structure to confirm continued safe operation.
- Outlet works, control house, tunnel, and gate chamber for structural integrity.
- <Insert Body of Water Type> and downstream areas for landslides.
- Other appurtenant structures.

Report all findings to the Local EMA and all other agencies that have already been contacted earlier during the emergency. Also make sure to keep close watch on the dam for the next two to four weeks as some damage may not show up immediately after the quake.

If the <Insert Body of Water Type> level reaches within <Insert Level> feet of the dam crest, or elevation <Insert elevation>, immediately implement the following procedures:

- Contact <Insert City/Town Name> Emergency Management Agency and DEM, if possible.
- Gradually increase discharge through the spillway and/or outlet works, if possible.
- Try to notify downstream residents of the increase in discharge, and increase the discharge in stages to avoid trapping downstream residents.
- Check downstream toe and abutments for any new seepage or abnormal toe train leakage. If there is any indication of muddy or silty flow, and/or the flow is increasing, implement Section 4.1.2.

- Check for increased seepage due to change in water level.
- Check for indications of movement of the dam, including cracks, slumping, sloughing, sliding, erosion, or other distress signals near the dam abutment or crest.

If failure appears likely, immediately implement Section 4.1.3 procedures; otherwise, contact DEM for instructions.

3.4.4 New Springs, Seeps, Bogs, Boils, Increased Leakage, or Sinkholes

If there is a rapid increase in the existing seep areas, and increase in toe drain flow, or if new springs, seeps, or bogs appear, then one should determine:

- Location of the affected area;
- Size of the affected area;
- Estimated discharge;
- Nature of discharge (clear, cloudy, etc.); and
- <Insert Body of Water Type> and tailwater elevations (a map of the area may be helpful to illustrate where the problem is located).

If failure appears likely, implement Section 4.1.3 procedures; otherwise, report all findings to the DEM.

3.4.5 Sudden Water Releases

In case of sudden, planned or unplanned, large water releases from the outlet works or spillway (e.g. opening or failure of gates or valves), notify downstream residents and the appropriate agencies identified in the Level 1 through 3 Flowcharts of the increased flow.

3.4.6 Abnormal Instrumentation Readings

After taking any instrument reading, compare the current reading with the previous reading of the same <Insert Body of Water Type> level. If the reading appears abnormal <Insert Responsible Person> is responsible for:

- Determining changes from the normal reading.
- <Insert Body of Water Type> and tailwater elevation.
- Weather conditions.
- Other pertinent facts.
- Contacting the dam owner, project engineer, and DEM.

3.4.7 Malicious Human Actions (Sabotage, Vandalism, or Terrorism)

If malicious activity on or around the dam has been identified, immediately make an assessment of the existing conditions and determine the potential for dam failure. If the integrity of the dam

appears to be threatened, immediately implement the Notification Flowchart for Potential or Imminent Failure.

3.4.8 Other Problems

In case of other problems occurring that might pose a threat to the dam safety, contact DEM and explain the situation as best as possible.

Section 4: Response

4.1 Response Process

STEP 1- Incident Detection, Evaluation, and Emergency Level Determination

After an unusual or emergency event is detected or reported, the local EMA Director or the <Chief Executive Officer> is responsible for classifying the event. All decisions that are made should be in accordance within the Incident Command Structure made up with the responsible agencies defined in Section 2.5.

Emergency Level 1- NON-EMERGENCY, Unusual Event, Slowly Developing

This situation is not normal but has not yet threatened the operation or structural integrity of the dam, but possibly could if it continues to develop. The condition of the dam should be closely monitored, especially during storm events, to detect any development of a potential or imminent dam failure situation.

Emergency Level 2- Potential Dam Failure Situation, Rapidly Developing

This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. The dam owner/operator should closely monitor the condition of the dam and periodically report the status of the situation through Level 2 of the Notification Flowchart.

Emergency Level 3- Urgent; Dam Failure is in Progress or Appears to be Imminent

This is an extremely urgent situation when a dam failure is occurring or obviously about to occur and cannot be prevented. Flash flooding will occur downstream of the dam. This situation is also applicable when flow through the earth spillway is causing downstream flooding of people and roads.

STEP 2- Notification and Communication

After an unusual or emergency event is detected or reported, notifications are made in accordance with the Plans Notification Flowcharts (Section 4.3).

Emergency Level 1- NON-EMERGENCY, Unusual Event, Slowly Developing

- If there is a slowly developing failure or unusual situation, where failure is not imminent, but could occur if no action is taken, dam tending personnel should:
- Contact the Rhode Island Department of Environmental Management Dam Safety Section (DSS) at (401) 222-1360 for an evaluation of the dam.
- Notify <Insert Local Agency Notification> at (401) <Insert #>, of the potential problem and keep them advised on the situation.

- Determine if there are any immediate actions that can be taken to reduce the risk of failure.
- If necessary, implement preventative actions described in this plan.

Emergency Level 2- Potential Dam Failure, Rapidly Developing

If the dam condition worsens, but is not yet imminent, the following steps should be initiated immediately:

- Implement the Notification Flowchart.
- Contact the Rhode Island Emergency Management Agency at (401) 946-9996 and notify them of possible dam failure and keep them advised on the situation.
- Advise persons downstream from the dam to evacuate due to the potential failure of the dam.
- Contact Local Emergency Management Office and begin any recommended procedures.
- Take preventative actions described in this plan.
- Make all possible efforts to reduce downstream flooding (i.e. reduce or stop inflow into the <Insert Body of Water Type>, operate outlet works).

Emergency Level 3- Urgent; Dam Failure is in Progress or Appears to be Imminent

If a failure is in progress, downstream evacuation of the floodplain must be started immediately in accordance with the following:

- Implement the Notification Flowchart.
- Notify persons immediately downstream from the dam of the failure.
- Coordinate efforts with other dam owners upstream and downstream to try to reduce flooding, if applicable.

STEP 3- Emergency Actions

In the event of possible dam failure or breach preventative actions should be initiated based on the following events. All decisions that are made should be in accordance with the Incident Command Structure made up of the responsible agencies defined in Section 2.5. All preventative actions should be in compliance with the DEM Rules and Regulations for Dam Safety.

Overtopping by Flood Waters.

- Open outlet to its maximum safe capacity.
- Place sandbags along the crest to increase freeboard and force more water through the spillway and outlet.
- Provide erosion-resistant protection to the upstream slope, crest and downstream slope by placing plastic sheets or other materials over the eroding areas.

- Divert flood waters around the <Insert Body of Water Type> basin if possible.
- Create additional spillway capacity by making a controlled breach in a low embankment or dike section where the foundation materials are erosion resistant. CAUTION: Use only as a last resort. Contact DEM before attempting any controlled breach.

Reduction in Freeboard and/or Loss of Dam Crest Width.

- Place riprap or sandbags in damaged areas to prevent further embankment erosion.
- Lower the water level to an elevation below the damaged area.
- Restore freeboard with the sandbags or earth and rockfill.
- Continue close inspection of the damaged area.

A Slide on the Upstream or Downstream Slope of the Embankment.

- Lower the water level at a rate, and to an elevation, that is considered safe given the slide condition. If the outlet is damaged or blocked, pumping, siphoning, or a controlled breach may be required.
- Restore lost freeboard, if required, by placing sandbags or filling in the top of the slide.
- Stabilize slides on the downstream slope by weighting the toe area below the slide with additional soil, rock, or gravel.

Erosional Seepage (Piping) or Leakage through the Embankment, Foundation, or Abutments.

- Plug the flow with whatever material is available (hay bales, bentonite, or plastic sheeting), if the entrance to the leak is in the <Insert Body of Water Type>.
- Lower the water level until the flow decreases to a non-erosive velocity or until it stops.
- Place an inverted filter (a protective sand and gravel filter) over the exit area to hold the materials in place.
- Continue operating at a reduced level until repairs are made.

A Failure of an Appurtenant Structure such as an Inlet/Outlet or Spillway.

- Implement temporary measures to protect the damaged structure, such as closing an outlet or providing temporary protection for a damaged spillway.
- Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair.

- Lower the water level in the <Insert Body of Water Type> to a safe elevation. If the inlet is inoperable, pumping, siphoning, or a controlled breach may be required.

A Mass Movement of the Dam on its Foundation (Spreading or Mass Sliding Failure).

- Immediately lower the water level until excessive movement stops and a safe level is reached.
- Continue operation at a reduced level until repairs are made.

Spillway Erosion Threatening <Insert Body of Water Type> Evacuation.

- Reduce the flow over the spillway by fully opening the main outlet.
- Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags.
- When inflow subsides, lower the <Insert Body of Water Type> to a safe level.
- Continue operating at a lower water level in order to minimize spillway flow.

Excessive Settlement of the Embankment.

- Lower the water level by releasing it through the outlet or by pumping or siphoning until it reaches a safe level.
- If necessary, restore freeboard, preferably by placing sandbags.
- Continue operating at a reduced level until repairs can be made.

A Loss of Abutment Support or Extensive Cracking in Concrete Dams.

- Lower the water level by releasing it through the outlet.
- Attempt to block water movement through the dam by placing plastic sheets on the upstream face.
- Continue operating at a reduced level until repairs can be completed.

Malicious Human Activity (Sabotage, Vandalism, or Terrorism)

- If malicious human activity that could endanger public safety is suspected, contact law enforcement to help evaluate the situation.
- If the principal spillway has been damaged or plugged, implement temporary measures to protect the damaged structure. Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair.

- If the embankment or spillway has been damaged or partially removed, provide temporary protection in the damaged area by placing sandbags, riprap materials, or plastic sheets weighted with sandbags.
- If the water supply has been contaminated, immediately close all inlets to the water supply system and notify appropriate authorities.

STEP 4- Termination and Follow-up

Once conditions indicate that there is no longer an emergency at the dam site and the proper authorities (e.g. Local Emergency Management, DEM, or a professional engineer) have declared the dam safe, <Insert Responsible Person> should contact the local authorities who will then terminate the emergency situation.

4.2 Responses

4.2.1 Response during Periods of Darkness

The spillway, gatehouse, and any distressed areas of the dam should be illuminated if an emergency condition develops during periods of darkness. This will allow the emergency condition to be monitored and assessed, and help facilitate a response. The <City/Town> of <Insert City/Town Name> will provide emergency power and illumination (e.g., portable light towers) during such events.

4.2.2 Response during Weekends and Holidays

The Emergency Notification Flowchart can be used for Weekends and Holidays. When practical, redundancies of personnel and alternate telephone contact numbers have been provided. This should maximize the probability of activating the Notification Flowchart and engaging all of the responsible parties.

4.2.3 Response during Periods of Adverse Weather

During periods of adverse weather, the primary access route described under Section 2.3 should be utilized. It is suggested that adequate quantities of gravel and or/or crushed stone should be stockpiled near the Dam or ready to be transported to the site to allow access roads to be maintained and for making emergency repairs.

4.2.4 Availability of Use of Alternate Systems of Communications

It is assumed that interruption of telephone service during an emergency condition could occur and that the evacuation of affected homes and businesses should be performed by the police or fire personnel informing residents by going street to street.

4.2.5 Dam Safety during Response Phase

During the response phase in mitigating dam failure, specific preventative actions may help to prevent or delay dam failure. Because the feasibility and effectiveness of preventative actions will depend on the specific situation, it is advised that the <City/Town> consult a qualified

engineer before taking any preventative actions. Departmental Standard Operating Procedures for first responders should be followed during a Dam Incident Response. During a Dam Incident Response, a Safety Officer should be assigned within the Incident Command Structure to oversee incident safety throughout the duration of the Dam Incident Response.

4.2.6 Emergency Supplies and Information

In an emergency situation, equipment and supplies might be needed on short notice, such as sandbags, riprap, fill materials, equipment, and laborers. The listing of equipment and supplies are located in Appendix K.

4.2.7 Staging Area

The <Insert Staging Area Name> parking lot may be used as an emergency response staging area if deemed necessary by responding authorities.

4.3 Notification Flowcharts

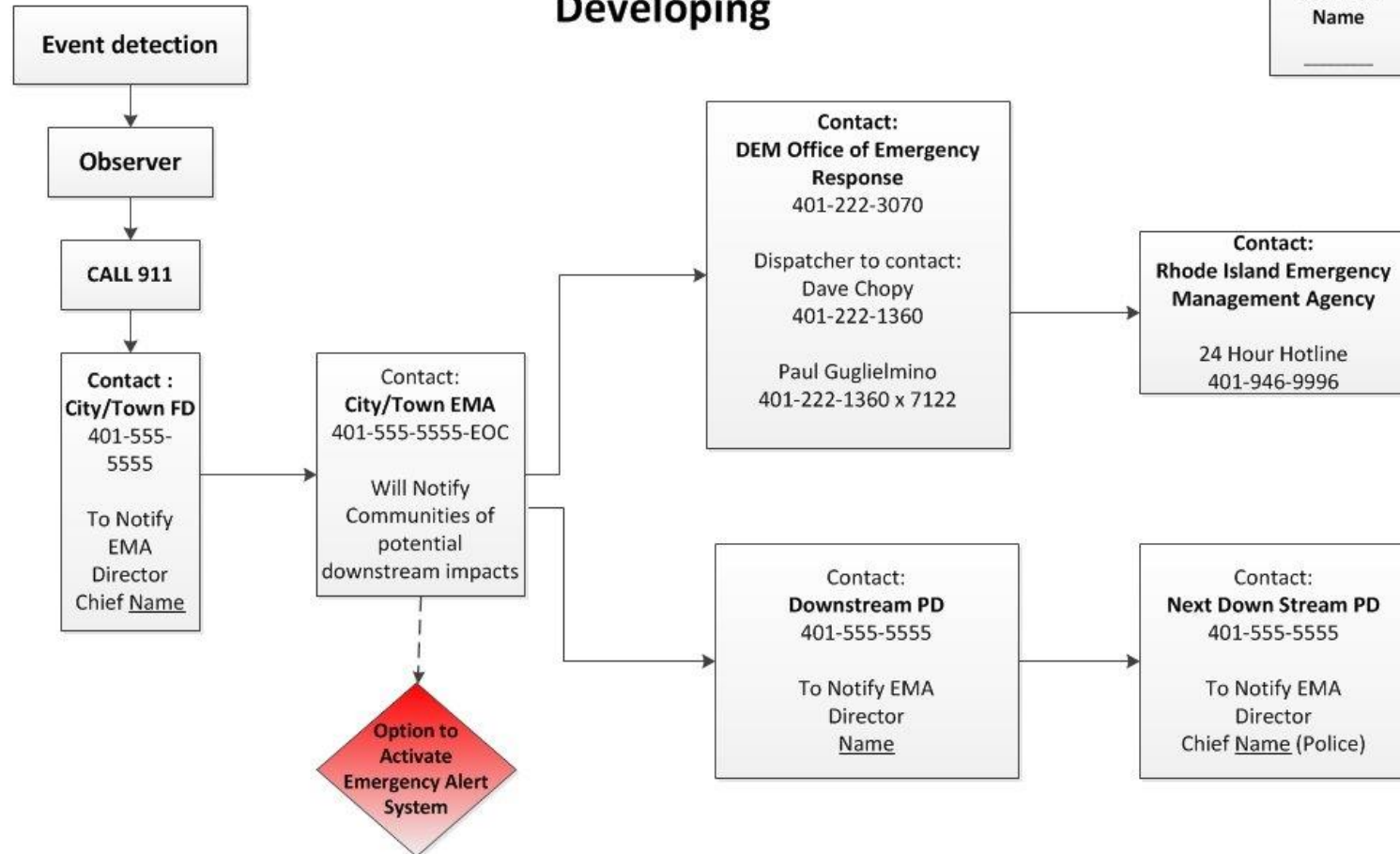
**LEVEL
1**

Level 1 Notification Flowchart

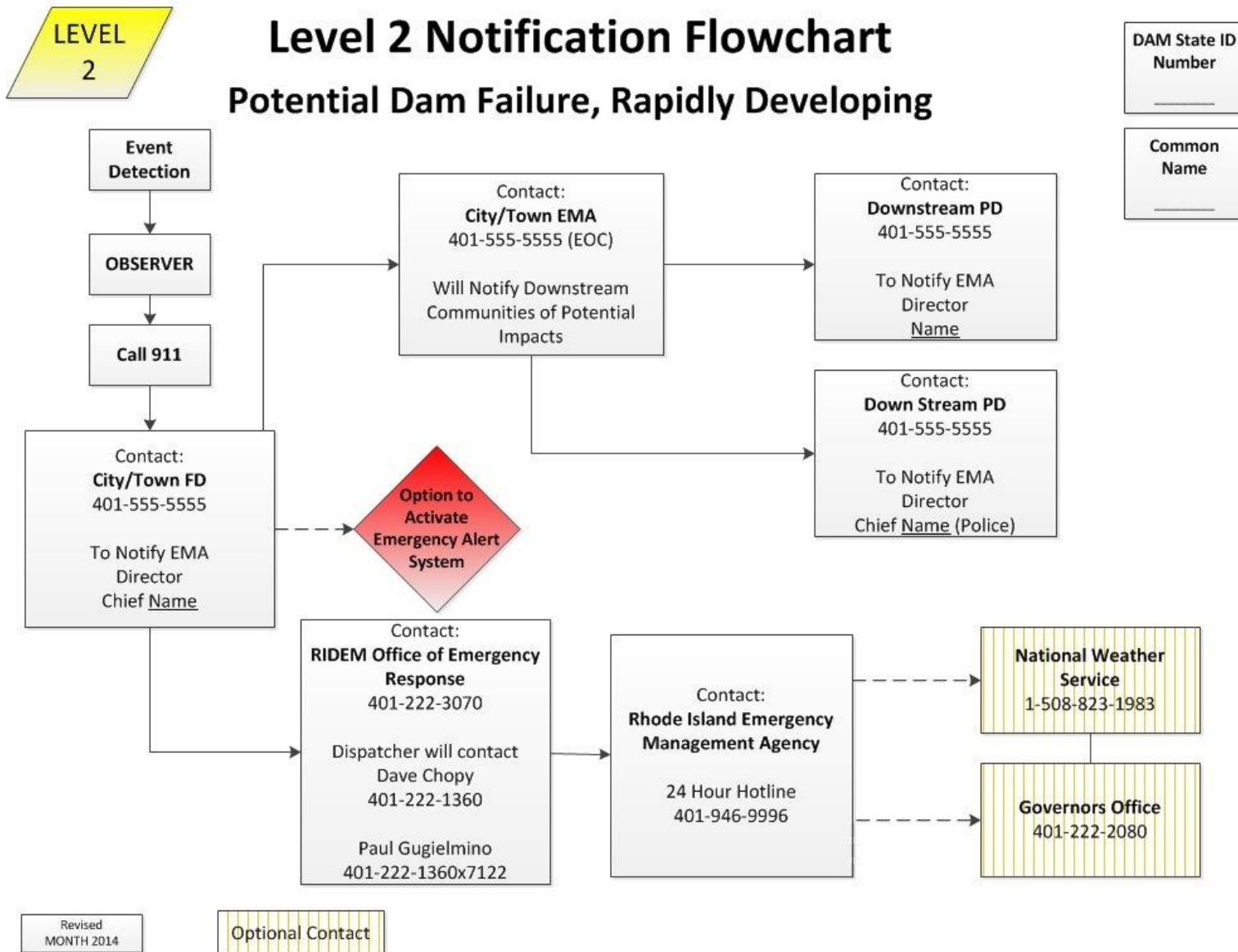
NON-EMERGENCY, Unusual Event, Slowly Developing

DAM State ID Number

Common Name



Revised
MONTH 2014



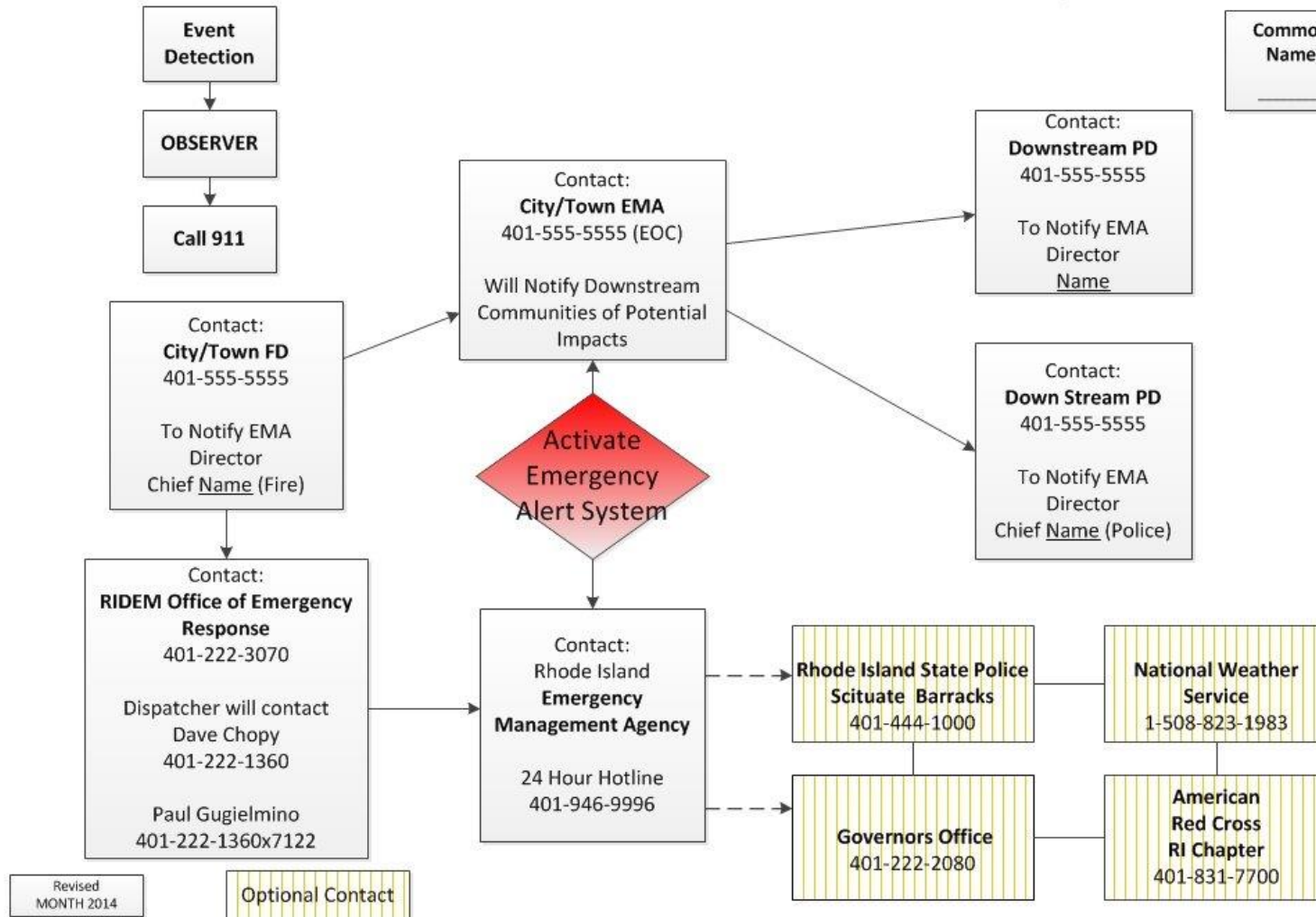
**LEVEL
3**

Level 3 Notification Flowchart

URGENT- Dam Failure Imminent or in Progress

DAM State ID Number

Common Name



Section 5: Plan Maintenance

5.1 EAP Annual Review and Revisions

<Insert EAP Coordinator> will review and, if needed, update the EAP at least once each year utilizing the Annual Review Checklist (Appendix M). <Insert EAP Coordinator> is responsible for updating the EAP document. The EAP document held by <Insert EAP Coordinator> is the master document. The EAP annual review will include the following:

- Calling all contacts within the flowcharts in the EAP to verify that phone numbers and persons in the specified positions are current. The EAP will be revised if any of the contacts have changed.
- Calling the locally available resources to verify that the numbers, addresses, and services are current.
- Verifying and updating the location of structures in the impact area.
- Verifying and updating contact information for persons in the impact area.
- Call a revision meeting and make changes as necessary.

5.2 EAP Periodic Test

<Insert EAP Coordinator> will host and facilitate a periodic test of the EAP at least once every 5 years.

The periodic test will consist of a meeting, including a tabletop exercise. Attendance should include all parties listed in Section 2.5 Responsibilities. At the discretion of <Insert EAP Coordinator>, other organizations that may be involved with an unusual or emergency event at the dam are encouraged to participate. Before the tabletop exercise begins, meeting participants will visit the dam during the periodic test to familiarize themselves with the dam site.

The tabletop exercise will begin with the facilitator presenting a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise. Once the scenario has been presented, the participants will discuss the responses and actions that they would take to address and resolve the scenario throughout the exercise. <Insert EAP Coordinator> should complete an event log as they would during an actual event.

After the tabletop exercise, the EAP will be reviewed and discussed. Mutual aid agreements and other emergency procedures can be discussed. <Insert EAP Coordinator> will prepare a written summary of the periodic test and revise the EAP, as necessary.

Section 6: Acronyms and Glossary

6.1 Acronyms

AAR	After Action Review
DEM	RI Department of Environmental Management
EAP	Emergency Action Plan
EMA	Emergency Management Agency
EMD	Emergency Management Director
EOC	Emergency Operations Center
ERT	Emergency Response Team
RIGL	Rhode Island General Law
RIEMA	RI Emergency Management Agency

6.2 Glossary

ABUTMENT - That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.

APPURTENANT WORKS - Any ancillary feature of a dam including such structures as dikes, training walls, spillways, either in the dam or separate there from, low level outlet works, and water conduits such as tunnels, channels, pipelines or penstocks, either through the dam or its abutments.

BENTONITE - An absorptive and colloidal clay used especially as a sealing agent or suspending agent.

BOIL - A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.

BOG - A wet spongy ground. A poorly drained usually acid area rich in accumulated plant material, frequently surrounding a body of open water, and having a characteristic flora.

BREACH - An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.

CONDUIT - A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.

CONSEQUENCES - Potential loss of life or property damage downstream of a dam caused by floodwaters released at the dam or by waters released by partial or complete failure of dam. Includes effects of landslides upstream of the dam on property located around the reservoir.

CONTROL SECTION - A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.

CROSS SECTION - A slice through the dam showing elevation vertically and direction of natural water flow horizontally from left to right. Also, a slice through a spillway showing elevation vertically and left and right sides of the spillway looking downstream.

DAM - Any barrier made by humans, including appurtenant works that impounds or diverts water.

DAM FAILURE - The uncontrolled release of a dam's impounded water.

DAM OPERATOR - The person or persons, including any individual, firm, partnership, association, syndicate, company, trust, corporation, municipality, agency, political or administrative subdivision of the state or any legal entity of any kind having authority to operate or maintain a dam.

DRAIN, TOE OR FOUNDATION OR BLANKET - A water collection system of sand and gravel and typically pipes along the downstream portion of the dam to collect seepage and convey it to a safe outlet.

DRAINAGE AREA (watershed) - The geographic area on which rainfall flows into the reservoir.

DRAWDOWN - The lowering or releasing of the water level in a reservoir over time or the volume lowered or released over a particular period of time.

EMBANKMENT – The fill material, including but not limited to rock or earth, placed to provide permanent barrier that impounds water.

EMERGENCY - A condition that develops unexpectedly, endangers the structural integrity of the dam and of downstream human life and property, and requires immediate action.

EMERGENCY ACTION PLAN (EAP) - A formal document identifying potential emergency conditions that may occur at the dam and specifying preplanned actions to minimize potential failure of the dam or minimize failure consequences including loss of life, property damage, and environmental impacts.

EAP EXERCISE - Activity designed to promote prevention, preparedness, and response to incidents and emergencies, and may also be extended to include recovery operations. The exercise also demonstrates the EAP's effectiveness in an actual situation and demonstrates the readiness levels of key personnel. Periodic exercises result in an improved EAP because lessons learned are incorporated into the updated EAP document. Exercises consist of testing and performing the duties, tasks, or operations identified and defined within the EAP through a simulated event.

EVACUATION MAP - A map showing the geographic area downstream of a dam that should be evacuated if it is threatened to be flooded by a breach of the dam or other large discharge.

FILTER - Those layers of sand and gravel in a drain that allow seepage through an embankment to discharge into the drain without eroding the embankment soil.

FLOOD ROUTING - Process of determining progressively, over time, the amplitude of a flood wave as it moves past a dam or downstream to successive points along a river or stream.

FREEBOARD - Vertical distance between a stated water level in the reservoir and the top of dam.

GATE, SLIDE OR SLUICE, OR REGULATING - An operable, watertight valve to manage the discharge of water from the dam.

HAZARD CLASSIFICATION - A rating for a dam that relates to the probable consequences of failure or misoperation of the dam, which is a determination made by the Director of DEM based on an assessment of loss of human life, damages to properties or structures located downstream of the reservoir, or loss of use as a drinking water supply. This rating has no relationship to the current condition of the dam. A higher hazard dam does not imply that it is more likely to fail or be misoperation than a lower hazard dam.

HAZARD POTENTIAL - Situation that creates the potential for adverse consequences, such as loss of life, property damage, or other adverse impact. Impacts may be for a defined area downstream of a dam from floodwaters released through spillways and outlet works of the dam or waters released by partial or complete failure of the dam. They may also be for an area upstream of the dam from the effects of backwater flooding or the effects of landslides around the reservoir perimeter.

HEADWATER - Water immediately upstream from a dam. The water surface elevation varies due to fluctuations in inflow and the amount of water passed through the dam.

HEIGHT – The vertical distance from the elevation of the uppermost surface of a dam to the lowest point of natural ground, including any stream channel, along the downstream toe of the dam.

INCIDENT - An incident in terms of dam operation includes an impending or actual sudden release of water caused by an accident to, or failure of, a dam or other water retaining structure, or the result of an impending flood condition when the dam is not in danger of failure, or any condition that may affect the safe operation of the dam. The release of water may or may not endanger human life, downstream property and structures, or facility operations.

INSTRUMENTATION- An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and appurtenant structures.

INUNDATION MAP - Map delineating areas that would be flooded as a result of a dam failure.

INUNDATION ZONE - Area downstream of the dam that would be inundated by the released water. This zone is typically demarcated by a boundary reflecting the vertical elevation of the peak flow of water for both a flood failure and “sunny day” failure situation.

LIFELINE FACILITIES - Essential facilities, the loss of which can result in indirect threats to life. Lifeline facilities may include hospitals, transportation links (highway, bridges, airports, rail lines, waterways, ports and harbor facilities and emergency evacuation routes), and utility systems (electric power plants, gas and liquid fuel pipelines, telecommunications system, water supply and waste water treatment facilities).

NOTIFICATION - To immediately inform appropriate individuals, organizations, or agencies about a potential emergency situation so they can initiate appropriate actions.

OUTLET WORKS - A dam appurtenance that provides release of water (generally controlled) from a reservoir.

OWNER - The person or persons, including any individual, firm, partnership, association, syndicate, company, trust, corporation, municipality, agency, political or administrative subdivision of the state or any legal entity of any kind holding legal title to a dam.

PIPING - The progressive development of internal erosion by seepage through the dam. Piping appears downstream as a hole or a discharging flow of water that includes soil particles from the dam embankment or foundations.

PROBABLE MAXIMUM PRECIPITATION (PMP) OR FLOOD (PMF) - The theoretically greatest precipitation or resulting flood that is meteorologically feasible for a given duration over a specific drainage area at a particular geographical location.

QUALIFIED ENGINEER – A professional engineer fully registered in the State of Rhode Island, who is experienced with dam inspection, design, construction and repair.

RESERVOIR - The body of water that is impounded or diverted by a dam.

RIPRAP - A layer of large uncoursed stone, precast blocks, bags of cement, or other suitable material, generally place on the slope of an embankment or along a watercourse as protection against wave action, erosion, or scour. Riprap is usually placed by dumping or other mechanical methods, and in some cases is hand placed. It consists of pieces of relatively large size, as distinguished from a gravel blanket.

RISK - A measure of the likelihood and severity of an adverse consequence.

SEEPAGE - The natural movement of water through the embankment, foundation, or abutments of the dam.

SLIDE - The movement of a mass of earth down a slope on the embankment or abutment of the dam.

SPILLWAY (primary, auxiliary or emergency) - A structure, a low area in natural grade or any part of the dam which has been designed or relied upon to allow normal flow or major flood flow to pass over or through while being discharged from a reservoir.

SPILLWAY CAPACITY - The maximum discharge the spillway can safely convey with the reservoir at the maximum design elevation.

SPILLWAY CREST - The lowest level at which reservoir water can flow into the spillway.

SLOUGHING - To be cast off or shed; come off or separate.

SLUMPING - To fall or sink heavily or settle, as into mud or slush.

TAILWATER - The water immediately downstream from a dam. The water surface elevation varies due to fluctuations in the outflow from the structures of a dam and due to downstream influences of other dams or structures of a dam and due to downstream influences of other dams or structures. Tailwater monitoring is an important consideration because a failure of a dam will cause a rapid rise in the level of the tailwater.

TOE OF DAM - The junction of the upstream or downstream face of an embankment with the ground surface.

TOP OF DAM (crest of dam) - The elevation of the uppermost surface of an embankment.

Section 7: References

- Federal Guidelines for Dam Safety, Emergency Action Planning for Dam Owners, Washington: FEMA, July 2013
- Federal Guidelines for Dam Safety, Glossary of Terms: FEMA, April, 2004
- Dam Safety Program, Annual Report to the Governor, RI DEM, 2006
- Rules and Regulations for Dam Safety: Rhode Island DEM, December, 2007
- Smithfield, RI Dam Failure Plan
- Coal County, OK Emergency Action Plan Template

Appendices

Appendix A: Location and Inundation Map

<Insert additional inundation mapping including the number of structures in the evacuation area>

Appendix B: Evacuation Map

<Insert Map>

Appendix C: Property Owner List

<Dam name> Dam	
Dam # 	
Property Owners to be Notified:	
Parcel ID#	Mailing Address

Appendix D: Upstream/Downstream Dam Owners

Upstream Dam Owners

Upstream Dam	Owner	Owner Contact Information

Downstream Dam Owners

Downstream Dam	Owner	Owner Contact Information

Appendix E: Plan View of Dam

<Insert Map>

Appendix F: Profile of Principal Spillway

<Insert Map>

Appendix G: Sample Guidance for Determining Emergency Level

Event	Situation	Emergency Level
Earth Spillway Flow	Reservoir water surface elevation at auxiliary spillway crest or spillway is flowing with no active erosion	Non-failure
	Spillway flowing with active gully erosion	Potential failure
	Spillway flow that could result in flood of people downstream if the reservoir level continues to rise	Potential failure
	Spillway flowing with an advancing head cut that is threatening the control section	Imminent failure
Embankment Overtopping	Reservoir level is XX feet/inches below the top of the dam	Potential failure
	Water from the reservoir is flowing over the top of the dam	Imminent failure
Seepage	New seepage areas in or near dam	Non-failure
	New seepage areas with cloudy discharge or increasing flow rate	Potential failure
	Seepage with discharge greater than XX gallons per minute	Imminent failure
Sinkholes	Observation of new sinkhole in reservoir area or on embankment	Potential failure
	Rapidly enlarging sinkhole	Imminent failure
Embankment Cracking	New cracks in the embankment greater than XX inches wide without seepage	Non-failure
	Cracks in the embankment with seepage	Potential failure
Embankment Movement	Visual movement/slippage of the embankment slope	Non-failure
	Sudden or rapidly proceeding slides of the embankment slopes	Imminent failure
Instruments	Instrumentation readings beyond predetermined values	Non-failure
Earthquake	Measurable earthquake felt or reported on or within XX miles of the dam	Non-failure
	Earthquake resulted in visible damage to the dam or appurtenances	Potential failure
	Earthquake resulted in uncontrolled release of water from the dam	Imminent failure
Security Threat	Verified bomb threat that, if carried out, could result in damage to the dam	Potential failure
	Detonated bomb that has resulted in damage to the dam or appurtenances	Imminent failure
Sabotage/Vandalism	Damage that could adversely impact the functioning of the dam	Non-failure
	Damage that has resulted in seepage flow	Potential failure
	Damage that has resulted in uncontrolled water release	Imminent failure

Appendix H: Contact Checklist

<Insert Dam Name>, Dam No. <Insert Dam #>

<Insert City/Town Name>, Rhode Island Date _____

The following contacts should be made immediately after the emergency level is determined (see pages for guidance to determine the appropriate emergency level for a specific situation). The person making the contacts should initial and record the time of the call and who was notified for each contact made (Contact is defined as speaking to a live operator for each identified contact - NOT an answering service). Follow the Notification Flowcharts for critical contact information in Section 4.3.

Emergency Level 1	Person Contacted	Time Contacted	Contacted By
Local Fire Dept.			
Local Police Dept.			
Local Emergency Management			

Emergency Level 2	Person Contacted	Time Contacted	Contacted By
Local Fire Dept.			
Local Police Dept.			
Local Emergency Management			
RIDEM OER			
RIEMA			

Emergency Level 3	Person Contacted	Time Contacted	Contacted By
Local Fire Dept.			
Local Police Dept.			
Local Emergency Management			
RIDEM OER			
RIEMA			
Downstream Police Depts.			

Appendix I: Unusual or Emergency Event Log

<Insert Dam Name>, Dam No. **<Insert Dam #>**

<Insert City/Town Name>, Rhode Island Date _____

When and how was the event detected? _____

Weather Conditions: _____

General description of the emergency situation: _____

Emergency level determination: _____ Made By: _____

Actions and Event Progression

Date	Time	Action/event progression	Taken by

Report prepared by: _____ Date: _____

Appendix J: Dam Emergency Situation Report

<Insert Dam Name>, Dam No. **<Insert Dam #>**

<Insert City/Town Name>, Rhode Island

National Inventory of Dams (NID) No.: **<Insert NID #>**

Dam location: **<Insert location>**

Date: _____ Time: _____

Weather Conditions: _____

General description of the emergency situation: _____

Area(s) of dam affected: _____

Extent of dam damage: _____

Possible cause(s): _____

Effect on dam's operation: _____

<Insert City/Town Name> Dam Emergency Action Plan

Initial reservoir elevation: _____ Time: _____

Maximum reservoir elevation: _____ Time: _____

Final reservoir elevation: _____ Time: _____

Description of area flooded downstream/damages/injuries/loss of life: _____

Other data and comments: _____

Observer's name and telephone number: _____

Report prepared by: _____ Date: _____

Appendix K: Equipment and Supplies

In an emergency situation, equipment and supplies might be needed on short notice, such as sandbags, riprap, fill materials, equipment, and laborers. Below is a partial list of equipment owned by the <City/Town> and available for use. Also listed are supplies that will be required at the site.

Item	Contact	Location
Earthmoving Equipment		
Sand & Gravel		
Sandbags		
Pumps		
Pipe		
Laborers		
Vehicles		
Other		

Appendix L: Emergency Notification Information and Messages

Level	Information to External Organizations
High Flow	<ol style="list-style-type: none"> 1. Explain how much flow the dam is currently passing, and the timing and amount of projected flows. 2. If known, describe at what flows downstream areas get flooded. 3. State that the dam is <u>NOT</u> in danger of failing. 4. Indicate when you will give the next status report. 5. Indicate who can be called for any follow-up questions.
Non-failure	<ol style="list-style-type: none"> 1. Explain what is happening at the dam. 2. Describe if the event could pose a hazard to downstream areas (e.g., gate failure). 3. State that the dam is <u>NOT</u> in danger of failing. 4. Indicate when you will give the next status report. 5. Indicate who can be called for any follow-up questions.
Potential Failure	<ol style="list-style-type: none"> 1. Explain what is happening at the dam. 2. State you are determining this to be a <u>POTENTIAL FAILURE</u>. 3. Describe what actions are being taken to prevent the dam failure. 4. Provide an estimate of how long before the dam would be at risk of failing (e.g., during floods that could overtop the dam). 5. Refer to the inundation maps and explain what downstream areas are at risk from a dam failure. 6. Indicate when you will give the next status report. 7. Indicate who can be called for any follow-up questions.
Imminent Failure	<ol style="list-style-type: none"> 1. Explain that the dam is failing, is about to fail, or has failed. 2. State you are determining this to be an <u>IMMINENT FAILURE</u>. 3. Refer to the inundation maps and explain what downstream areas are at risk from a dam failure and estimate when flows should reach critical downstream areas. 4. Indicate when you will give the next status report. 5. Indicate who can be called for any follow-up questions.

Examples of Emergency Messages/Notifications

Potential Failure

This is _____ [your name and position]. We have an emergency condition at <Insert Dam Name>, Dam No. <>, <Dam Location>. We have activated the Emergency Action Plan for this dam and are determining this to be a **Potential Failure** condition. We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure. Please prepare to evacuate the area along low-lying portions of <Insert River>. The dam could potentially fail as early as <Impact Time>. Reference the evacuation map in your copy of the Emergency Action Plan. We will advise you when the situation is resolved or if the situation gets worse. I can be contacted at the following number: _____. If you cannot reach me, please call the following alternative number: _____.

Imminent Failure

This is an emergency. This is _____ [your name and position]. <Insert Dam Name>, Dam No. <>, <Insert Dam Location>, is failing. The downstream area must be evacuated immediately. Repeat, <Insert Dam Name>, Dam No. <>, is failing; evacuate the area along low-lying portions of <Insert River>. We have activated the Emergency Action Plan for this dam and are determining this to be an **Imminent Failure** condition. Reference the evacuation map in your copy of the Emergency Action Plan. I can be contacted at the following number _____. If you cannot reach me, please call the following alternative number: _____. The next status report will be provided in approximately 30 minutes.

The following pre-scripted message may be used as a guide for emergency management authorities to communicate the status of the emergency with the public:

- Attention: This is an emergency message from the <CEO>. Listen carefully. Your life may depend on immediate action.
- <Insert Dam Name>, Dam No. <>, <Dam Location> is failing. Repeat. <Insert Dam Name>, Dam No. <>, <Dam Location> is failing.
- If you are in or near this area, proceed immediately to high ground away from the valley. Do not travel on <Impacted roads> or return to your home to recover your possessions. You cannot outrun or drive away from the flood wave. Proceed immediately to high ground.
- Repeat message.

Appendix M: Annual Review Checklist

Dam Emergency Action Plan (EAP) Annual Review Checklist - 2016				
Dam Number:		Dam Name:		
Dam Address:		Municipality:		
	Yes	No	Name/Verified By	Date
A. Dam owner contact information has been reviewed and/or updated?	<input type="checkbox"/>	<input type="checkbox"/>		
B. Call tree information has been reviewed and/or updated?	<input type="checkbox"/>	<input type="checkbox"/>		
C. Date of last RIDEM inspection? (Contact RIDEM Office of Dam Safety)	<input type="checkbox"/>	<input type="checkbox"/>		
D. Have any new downstream impacts (residential or commercial) been identified? If yes, see attached documents.	<input type="checkbox"/>	<input type="checkbox"/>		
E. Record of Change form completed?	<input type="checkbox"/>	<input type="checkbox"/>		
F. Have updates and a copy of the current plan been sent to all stakeholders?	<input type="checkbox"/>	<input type="checkbox"/>		
G. Location of keys and contact information is available (if site has locked gates)?	<input type="checkbox"/>	<input type="checkbox"/>		

Reviewed and Approved by:

Dam Owner/Operator

Date

Local Emergency Management Director

Date

Rhode Island Department of Environmental Management*

Date

Rhode Island Emergency Management Agency

Date

*Reviewed for consistency of the inundation map with the map that was completed for RIDEM and for the water level at which an emergency condition is declared.

Appendix N: Record of Changes

Dam Emergency Action Plan (EAP) Record of Change - 2016		
Dam Number:	Dam Name:	
Dam Address:	Municipality:	
Page ___ of ___		
Topic of Change:	Page Number(s):	Responsible Party for Change:

Appendix O: Exercising the Emergency Action Plan

Dam owners should exercise the Emergency Action Plan (EAP) in coordination with State, local and tribal emergency management authorities. Exercises promote prevention, preparedness, and response to incidents and emergencies and may also be extended to include recovery operations. Exercising also demonstrates 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 the updated EAP document.

Dam owners should include State, local and tribal emergency authorities in exercise activities. This includes, but is not limited to, entities listed on the Notification Flowchart. To facilitate the participation of emergency management authorities, dam safety exercises also can be coordinated with, or integrated into, other event exercise scenarios for earthquakes, floods, hurricanes, and other hazards.

Types of Exercises There are seven (7) types of exercises defined in the Homeland Security Exercise and Evaluation Program (HSEEP). Although it is not required that every exercise program include all seven (7) exercises, the program should be built from the ground up, beginning with simple exercises and advancing to more complex exercises. Sufficient time should be provided between each exercise to learn and improve from the experiences of the previous exercise. More information on the HSEEP is available at hseep.dhs.gov.

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 – An informal discussion designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure). Seminars should include internal discussions as well as coordination with emergency management authorities and other organizations with a role in 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 – Involves key personnel discussing simulated scenarios in an informal setting. Tabletop exercises can be used to assess plans, policies, and procedures.
- Games – 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.

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

- Drill – A coordinated, supervised activity usually employed to test a single operation or function within a single entity, such as testing sirens and warning systems, calling suppliers, checking material on hand, and conducting a call-down drill of those listed on the Notification Flowchart.
- Functional Exercise – A functional exercise examines and/or validates the coordination, command, and control between various multi-agency coordination centers, such as Emergency Operation Centers (EOCs) and Joint Field Offices. 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 multi-agency, multi-jurisdictional, multi-discipline exercise involving functional (e.g., Joint Field Office, EOC, “boots on the ground” response to a simulated event, such as activation of the EOC and role-playing to simulate an actual dam failure).

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 emergencies at a dam. 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 dam owner and emergency management authorities.
- Improve coordination efforts between the dam owner and emergency management authorities. 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 dam owner and emergency management authorities.

- Improve individual performance of the people who respond to the dam failure or other emergency conditions.
- 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 recommended frequencies for these exercise types are noted in Section 5 of this Plan. Dam owners, in consultation with emergency management authorities, should determine actual frequencies appropriate for their dam.

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 a dam owner 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.

Evaluation of Exercises

Emergency exercises and equipment tests should be evaluated orally and in writing. Immediately after an exercise or actual emergency, an after-action review (AAR) should be conducted with all involved parties to identify strengths and deficiencies in the EAP. The after-action review should focus on procedures and other information in the EAP, such as outdated telephone numbers on the Notification Flowchart, inundation maps with inaccurate information, and problems with procedures, priorities, assigned responsibilities, materials, equipment, and staff levels. The AAR also should address the procedures that worked well and the procedures that did not work so well. Responses from all participants involved in the exercise should be considered. The AAR should discuss and evaluate the events before, during, and after the exercise or actual emergency; actions taken by each participant; the time required to become aware of an emergency and to implement the EAP; and improvements for future emergencies.

After the AAR has been completed, the EAP should be revised, as appropriate, and the revisions disseminated to all involved parties.

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