

Appendix A: Emergency Action Plan Template

Emergency action plans (EAPs) are discussed in Section 4 of the handbook. EAP content is also discussed in more detail in *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners* (FEMA 64), which can be obtained from FEMA in print or on CD, or is available online at <http://www.fema.gov/plan/prevent/damfailure/fema64.shtm>.

This appendix presents an EAP template, similar to an example EAP developed by the Natural Resource Conservation Service of the U.S. Department of Agriculture, dated September 25, 2006. This template might be suitable for use at some dams. The Federal Energy Regulatory Commission also has developed a similar template for use by its licensees. The dam owner must ensure that the EAP conforms to any applicable State or Federal requirements.

Samples of EAPs will be posted on the HSIN Dams Portal as they become available.

NOT FOR PUBLIC DISTRIBUTION

Emergency Action Plan

_____ Watershed

Any county, Any town, Any State

Structure: _____

National Inventory of Dams ID#: _____

OWNER: _____

ISSUE DATE: _____

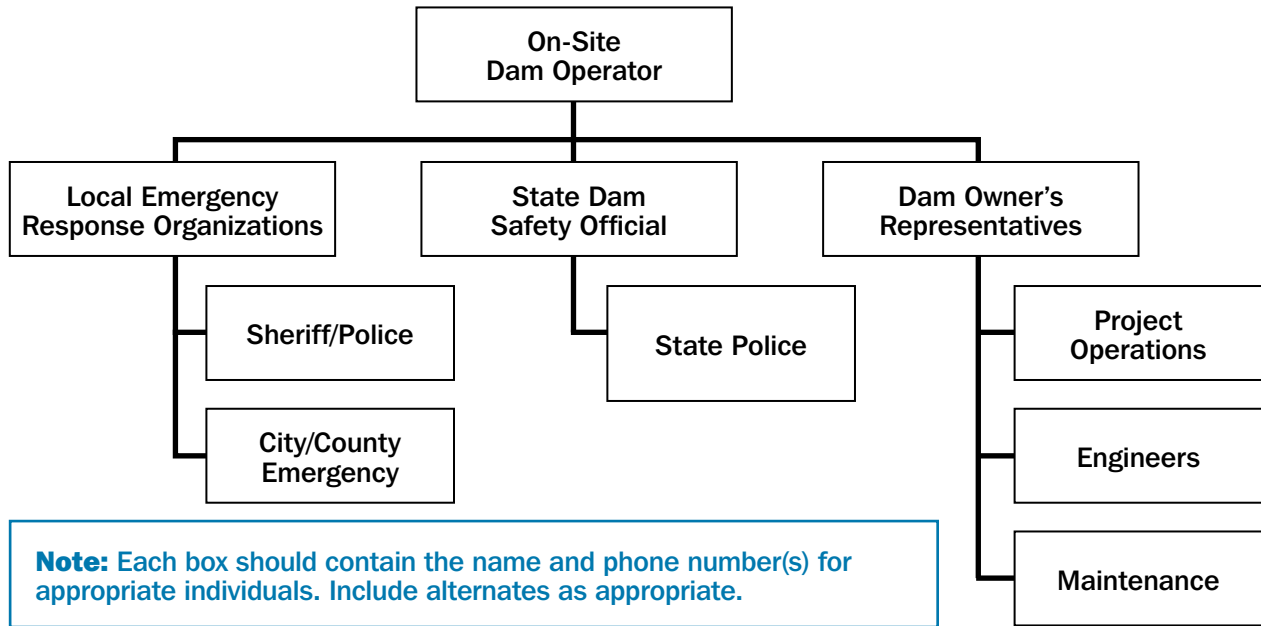
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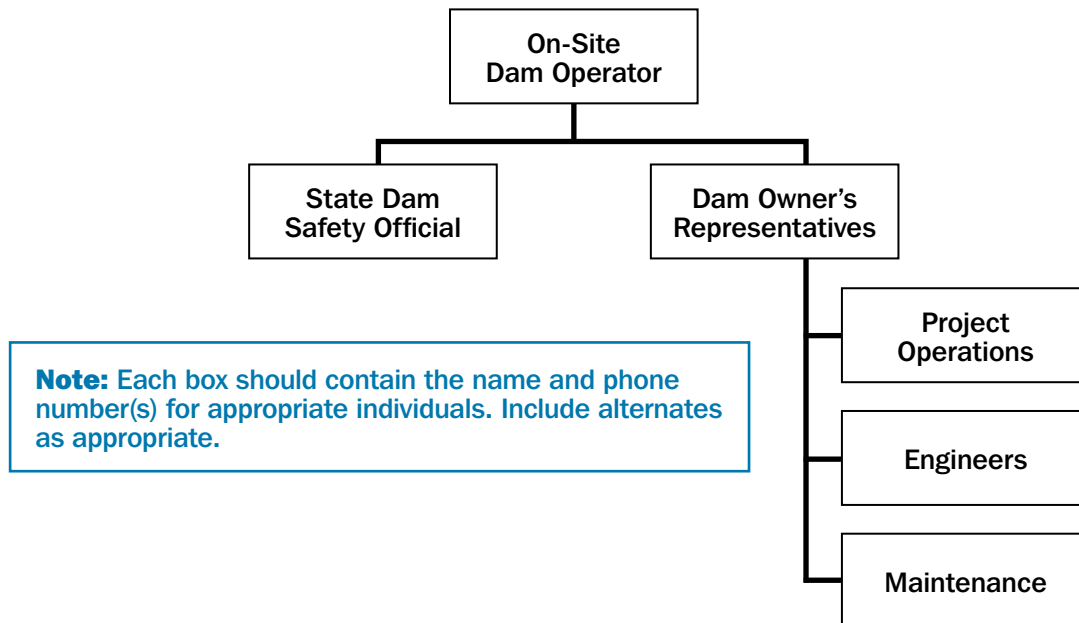
I. NOTIFICATION FLOWCHARTS

Warning: Notification charts must be customized per local circumstances

Notification Flowchart for Potential or Imminent Failure



Notification Flowchart for Non-Failure Concern



II. STATEMENT OF PURPOSE

The purpose of this plan is to prescribe procedures to be followed in the event of an emergency associated with the _____ Dam that is caused by an unusually large flood or earthquake; a structural malfunction of the gates on the principal spillway; malicious human activity such as sabotage, vandalism or terrorism; or failure of the dam.

This Emergency Action Plan (EAP) defines responsibilities and procedures to:

- Identify unusual and unlikely conditions that may endanger the dam.
- Initiate remedial actions to prevent a dam failure or minimize the downstream impacts of a dam failure.
- Initiate emergency actions to warn downstream residents of impending or actual failure of the dam.

III. PROJECT DESCRIPTION

Official Dam Name: _____ NID ID#: _____

Structure:

Stream:

Location: Lat. _____ Long. _____ Any county, Any State

Directions to dam:

Dam Owner/Operator:

Type of Dam:

Year Constructed:

Dam Height:

Dam Length:

Drainage Area:

Hazard Classification:

Principal Spillway Type:

Principal Spillway Capacity:

Auxiliary Spillway Type:

Max Capacity:

Maximum Storage Volume:

Elevations (Mean Sea Level):

Principal Spillway Crest:

Auxiliary Spillway Crest:

Top of Dam:

Impact Basin:

Vertical Datum Used:

Description of Impacted Property: (list residences, businesses, infrastructure, etc.)

[Add vicinity map that shows the location of the dam with respect to nearest town]

[Add plan view of dam from construction drawings]

[Add aerial photographs]

IV. EMERGENCY DETECTION, EVALUATION AND CLASSIFICATION

Daily surveillance and instrumentation readings at the site will be the normal methods of detecting potential emergency situations. For conditions beyond the normal range of operations, contact the Dam Safety Office (DSO) for assistance with evaluation of the conditions.

Each event or situation will be placed in one of the following classifications:

- **Non-failure Concern**—This classification indicates a situation is developing; however, the dam is not in danger of failing, but flooding is expected downstream from the dam. Downstream residents need to be notified if flooding increases and life and property are threatened.
- **Potential Failure**—This classification indicates that a situation is developing that could cause the dam to fail. Residents in affected areas shall be alerted that an unsafe situation is developing. A reasonable amount of time is available for analysis before deciding on evacuation of residents.
- **Imminent Failure**—This classification indicates dam failure is occurring that may result in flooding that will threaten life and property. When the sponsor/land user determines that there is no longer time available to implement corrective measures to prevent failure, an order for evacuation of residents in potential inundation areas shall be issued.

Listed below are some of the events that can lead to the failure of the dam and a brief outline of steps to take to address the situation. See the “Preparedness” section for a summary of actions to be considered for various situations.

FLOODING:

The _____ Dam is designed to safely convey the expected runoff from a _____ (____ inches in ____ hours). However, if during a major flood event, the reservoir level rises to within 1 foot of the top of dam (elevation _____), conduct periodic (at least daily) inspections of the dam to check for and record the following:

- reservoir elevation;
- rate the reservoir is rising;
- weather conditions—past, present, predicted;
- discharge conditions of creeks and rivers downstream;
- downstream toe and abutments for any new seepage or abnormal (muddy flow) toe drain leakage;
- increased seepage rate as reservoir level rises;
- cracks, slumping, sloughing, sliding, or other distress signals near the dam abutment or crest.

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

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 reservoir and tail water elevations. If the integrity of the dam appears to be threatened, immediately implement the **Notification Flowchart for Potential or Imminent Failure**.

NEW SPRINGS, SEEPS, BOGS, SANDBOILS, INCREASED LEAKAGE, OR SINKHOLES:

If there is a rapid increase in previously existing seep areas, an increase in toe drain flow, or if new springs, seeps, or bogs appear, determine the location, size of the affected area, estimated discharge, nature of the discharge (clear or cloudy), and reservoir and tail water elevations (a map of the area may be helpful to illustrate where the problem is located). If the integrity of the dam appears to be threatened, immediately implement the **Notification Flowchart for Potential or Imminent Failure**.

ABNORMAL INSTRUMENTATION READINGS:

After taking instrumentation readings, compare the current readings to previous readings at the same reservoir level. If the readings appear abnormal, determine reservoir and tail water elevations, and contact the State Dam Safety Officer.

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**.

DECLARING AN EMERGENCY AND IMMEDIATE ACTIONS

Emergency Level 1: Non-emergency, Unusual Event; Slowly Developing:

Contact the State Dam Safety Officer. Describe the situation and discuss the next steps that should be taken.

Emergency Level 2: Potential Dam Failure Situation; Rapidly Developing:

The following message may be used to help describe the emergency situation to local law enforcement and emergency management personnel:

“This is ___your name and position___. We have an emergency condition at ___dam name and location___. We have activated the Emergency Action Plan and are currently under emergency level 2. We are responding to a rapidly developing situation that could result in dam failure. Please prepare to evacuate low-lying areas along ___name of stream___, per the evacuation map in your copy of the Emergency Action Plan. I can be contacted at ___phone number___. If you cannot reach me, please call ___name of alternate contact and phone number___.”

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

Call the local law enforcement dispatch center immediately; say “This is an emergency.” They will call other authorities and the media and begin the evacuation. The following message may be used to help describe the emergency situation to law enforcement and emergency management personnel:

“This is an emergency. This is ___your name and position___. ___Dam name and location___ is failing! The downstream area must be evacuated immediately. Repeat: ___Dam name and location___ is failing! The downstream area must be evacuated immediately. Evacuate low-lying areas along ___name of stream___, per the evacuation map in your copy of the Emergency Action Plan. We have activated the Emergency Action Plan and are currently under emergency level 3. I can be contacted at ___phone number___. If you cannot reach me, please call ___alternate number___.”

END OF EMERGENCY SITUATION AND FOLLOW-UP ACTIONS

Once conditions indicate that there is no longer an emergency at the dam site, _____ will contact the Any county Emergency Management Agency, which will then terminate the emergency situation.

V. DIRECTORY OF ADDITIONAL PERSONNEL WITH DAM SAFETY EXPERTISE

In addition to personnel shown elsewhere in this plan, the following list identifies other individuals with expertise in dam safety, design and construction who may be consulted about taking specific actions at the dam when there is an emergency situation:

Name	Telephone	Responsibility

VI. PREPAREDNESS

Preparedness actions are taken to prevent a dam failure incident or to help reduce the effects of a dam failure and facilitate response to emergencies. The following actions describe some of the steps that could be taken at the dam to prevent or delay failure after an emergency is first discovered. **These actions should only be performed under the direction of the dam safety office or other qualified professional engineers.**

ACTIONS TO BE TAKEN IN THE EVENT OF:

Overtopping by Flood Waters:

- Provide erosion-resistant protection to the downstream slope by placing plastic sheets or other materials over eroding areas.
- Divert floodwaters around the reservoir basin, if possible.

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

- Lower the water level in the reservoir 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.
- Stabilize slides on the downstream slope by weighting the toe area below the slide with additional soil, rock, or gravel.

Erosional Seepage or Leakage (Piping) 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 reservoir).
- Lower the water level in the reservoir 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 materials in place.
- Continue lowering the water level until a safe elevation is reached; continue operating at a reduced level until repairs are made.

Failure of an Appurtenant Structure such as an Inlet/Outlet of Spillway:

- Implement temporary measures to protect the damaged structure, such as closing the inlet 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 reservoir to a safe elevation. If the inlet is inoperable, pumping, siphoning, or a controlled breach may be required.

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

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

Spillway Erosion Threatening Reservoir Evacuation:

- Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags. Consider pumps and siphons to help reduce the water level in the reservoir.
- When inflow subsides, lower the water level in the reservoir 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.
- If necessary, restore freeboard, preferably by placing sandbags.
- Lower water level in the reservoir to a safe level; continue operating at a reduced level until repairs can be made.

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. Use pumps and siphons to help reduce the water level in the reservoir.
- If the water supply has been contaminated, immediately close all inlets to the water supply system and notify appropriate authorities.

SUPPLIES AND RESOURCES

In an emergency situation, equipment, supplies and other resources might be needed on short notice. Examples are sandbags, riprap, fill materials, and heavy equipment. The table below lists resources that may be helpful and indicates contacts to access them.

Item	Contact	Location
Earthmoving Equipment		
Riprap		
Sand and Gravel		
Sandbags		
Pumps		
Pipe		
Laborers		
Lighting Equipment		

VII. BREACH INUNDATION MAP

___ homes could be affected by a major flood caused by a sudden breach of the dam. These homes are marked on the attached inundation map. Floodwaters would reach the first home approximately ___ minutes after the dam failure.

Number	Resident	Distance Downstream	Max Water Depth (above 1st Floor)

(Provide similar information for businesses and other non-residential structures)

(Attach Inundation Map)

VIII. PLAN MAINTENANCE

This plan shall be reviewed and updated annually (and whenever needed due to changed conditions) by the dam owner and local emergency management agency personnel. All signatory parties to this plan should be encouraged to review the plan to assure all names and contact information are current. Revisions shall be promptly provided to all parties.

IX. TRAINING

All people involved in the EAP shall be trained to ensure that they are thoroughly familiar with the elements of the plan, availability of equipment, and their responsibilities and duties in the plan. Personnel shall be trained in problem detection and evaluation, and appropriate corrective measures. This training is essential for proper evaluation of developing situations at all levels of responsibility.

A tabletop exercise shall be conducted at least once every 5 years. The tabletop exercise involves a meeting of the dam owner and State and local emergency management officials in a conference room environment. The exercise begins with a description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures, and to resolve concerns regarding coordination and responsibilities.

X. DISTRIBUTION

Copies of this Emergency Action Plan have been provided to all individuals or groups who are signatory parties to the plan. Large-scale maps are on file with the local emergency management agency for evacuation purposes.

XI. APPROVAL OF THE PLAN

We, the undersigned individuals, as authorized by the laws and regulations of the State of _____, hereby adopt this Emergency Action Plan and agree to execute it.

Name/Title	Date
(Provide signatures of key responsible parties for the dam owner, state/local emergency managers, and local response organizations)	

XII. REVIEW AND UPDATE OF THE PLAN

This plan will be reviewed and updated annually and tabletop exercises will be conducted at least once every five years. Document these reviews below:

Date of review: _____ Participants: _____

Date of review: _____ Participants: _____

Date of review: _____ Participants: _____

Date of tabletop exercise: _____