

Utah Division of Water Rights – Dam Safety

Simplified Emergency Action Plan

For Moderate Hazard Dams

Dam Name: _____

Dam Identification Number: _____

Location (Town, County): _____

Owner: _____

Issue Date: _____

Revision Date: _____

INTRODUCTION

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

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

Dam Name: _____

Drainage the Dam is Located on: _____ or Off Channel Site

Directions to the Dam: _____

Dam Owner and Operator: _____

Type of Dam: _____

Dam Height: _____ Hydraulic Height: _____ Crest Length: _____ Crest Width: _____

Upstream Slope: _____ Downstream Slope: _____

Reservoir Capacity at Spillway Crest (Acre-Feet): _____

Surface Area of Reservoir at Spillway Crest (Acre): _____

Nearest Downstream Town: _____ Distance to Nearest Town (Miles): _____

Approximate Number of Properties in the Floodplain: _____

Downstream Property Description: _____

APPROVAL OF THE EMERGENCY ACTION PLAN

The undersigned persons have reviewed this Emergency Action Plan and concur with the proposed notification procedures.

Dam Owner Signature: _____ Date: _____

Dam Operator Signature: _____ Date: _____

Local Emergency Services Signature: _____ Date: _____

NOTIFICATION FLOWCHART

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

- Contact local county or city emergency services or Sheriff's office
- Notify persons immediately downstream from the dam of the failure
- Contact Dam Safety and the Utah Division of Emergency Management
- Take preventive actions described on pages 12-13 of this plan

A. County/City Emergency Services or Sheriff

	Name	Position	Phone No.
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

B. Downstream Property Owners Affected by Flood Waters (1st affected, 2nd affected, etc.)

	Name	Address	Phone No.
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____

C. Division of Water Rights, Dam Safety Office

Utah Division of Water Rights, Dam Safety
1594 W North Temple Street, Suite 220
PO Box 146300
Salt Lake City, UT 84116-6300
Office hours: 801-538-7414
After hours: 801-538-7376

D. Utah Division of Emergency Management

	Name	Position	Phone No.
1.	<u>Duty Officer</u>	<u>Duty Officer</u>	<u>801-538-3400</u>

INUNDATION MAP

Approximately _____ properties and _____ roads could be affected by a major flood caused by a sudden breach of the dam. These are identified on the following inundation/vicinity map.

Place Vicinity Map Here

SLOWLY DEVELOPING FAILURE OR UNUSUAL SITUATION

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:

- Notify Local Emergency Services of the potential problem and keep them advised of the situation.
- Contact the Utah Division of Water Rights, Dam Safety Office.
- During these contacts, find out if there are any immediate actions that can be taken to reduce the risk of failure.
- If necessary, implement preventative actions described on pages 8-13 of this plan.
- If the situation deteriorates, be prepared to implement notification flowchart on Page 4.

POSSIBLE EMERGENCY CONDITIONS

Listed below are some, not necessarily all, of the events that can lead directly to the failure of the dam. Included after each one is a brief outline of steps to take in trying to stabilize the situation.

EARTHQUAKE

If an earthquake has been reported in the vicinity, or the responsible individual has felt ground motion:

- Immediately conduct a general overall visual inspection of the dam.
- If the dam is failing, or is damaged to the extent that there is increased flow passing downstream, immediately implement Notification Flowchart procedures found on page 4 then take the appropriate action listed on page 9.
- 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, and evaluate the potential for failure. A description of slides, sloughs, new or increased seepage, or sudden subsidence, including the location, extent, rate of subsidence, effects on adjoining structures, springs or seeps, reservoir elevation, weather conditions, and other pertinent facts would also be helpful. Contact Local Emergency services to notify them of the situation, contact Dam Safety, and then take the appropriate action listed on page 9.
- If the dam crest has settled, lower the reservoir pool to an appropriate level. The pool should remain drawn down until the dam can be examined by Dam Safety or other qualified professional engineers and any necessary repairs are made.
- If there is no imminent danger of dam failure the dam owner should thoroughly inspect the following:
 - Faces of the dam for cracks, settlement, or seepage;
 - Abutments for possible displacement;
 - Outlet works, control house, tunnel, and gate chamber for structural integrity;
 - Spillway structure to confirm continued safe operation;
 - Drains and seeps for any turbidity, muddy water or increased flow;
 - Reservoir and downstream areas for landslides;
- Report all findings to Dam Safety and all other agencies that had 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 earthquake.

Actions to be taken in the event of:

REDUCTION IN FREEBOARD AND/OR LOSS OF DAM CREST WIDTH:

- Place additional riprap or sandbags in damaged areas to prevent further embankment erosion.
- Lower the reservoir to an appropriate level.
- Restore freeboard with sandbags or earth and rock fill.
- Continue close inspection of the damaged area until permanent repairs can be made.

MASS MOVEMENT OF THE DAM ON ITS FOUNDATION (SPREADING OR MASS SLIDING FAILURE):

- Immediately lower the reservoir to an appropriate level.
- Continue operation at a reduced level until repairs are made.

EXCESSIVE SETTLEMENT OF THE EMBANKMENT:

- Lower the reservoir level to a safe elevation by releasing it through the outlet or by pumping, or siphoning.
- If necessary, restore freeboard by placing sandbags or earth and rock fill.
- Continue operating at a reduced level until permanent repairs can be made.

FAILURE OF AN APPURTENANT STRUCTURE SUCH AS AN 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 to a safe elevation. If the outlet is inoperable, pumping, siphoning, or a controlled breach may be required.

FLOODING

If major flooding is predicted, lower the reservoir to an appropriate level and monitor the following:

- Current reservoir elevation and freeboard;
- Rate the reservoir is rising;
- Seepage from drains.
- Weather conditions
- Discharge conditions of creeks and rivers upstream and downstream;

If flooding occurs, lower the reservoir by gradually increasing the discharge through the spillway and outlet; implement the following procedures:

- Notify downstream residents of the increases in discharge, and increase the discharge in stages to avoid flooding downstream residents.
- Check the downstream toe and abutments for any new seepage, increase in seepage, or any indication of muddy or silty flow.
- Check for cracks, slumping, sloughing, sliding, or other distress signals near the dam abutments, faces, or crest.
- Contact Local Emergency Services and Dam Safety.
- If necessary, take the appropriate action listed below.

Actions to be taken in the event of:

OVERTOPPING BY FLOOD WATERS:

- Open outlet to its maximum safe capacity.
- Place sandbags along the dam crest to increase freeboard and force more water through the spillway and outlet.
- 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.

SPILLWAY CHANNEL BACK CUTTING THREATENING RESERVOIR 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, or plastic sheets weighted with sandbags.
- When inflow subsides, lower the reservoir to a safe level.
- Continue operating at a lower water level in order to minimize spillway flow until permanent repairs can be made.

EROSION, SLUMPING/SLOUGHING, OR CRACKING

- Determine the location, size of the affected area (height, width, and depth), severity, seepage discharge, clear or cloudy seepage, and the reservoir level.
- If failure appears likely, implement Notification Flowchart procedures found on page 4 then take the appropriate action listed below.
- Otherwise, contact Dam Safety.

Actions to be taken in the event of:

SLIDE OR SLOUGH 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 with additional soil, rock, or gravel.

NEW SPRINGS, SEEPS, BOGS, SANDBOILS, CLOUDY SEEPAGE, INCREASED LEAKAGE, OR SINKHOLES

If there is an increase in old seeps, 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 level (a map of the area may be helpful to illustrate where the problem is located).
- If failure appears likely, implement Notification Flowchart procedures found on page 4 then take the appropriate action listed below.
- Otherwise, report all findings to Dam Safety.

Actions to be taken in the event of:

EROSIONAL SEEPAGE OR LEAKAGE (PIPING) THROUGH THE EMBANKMENT, FOUNDATION, OR ABUTMENTS:

- Plug the seepage inlet with whatever material is available (hay bales, bentonite, or plastic sheeting).
- Lower the water level until the flow decreases to a non-erosive velocity or until it stops.
- Continue lowering the water level until a safe elevation is reached.
- Continue operating at a reduced level until repairs are made.

EXCESSIVE SEEPAGE AND HIGH LEVEL SATURATION OF THE EMBANKMENT:

- Lower the water to a safe level.
- Continue frequent monitoring for signs of slides, cracking, or concentrated seepage.
- Continue operations at a reduced level until repairs are made.

SUDDEN WATER RELEASES

In case of sudden, planned or unplanned, large water releases from the outlet works or spillway (e.g. opening gates or valves, pulling stop logs), notify downstream residents and the appropriate agencies of the increased flow.

ABNORMAL INSTRUMENTATION READINGS

After taking any instrumentation reading, compare the current readings to previous readings of the same reservoir level. If the reading appears abnormal, Determine:

- Changes from the normal readings
- Reservoir level
- Weather conditions
- Other pertinent facts
- Contact the Dam Owner, Project Engineer, and Dam Safety

OTHER PROBLEMS

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

END OF EMERGENCY SITUATION AND FOLLOW-UP ACTIONS

Once conditions indicate that there is no longer an emergency at the dam site and the proper authorities (e.g. Dam Safety or a qualified professional engineer) have declared the dam safe, the Dam Owner or Operator should contact the local emergency management authorities, who will then terminate the emergency situation.

SUPPLIES AND RESOURCES

In an emergency situation, equipment and supplies might be needed on short notice, such as sandbags, riprap, fill materials, equipment, and laborers. The table below lists the supplies and indicates how to access them.

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

INDIVIDUAL RESPONSIBILITIES

The following list indicates who is responsible for taking specific actions at the dam when there is an emergency situation. In this manner, tasks can be well divided so in an emergency no one person is overwhelmed.

Name	Telephone No.	Responsibility