*This document is a guide for development of an Emergency Action Plan (EAP). All text in red italics is instructional and should be removed prior to completing the EAP. The main body of an EAP should be as simple as possible, designed for a person faced with a possible crisis. A useful EAP contains information on preventing a dam failure, if possible, and saving people if this is not possible. Most of this document is a template that may be used to assist in the drafting of a dam specific EAP. The actual EAP should include only that information relevant to that dam. A person preparing an EAP should delete all irrelevant information and add dam specific information. The EAP preparer should develop or refine observable or quantitative criteria for event detection (mode of failure) and classification.*

Emergency Action Plan (EAP)

For

 ----------- Dam ()

Located in

\_\_\_\_\_\_\_\_ County

Prepared By

, 2017

**EAP Organization**

Page 1 Emergency notification messages

Page 2 Dam Information and Directions

**Page xx Means for Emergency Detection**

**Page xx Means for Emergency Level Determination**

 **Page xx Unusual condition – non emergency**

 **Page xx Potential failure**

 **Page xx Failure imminent or in progress**

**Page xx Notification and Communication**

 Page xx **Contact Information**

Page xx **Preventing Failure/Reducing Effects**

 Page xx **Sources of Materials and Equipment**

Page xx **Inundation Maps**

Page xx **Termination of Emergency**

Page xx **EAP Upkeep and Exercises**

**Page xx Holders of the EAP**

**Emergency Notification Messages**

|  |
| --- |
| Urgent – dam failure - flooding is imminent or in progress |
| Call 9-1-1Message: I am reporting an emergency at \_\_\_\_\_ Dam on \_\_\_\_\_\_\_\_ located off Milepost \_\_\_\_ on OR \_\_ in \_\_\_\_\_\_\_\_County, Oregon. This is *name and position* with *organization*. This is an urgent emergency, the dam is failing and a dam breach flood will occur. People are in danger and need to evacuate. Please implement the emergency action plan and make emergency contacts immediately. I am at *location* and can be reached at *phone number* after you have made emergency notifications. *Stay on the phone with the 9-1-1 operator until you both agree necessary information has been exchanged and the emergency response effectively initiated.* |

|  |
| --- |
| Potential dam failure situation is rapidly developing |
| Call 9-1-1Message: I am reporting a potential emergency at \_\_\_\_\_ Dam on \_\_\_\_\_\_\_\_ located off Milepost \_\_\_\_ on OR \_\_ in \_\_\_\_\_\_\_\_ County, Oregon. This is *name and position* with *organization.* At this time it is a potential dam failure emergency. Please inform Jackson County Emergency Management, and make other emergency contacts as necessary to prepare for possible evacuations. I am at *location* and can be reached at *phone number*. We are taking emergency actions to save the dam, and will contact the State Engineer and our engineer for technical advice on preventing dam failure. Please contact local emergency management and others as described in the Emergency Action Plan for this dam. |

For an unusual condition, notify the Water Resources Department dam safety program and a consulting engineer as needed. Do not call 9-1-1 unless the situation worsens or more information at the site confirms a potential failure or failure in progress. Contacts are on Page 6 of this document

**Dam Information and Directions**

**\_\_\_\_\_\_\_\_\_Dam:** Height: \_\_\_ feet Latitude: \_\_\_\_\_\_\_\_ Longitude: \_\_\_\_\_\_\_\_\_\_\_\_

**Directions to dams:** The dam is on \_\_\_\_\_\_\_ road, located off Milepost \_\_\_\_\_\_ on OR-\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_County, Oregon.

**Potential Impacted Area:** Dam failures may inundate \_\_\_\_\_\_\_\_\_*(list names of cities or portions of cities, road, or other areas that may be inundated if the dam were to fail)*

**Map of Dam Location:**

*Include a map of the dam location showing clearly the dams location with respect to roads and/or highways as well as nearby cities.*

**Means of Emergency Detection:**

*This section is used to provide information on how an emergency can be detected at the dam. List all possible failure modes in order of likelihood of occurance and list*

**Existing conditions at the dam**

*Any conditions relating to a deficiency of the dam identified should be stated in this section. Examples of these conditions are water level restriction (\_\_\_\_ feet), past near failures caused by (internal piping, overtopping) (in 19xx), unsatisfactory seismic analysis, non-functional outlet…etc. Describe others as known for this dam.*

**Instrumentation**

*Any information on instrumentation (water level indicator, cameras, weirs, piezometers…etc) and how it can be used should be included in this section (see subsection below*

**Possible failure modes** (listed below in order of likelihood of occurrence):

*Most dams are likely more likely to fail in certain ways versus others. Below, list in order of the likelihood of occurrence the possible failure modes for this dam. The text in the list below is for example purposes only; items in the list should only be included if the possible failure mode exists for your dam.*

* Overtopping of the dam from flood flows
* Internal dam erosion, including piping and uncontrolled leakage
* The dam slides or moves
* Other damage or vulnerabilities, including earthquake, misoperation.

**Problem Detection**

*Unusual or emergency events may develop at any time. Unusual or emergency events may be detected by observations at or near the dam by the dam owner or other nearby observers or from monitoring instrumentation at or near the dam site. This section should include a list of any situations/scenarios which could result in an unusual or emergency event occurring. Also include a list of actions responsible parties or their representatives will take to communicate the detection of an unusual event or emergency situation. The lists below are for example purposes; only events and actions related to your dam should be included in this section.*

The owner, or their representative, will inspect the dam (and below the dam) and make observations routinely as needed and always after the following events or situations:

* Daily rainfall of over \_\_\_\_ inches at or near the dam *(varies depending on location and conditions of the dam; consult with your engineer and/or OWRD to determine the value for your dam)*
* Water level reaches \_\_\_\_\_\_\_ feet below the crest of the dam *(typically 3 feet but may vary depending on conditions at the dam; consult with your engineer and/or OWRD to determine the value for your dam)*
* Earthquake which causes cracking in building or ground as observed near the dam

Following an unusual or emergency event, the owner or owner’s representative will report (to the State Engineer) any:

* New location(s) of seepage from the dam
* Rapid changes in flow downstream (below) the dam that are unrelated to operation
* New area(s) of green vegetation on the dam
* Large cracks or slides in or adjacent to the dam

**Means of Emergency Level Determination:**

*The emergency level describes the severity of the event. For each scenario, list the observations used to determine the emergency level and list action(s) that is needed. The lists below are for example purposes; only observations and actions related to your dam should be included in this section.*

Severityof the problemis classified into one of the following (in order of increasing severity):

1. **Unusual Condition – This is not currently an emergency.**
2. **Potential Dam Failure**
3. **Dam failure occurring URGENT**

As soon as an emergency event is detected, immediately classify the Emergency Severity using the information on the next \_\_ pages. Monitor dam for changing conditions, and take all actions to save the dam if potential failure situation exists.

**Unusual Condition**

An unusual condition is a non-emergency that warrants inspection and monitoring for changes. For unusual conditions, the owner, or owner’s representative, should consult with their engineer and the State Engineer as needed to determine the appropriate Emergency Level, if any.

**Observation**

**High Reservoir**

* The water level in the reservoir is within *\_\_\_\_* feet of dam crest *(typically one to two feet for most dams but will vary depending on the conditions at the dam; consult with your engineer and/or OWRD to determine the value for your dam)*
* Spillway capacity is reduced by logs or other large debris, and rain or snowmelt may occur before debris can be removed

**Leakage**

* A new seep in the dam, with clear water and no observed increase in flow
* Any increase in flow through the outlet pipes that is unrelated to valve operation.

**Earthquakes, Landslides and embankment damage**

* An earthquake that causes materials to fall off of shelves in buildings close to the dams
* Cracks in the dam (unrelated to drying) with no seepage
* Small, shallow landslide or slump on either dam face, extending less than 1/3 of the way into the dam crest.

**Spillway Headcutting**

* Water flowing over the spillway has recently eroded the spillway channel. The erosion is more than \_\_\_\_\_\_ feet from the dam

**Gates/Valves**

* The upstream valve is fully/partially closed/open and no longer operational, leaking more than \_\_\_ gpm *(typically 10 gpm but depends on the specifics of the dam; consult with your engineer and/or OWRD to determine the value for your dam,)* or no longer functions as designed

**Action**

Conduct an on-site inspection of the dam. If unusual conditions are observed, the owners Engineer and the OWRD State Engineer will be contacted. Take pictures of the unusual conditions and send them by email or deliver directly to the owners Engineer and the State Engineer. Record the time of day and conditions observed if seepage or movement increases. Document the situation with photographs and video if possible.

**Potential Dam Failure**

**Observation**

**High Reservoir**

* The reservoir is within [*1]* foot of the top of the lowest point on the crest and rising, with no erosion of the dam.
* Any other condition that could lead to an uncontrolled release of the reservoir.

**Leakage**

* Any leak in the dam with either muddy water or measurably increasing flow. This flow from this leak is not enough to make it unsafe to walk through the leaking water.
* Cracks through the dam that are leaking. Water is clear and flow is not increasing.
* Leakage from the outlet pipe that is rapidly increasing and muddy.
* A boil (bubbling water) at the toe of the dam with generally clear water.

**Landslides and embankment damage**

* A deep landslide on the embankment or abutments that does not extend to the reservoir level.
* A slide has lowered the crest of the dam but the crest is still \_\_\_\_ feet above the water level *(typically 1 to 2 feet but depends on the specifics of the dam; consult with your engineer to determine the value for your dam)*
* A new and developing sinkhole on the dam that is not related to animal burrows.

**Spillway Headcutting and Obstruction**

* Water flowing over the spillway has recently eroded the spillway channel. The erosion is more than \_\_\_\_\_\_ feet from the dam
* The spillway is fully or partially obstructed and the water level in the reservoir is less than 2 feet from the lowest point on the crest and rising.

**Gates/Valves**

* The upstream/downstream valve is fully/partially closed and no longer operational and the reservoir level is rising
* The upstream/downstream valve is fully/partially open and no longer operational and the reservoir level is rising and flow downstream of the dam is increasing and may begin to flood areas downstream of the dam.

**Action**

This situation may eventually lead to dam failure and severe flooding downstream. **Call 9-1-1 and inform the dispatcher that there is a potential dam failure using Message 2 on the second page of this EAP.** Closely monitor the condition of the dam and periodically report the status of the situation to the \_\_\_\_\_\_\_\_ County [or City] Emergency Manager and to the OWRD dam safety engineer. If the dam condition worsens and failure becomes imminent, the \_\_\_\_\_\_\_ County [or City] Emergency Manager must be notified immediately of the change in the emergency level to “Urgent” and to evacuate the people at risk.

**After notifications, take all reasonable actions to prevent dam failure, as described on PAGE \_\_\_\_.**

**Dam failure occurring - URGENT**

**Obersvation**

**High Reservoir**

* Water is flowing over the top of the dam and eroding into the dam.
* Waves are flowing over the dam and have eroded into the crest at the downstream face of the dam

**Leakage**

* There is a very large leak in the dam. This leak is actively eroding and muddy, and is of such a volume that it is unsafe to walk through the leaking water.
* Rapidly increasing muddy leakage through cracks from a landslide or any other damage.

**Landslides and embankment damage**

* A deep landslide extending into the upstream slope and to water level in the reservoir.
* Any other condition that is resulting in uncontrolled release from the reservoir either through the dam or the spillway
* Any breach observed with uncontrolled water flowing from the reservoir.

**Spillway Headcutting and Obstruction**

* Water flowing over the spillway is actively eroding the spillway channel
* The spillway is fully or partially obstructed and the water level in the reservoir is less than one foot from the lowest point on the crest and rising.

**Gates/Valves**

* The upstream/downstream valve is fully/partially closed and no longer operational and the reservoir level is rapidly rising and less than one foot from the crest

**Action**

For an imminent failure condition the priority is to notify 9-1-1 to save lives. **Call 9-1-1 and inform the dispatcher that there is a dam failure in progress using the Message 1 on the second page of this EAP.** Protect people on and immediately below the dam. After persons in the vicinity are in safe places, determine if the rate of dam failure can be slowed by dumping material and opening valves, or constructing a breach off of the actual dam. Actions at the dam under an imminent failure condition should be to protect persons on site, delay the flood if possible, and inform emergency managers on status of flooding at the dam.

**Notification and Communication:**

*This section is used to provide the contact information for all necessary parties. The list below provides typical emergency contacts that are made following detections of an unusual or emergency event. This list is not all inclusive and additional contacts may be necessary depending on the dam. It is essential to transmit information properly in order to get help to the site. Notification procedures for dams with a single person owner may be very different from that of a larger organization. For an individual, calling 9-1-1 and informing them help is needed for notifications is essential. In such cases, upon prior notice, some additional notifications may be made by the 911 center. However, not all 9-1-1 centers will perform additional notifications. As a result, during creation of the EAP, it is the owner’s (or owner’s representative) responsibility to determine how the notifications will proceed and to clearly define the process in the EAP.*

**Unusual Condition**

***Call the State dam safety office number if it is a minor change. Call the after-hours number if there is any question that it could be a potential failure developing. This could include a leak that is new, or new cracks in the dam that are changing, or with any sign of water moving through the cracks***

***Potential failure – Page 1***

***Imminent or Failure occurred – Page 1***

**Essential Emergency Contacts**

|  |  |  |  |
| --- | --- | --- | --- |
| Organization | Name | Title | Contact |
| ###### County [City] Emergency Management |  | Emergency Manager | **24-hour phone: 9-1-1** |
| National Weather Service [**Medford****Portland Pendleton****Boise]**Office |  | Lead Duty Forecaster | **Medford (541) 773-1067****Portland (503) 261-9246****Pendleton (541) 276-7832****Boise (208) 334-9860** |
| Sheriff’s Office |  | Sheriff | **######****24-hour phone: 9-1-1** |
| Oregon State Police####### Command Center Dispatch |  | Duty Dispatcher | **##########** |
| ODOTDistrict ####### |  | Duty Dispatcher |  |
| Dam Owner | ####### | ####### | **541-538-9507** |
| Oregon Emergency Response System (OERS) |  | Duty Officer | **800-452-0311** |
| Dam Owner’s Engineer | ######## | Experienced Engineer | **##########** |
| Oregon Water Resources Department | Keith Mills | State Engineer | **Phone: (503) 986-0840****Cell: (541) 706-0849** |
| Oregon Water Resources Department | Tony Janicek | Dam Safety Program Coordinator | **Phone: (503) 986-0839** |

**Preventing Failure/Reducing Effects:**

*This section provides information on means for preventing or reducing failure. The list below provides examples of actions that should be taken based on the observation used to detect the unusual or emergency event. Not all actions listed below will be applicable to all dams. In addition, there may be other actions needed, not listed below, depending on the specifics of the situation and dam site. Only actions relevant to this dam should be included in this section.*

 **For Internal Erosion**

Open outlet(s) to lower the reservoir level as rapidly as possible to a level that stops or decreases the seepage to a non-erosive velocity. If the outlet is damaged, blocked, or of limited capacity, initiate pumping and or siphoning. Continue lowering the water level until the seepage stops, or has stabilized as determined by an engineer.. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.

 **For landslide or major deformation**

Open the outlet pipes, and work to bring pumps and or siphons to the dam. Observe cracks and measure drops and offset if the slide is not moving. Stay well above the slide or out of the area if this slide is moving. Use a rock buttress at the toe of the slide only if so instructed by an engineer. Construct an emergency spillway off of the embankment.

 **For water flowing over the crest**

Place fill dirt, gravel and or sandbags as available along the low areas of the top of the dam to reduce the likelihood of overtopping and to safely direct more water through the spillway. Clear the spillway with whatever equipment is available and reasonably safe.

 **Other Damage**

Immediately conduct a general overall visual inspection of the dam. Full open the low level conduit if there is leakage that could cause the dam to fail. Consider siphoning or pumping water from the reservoir.

**Sources of Equipment and Materials**

*This section provides information on suppliers for equipment and materials that will be needed to take action during an unusual or emergency event condition. The list below provides examples and is not all inclusive. Equipment and material needs vary depending on the actions needed and the dam site. As a result, the list below should only include equipment and material suppliers necessary for actions to be taken at this dam.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment/Material** | **Names** | **Phone** | **Address** |
| 1) Heavy equipment contractors |  |  |  |
| Pumps | United Rental – Pump Solutions | 503-405-1197 | 4621 NW Saint Helens RdPortland, OR 97210 |
| Sand, gravel and rock |  |  |  |
| Excavation/Earth Moving EquipmentRental |  |  |  |
| Sandbags |  |  |  |
| Diving contractors |  |  |  |

**Inundation Maps**

*A map of the area inundated by the dam breach must be included with the EAP. The map must be prepared by a Professional Engineer registered in the State of Oregon.*

**Termination of Emergency**

Whenever the EAP has been activated and a dam failure emergency declared, the local Emergency Manager will determine when the emergency is over based on actual conditions. The local Emergency Manager will relay this decision to the dam owner, other emergency responders, and OERS to inform them the emergency has been terminated.

Prior to termination of a dam failure event that has not caused actual dam failure, the State Engineer will make every effort to inspect the dam or require the inspection of the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage. If it is determined conditions do not pose a threat to people or property, the local Emergency Manager will be advised to terminate EAP operations as described above.

Unusual conditions are not emergencies. Unusual conditions end after an engineer determines that the unusual conditions pose no dam safety risk, and either conditions have improved or returned to normal.

**EAP Upkeep and Exercises**

**Updating the EAP**

The EAP shall be updated every two (2) years *(may be adjusted based on conditions of the dam)*. This should include:

* Calling phone numbers on the contacts list and the materials suppliers
* Updating indicators of failure based on engineers analysis or Oregon dam safety direction

The owner should review and update the EAP as needed. Copies of the revised EAP are distributed to all who received copies of the original EAP. Copies may be in a secure electronic format. Emergency Action Plans need to be revised as conditions at the dams or contact information changes. All contact phone numbers should be checked by dialing them. This should occur on an [one two or three year] interval basis. Send pages with changes to all holders of the EAP.

**Emergency Response Exercise**

On a basis of every four (4) years *(may be adjusted based on conditions of the dam)*, the owner should perform an emergency response exercise which is a periodic test of the EAP. This periodic test can include, but is not limited to the following.

The emergency response exercise should consist of a meeting, including a tabletop exercise, conducted at the dam. Attendance should include all key personnel including but not limited to the agency responsible for notifications, at least one representative of the local law enforcement agency, and others with key responsibilities listed in the EAP. At the discretion of the dam owner, 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 should 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. The narrator will control the discussion, ensuring realistic responses and developing the scenario throughout the exercise.

After the tabletop exercise, the EAP will be reviewed and discussed. Mutual aid agreements and other emergency procedures can be discussed. The dam owner should prepare a written summary of the periodic test and revise the EAP, as necessary.

**Use and limitations of this Document**

Intended first for the dam owner, to communicate unusual conditions and emergency conditions.

Inundation maps are provided for the emergency managers and first responders.

This is a very general document. It is essential to obtain expert services and equipment and supplies quickly. It is the owner’s responsibility for upkeep of this document, and to maintain communication with the local emergency managers.

The OWRD dam safety program conducts infrequent safety inspections of these facilities, and will not be able to detect any rapidly developing situation. OWRD will provide technical input in an actual emergency as time allows.

***Holders of the EAP***

***Dam Owner***

***\_\_\_\_\_\_\_ 9-1-1 Center***

***\_\_\_\_\_\_\_ Emergency Manager***

***\_\_\_\_\_\_\_ Oregon Department of Transportation***

***\_\_\_\_\_\_\_\_ State Engineer, Oregon Water Resources Department***