DEPARTMENT OF ECOLOGY
State of Washington

Water Resources Program - Dam Safety Office

Dam Safety Office- Emergency Action Plan

Project Name: _____

DSO File Number: _____

Location: _____
(City/Town, County, and Stream)

Location Map

Prepared by: _____

OWNER: _____

ISSUE DATE: _____

REVISED DATE: _____

Table of Contents

Introductions and Instructions:

Introduction:

The Department of Ecology, Dam Safety Office (DSO) has developed this Emergency Action Plan (EAP) template to help dam owners (or their representatives) create an EAP that will be used in case of an unusual event or emergency. The goal of the form is to provide a useful EAP for significant and high hazard dams under state jurisdiction. The format for the EAP form was developed from the *National Dam Safety Program* and existing guidelines established by the DSO.

Purpose:

The purpose of this EAP is to reduce the risk of injury or loss of life and to minimize property damage during an unusual event or emergency. The EAP defines responsibilities and provides procedures designed to:

- Identify conditions that may endanger the dam.
- Begin remedial actions to prevent or minimize the downstream impacts of a dam failure.
- Notify local emergency personnel and effectively communicate conditions.
- Warn downstream residents of impending or actual failure of the dam.
- Conclude the response to the unusual or emergency event.

Instructions:

There are two parts to the EAP form; the unique information that you, the dam owner, must supply to complete the form, and the procedures listed in the Emergency Action Plan.

- Use the *"Guidelines for Developing Dam Emergency Action Plans"* to help develop your EAP. The publication is available in several formats: online, on disk, or in print available through this office.
- Please review the "Guidelines" and EAP form, including the glossary at the end of this document, before gathering the information requested.
- Contact the DSO, if you have no engineer available, for engineering assistance to develop an inundation map, or to resolve other technical issues.
- Verify all names and phone numbers of residents and facilities in the flood path where possible.
- Assure emergency supplies, equipment, and contractors are readily available.
- Confirm the level of assistance your local emergency responders can supply; determine who is in charge of evacuations, roadblocks and emergency supplies.

The Dam owner will provide the following:

- Basic contact information.
- Information about the dam, including the dam's condition, type, height, crest width, and any other pertinent information.
- Contact numbers for emergency personnel and for residences in the flood path where appropriate.
- Coordination plans relating to local emergency management agencies.

The DSO will provide the following:

- The dam's Downstream Hazard Classification as Low, Significant, or High Hazard.
- Review the Emergency Action Plan.
- Inundation maps for dam owners who do not have the resources to hire an engineer.
- Technical assistance.

General Guidelines:

To make best use of the EAP, you must become familiar with each step of the plan. Please **review** and/or **complete** the following pages prior to finalizing the information requested in the Five Step Emergency Action Plan. Use the *"Guidelines for Developing Dam Emergency Action Plans"* for assistance. If you have additional questions, please contact this office.

- **COMPLETE the Basic EAP Data.** This section includes contact information and any information specific to your dam.

- **REVIEW** the **Five Step Plan** flowchart, and the steps to follow.

- **REVIEW** the **Roles and Responsibility** section; determine who is responsible for individual duties and tasks. Remember it is important that no one person becomes overwhelmed during an unusual event.

- **COMPLETE the Emergency Services & Contacts List.** Use the information gathered above to complete this list.

- **REVIEW Event Detection.** An unusual or emergency event can be detected and reported in a number of ways.

- **REVIEW** and become familiar with the **Emergency Level Determination & Emergency Level Guidance table**. Use this section when inspecting your dam; you will then be able to determine quickly which emergency level is appropriate during an event.

- **Contact** the Dam Safety Office at (360) 407-6208 during business hours for current contact information and telephone numbers.

- **Adjust the plan and procedures** as needed for your dam and its surroundings. For example;

    - High hazard dams in a heavily populated area may need to initiate the Five Step EAP process whenever any unusual event occurs.

    - If the location of a dam only allows for remote monitoring and has limited access, the dam owner will need to plan accordingly on how to receive data regarding the condition of the dam.

    - Take the time to develop emergency response procedures for unusual situations that happen after normal working hours and at night.

    - You may also edit the format of the Emergency Action Plan to include only those parts of the plan that are specific to your project, such as the contact and supply lists.

- Also available is a ***Simplified Emergency Action Plan form.*** **T**his form is suitable for smaller dams with a limited number of residences at risk.

Signature Page: (Concurrences)

After a plan is developed and approved by the Department of Ecology Dam Safety Office, the plan will be "signed off" by the various responsible parties. This will establish that they have reviewed the plan and agree to the tasks and responsibilities assigned. The Signature page is located in **Appendix B-7**.

Basic EAP Data:

Potentially Impacted Area:

Please describe the property downstream of the dam: (agricultural, residential, industrial, critical wildlife habitat, etc.) _____.

Additional information on impacted areas if available: _____

_____

_____

Located on: _____ Creek/River

Downstream Flood Path: _____Creek/River to_____

Creek/River_____ to _____River, etc.

Description of the Dam:

Official Dam Name: _____

State I.D. Number: _____

Dam Owner and/or Operator: _____

Mailing Address:_____

Owner and/or Operator Contact Numbers: (_____)_____-_____ (_____)_____-_____

Section _____Township _____ Range _____W.M. County:_____

Type of Dam: (earthfill, concrete, rockfill, or:)_____

Dam Height: _____Crest Length: _____Crest Width:_____

Downstream Hazard Classification: _____

Number of Homes in the Dam break floodplain: _____

Complete the contact list for persons downstream affected by flood waters in Step 3.

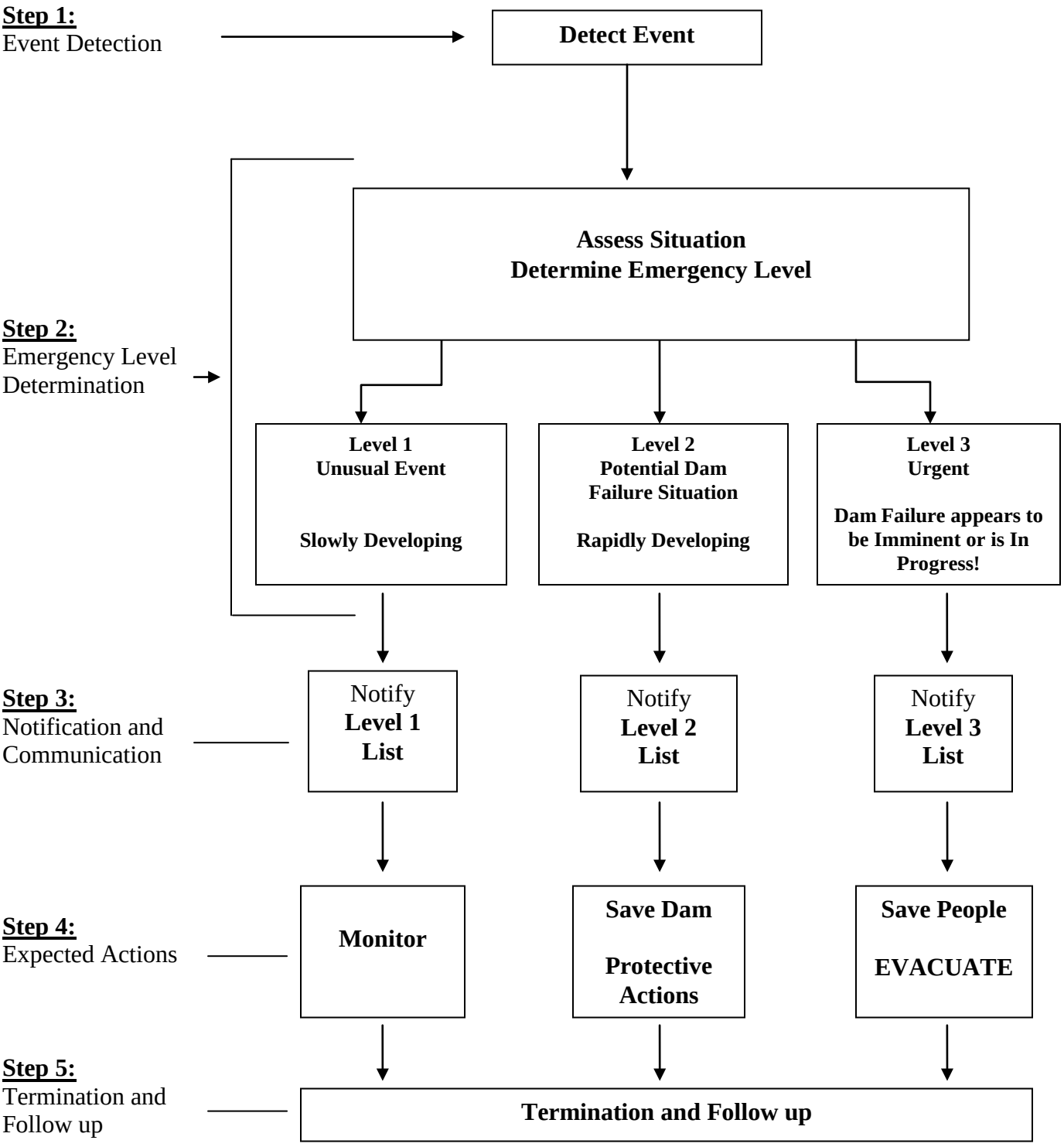
Directions to the Dam: _____

_____

_____

The Five Step Emergency Action Plan:

Emergency Action Plan Overview



Roles and Responsibilities:

Dam Owner or Operator: _____ (_____)_____-_____,(_____)_____-_____
primary phone secondary phone(s)

As soon as an emergency event is observed, or reported:

- **Determine the emergency level (see Emergency Levels table, page __)**
  - ***-Level 1:*** *unusual event, slowly developing*
  - ***-Level 2:*** *potential dam failure, rapidly developing*
  - ***-Level 3:*** *dam failure appears to be imminent or is in progress*
- **Call 911, for Level 2 or 3 Emergencies**
- **Immediately notify the appropriate personnel for the emergency level in the order shown in *Emergency Services & Other Contacts** list, next page.**
- **Continue to provide updates of the situation to the _____ Office of Emergency Management at: (_____)_____-_____ or other emergency personal. This information is needed to make timely and accurate decisions regarding warnings and evacuations.**

****Developing an Emergency Contacts List***

Contact the agencies listed in the *Guidelines for Developing Dam Emergency Action Plans* to identify ***who*** will do ***what*** during an emergency. Update this information whenever the EAP is revised.

To request a copy of this publication call (360)407-6872 e-mail WRPublications@ecy.wa.gov, or visit our website at: http://www.ecy.wa.gov/programs/wr/dams/Emergency.html If you need technical assistance, please contact this office.

State office of WA Dept. of Emergency Management: www.emd.wa.gov/about/contact.shtml

Main Switchboard (800) 562-6108 or (253) 512-7000
Public Information Officers (800) 688-8955
Search and Rescue (888) 849-2727
Emergency Operations Center (Activations Only) (800) 854-5406, or (253) 912-4900

Dam Owner's Engineer (if available)

- Advises, if time permits, the dam owner as to what the emergency level determination is.
- Advises, if time permits, the dam owner as to what remedial action to take when a Level 2 event has occurred.

Washington Department of Ecology - Dam Safety Office

Dam Safety Office at: **(360) 407-6208** **(360) 971-6347** 24 hr. Emergency number

Geotechnical Engineer at: **(360) (office) or (360) (cell). (**Please call the Dam Safety Office at (360) 407-6208 during business hours for current contact information and telephone numbers).

- Provides assistance, if time permits, in determining the emergency level.
- Provides advice, if time permits, of remedial actions to be taken.
- Provides advice on when to terminate the EAP.

Emergency Services & Other Contacts:

Agency/Organization	Principal Contact & Email Address	Address	Office telephone number	Alternate telephone numbers
Emergency Responders	**911**		**911**	
_____County Office Of Emergency Management			( ) - .	( ) - . 24 hour
State of Washington Department of Ecology		PO Box 47600 Olympia, WA 98504	(360) 407-6208	(360) 971-6347 24 hr. Emergency number
State of Washington Department of Ecology	Geotechnical Engineer	PO Box 47600 Olympia, WA 98504	(360)	(360) cell

(Attach additional sheets as necessary)

Event Detection:

Unusual or emergency events can be detected by:

- Observations made at or near the dam. Reports can be made by hikers, law enforcement, staff on site, or from a variety of sources. It is important to evaluate all reports that are received.
- Earthquakes felt or reported at or near the dam.
- Other conditions that can cause an unusual or emergency event at the dam, for example, forecasts of a severe weather event, a flash flood, high fire danger, upstream dam failures, or releases from upstream sources.

Determining the Emergency Level:

After an unusual or emergency event is detected or reported, **the dam owner or representative is responsible for classifying the event into one of the following three emergency levels. U**se the Guidance Chart* on the next page and examples of emergency situations in **Appendix B-1**.

It is important to become familiar with the different emergency levels and situations before an event occurs.

Emergency Level 1 - Unusual Event, Slowly Developing

This event is not normal but has not yet threatened the operation or structural integrity of the dam. This event could affect the structural integrity of the dam if left unchecked.

Emergency Level 2 - Potential Dam Failure, Rapidly Developing

This event may eventually lead to dam failure and potential flooding downstream, but there is not an immediate threat of dam failure. This emergency level also applies when uncontrolled flow through the dam's spillway has or is likely to result in flooding of downstream areas, but is not yet affecting buildings or roads, or posing a significant risk to healthy, safety, or welfare.

Emergency Level 3 – Urgent, Dam Failure Appears Imminent or is in Progress

This is an urgent event, where a dam failure is occurring or is clearly about to occur and cannot be prevented. Flash flooding will occur downstream of the dam. The amount of flooding and resulting damage will be dependent upon several factors, such as the water level in the reservoir and the time of year. If the breach occurs during the dry season when the water level in the reservoir level is low, the escaped water will flood a significantly smaller area than if the breach occurs at the time the dam's reservoir is full. If a breach occurs when the dam's reservoir is full, the entire area shown on the inundation map will be flooded.

This event level is also applicable when flow through the dam's spillway is flooding buildings or roads. The dam owner **will contact (911)** and the **responsible Emergency Services** to evacuate people at risk and close roads in the flood path if necessary.

*Guidance for Determining the Emergency Level**

Event	Situation	Emergency Level*
Spillways	Principal spillway severely blocked with debris or structurally damaged	1
	Principal spillway leaking with muddy flows	1
	Principal spillway blocked with debris and pool is rapidly rising	2
Flooding	National Weather Service issues a flood warning for the area	1
	The reservoir elevation reaches the predetermined notification trigger elevation of ___ inches below dam crest	2
	The reservoir elevation reaches the predetermined notification trigger elevation of ___ inches below dam crest	3
	Spillway flow is flooding roads and people downstream	3
	Flood flows are overtopping the dam	3
Seepage	New seepage areas in or near the dam	1
	Boils observed downstream of dam	1
	Boils observed downstream of dam with cloudy discharge	2
	New seepage areas with cloudy discharge or increasing flow rate	2
	Seepage with discharge greater than a predetermined rate of flow of _____ (gallons per minute)	3
Sinkholes	Observation of new sinkhole in reservoir area or on embankment	2
	Rapidly enlarging sinkhole	3
Embankment Cracking	New cracks in the embankment greater than 1/2 –inch wide and greater than two feet deep, without seepage	1
	Cracks in the embankment with seepage emerging	2
Embankment Movement	Visual movement/slippage of the embankment slope	1
	Sudden or rapidly proceeding slides of the embankment slopes	2
Instruments	Instrumentation readings beyond predetermined values	1
Earthquake	Measurable earthquake felt or reported within 50 miles of the dam	1
	Earthquake resulting in visible damage to the dam or appurtenances	2
	Earthquake resulting in uncontrolled release of water from the dam	3
Security Threat	Verified bomb threat that, if carried out, could result in damage to the dam	2
	Detonated bomb that has resulted in damage to the dam or appurtenances	3
Sabotage/Vandalism	Damage to the dam or appurtenances with no impacts to the functioning of the dam	1
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	1
	Damage to the dam or appurtenances that has resulted in seepage flow	2
	Damage to the dam or appurtenances that has resulted in uncontrolled water release	3

Emergency level 1: Non-emergency, unusual event, slowly developing.
Emergency level 2: Potential dam failure situation, rapidly developing.
Emergency level 3: Urgent; dam failure appears to be imminent or is in progress.

For further examples and guidance in determining emergency levels, see Appendix B-1.

Emergency Level 1: Unusual Event, Slowly Developing

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STEP 1* - *EVENT DETECTION

Unusual or emergency events can be indicated by:

- Observations made at or near the dam.
- Earthquakes felt or reported at or near the dam.
- Other conditions that can cause an unusual or emergency event at the dam. For example, forecasts of a severe weather event, a flash flood, upstream dam failures or releases, or _____.

Go to Step 2 – Emergency level Determination.

STEP 2* - *EMERGENCY LEVEL DETERMINATION

After an unusual or emergency event is detected or reported, the dam owner is responsible for classifying the event into one of the three emergency levels. Confirm the emergency level by using the chart below.

Emergency Level 1 Table – *further guidance is in Appendix B-1.*

Category	Emergency Level 1 Events
Spillways	Principal spillway severely blocked with debris or structurally damaged
	Principal spillway leaking with muddy flows
Flooding	National Weather Service issues a flood warning for the area
Seepage	New seepage areas in or near the dam
	Boils observed downstream of the dam
Embankment Cracking	New cracks in the embankment greater than 1/2 inch wide and greater than two feet deep, without seepage
Embankment Movement	Visual movement/slippage of the embankment slope
Instruments	Instrument readings beyond predetermined “normal” values
Earthquake	Measurable earthquake felt or reported within 50 miles of the dam
Sabotage/ Vandalism	Damage to the dam or appurtenances with no impacts to dam functions
	Change to the dam or appurtenances that could adversely impact the functioning of the dam

Each of these situations is not normal but has not threatened the operation or structural integrity of the dam, but could affect the operation or structural integrity of the dam if left unchecked.
Go to Step 3: Notification and Communication

STEP 3 – NOTIFICATION AND COMMUNICATIONS

- **Contact the Department of Ecology, Dam Safety Supervisor, and the Dam Owner's Engineer.** Describe the situation and request technical assistance on the next steps you should take.
- **Monitor the dam,** especially during storm events to detect any further development of a potential or imminent dam failure.
- **Contact the _____ County Emergency Manager** if you believe the conditions may worsen and require emergency action.

Emergency Level 1 Notifications

You must use the Contact Checklist (next page) to record all contacts made.

Dam owner or representative:

Name: _____
Organization: _____
Office (_____) _____-_____
Home (_____) _____-_____
Cell (_____) _____-_____
E-mail _____

Washington State Department of Ecology, Dam Safety Office:

Dam Safety Emergency Number:
Office (360) 407-6208
24 hr.: (360) 971-6347

Lead Geotechnical Engineer:
Office: (360) 407 Cell: (360)

Engineering firm (if applicable)

Name: _____
Organization: _____
Office (_____) _____-_____
Home (_____) _____-_____
Cell (_____) _____-_____
E-mail _____

Other contact numbers (as needed)

Name: _____
Organization: _____
Office (_____) _____-_____
Home (_____) _____-_____
Cell (_____) _____-_____
E-mail _____

Name: _____
Organization: _____
Office (_____) _____-_____
Home (_____) _____-_____
Cell (_____) _____-_____
E-mail _____

Name: _____
Organization: _____
Office (_____) _____-_____
Home (_____) _____-_____
Cell (_____) _____-_____
E-mail _____

Go to step 4: Expected Actions

Contact Checklist – Emergency Level 1

(Dam owner/operator to complete during event)

Date: _____

Dam Name: _____, Dam ID Number: _____

_____ County, Washington

Contact Ecology's Dam Safety Office and your engineering firm immediately after you are alerted to an unusual or emergency situation if you need assistance in determining the emergency level (see **Appendix B-1** for additional guidance).

The person making the contacts should initial and record the time of the call and whom they notified for each contact made.

Washington State Department of Ecology, Dam Safety Office:

Dam Safety Emergency Number:
Office (360) 407-6208
24 hr.: (360) 971-6347

Lead Geotechnical Engineer:
Office: (360) 407- Cell: (360)

Engineering firm (if applicable)

Name: _____

Organization: _____

Office (_____) _____-_____

Home (_____) _____-_____

Cell (_____) _____-_____

E-mail _____

Person Contacted	**Time of Contact** (Record and Initial)					

(Attach additional sheets as necessary)

STEP 4 - EXPECTED ACTIONS

Once you have determined the emergency level and made the necessary contacts, follow the steps below:

Emergency Level 1:

You must record all information, observations, and actions taken on the **Event Log Form** on the next page.

Note the times when the conditions change and, if possible, document the situation with photographs and/or video.

- **Assess and monitor conditions:** Inspect the full length of the upstream slope, crest, downstream slope, and downstream toe of the dam. Check the reservoir area, abutments, and downstream channel of the dam for signs of changing conditions.
- **Contact Ecology's Dam Safety office and your dam engineer** to further investigate conditions and recommend corrective actions. Call Ecology's Dam Safety Office immediately if you see increased seepage, erosion, cracking, or settlement. (Refer to the emergency level table on page __ for guidance in determining the appropriate event level for new conditions.)
- **Complete the recommended actions and continue to monitor conditions until risk has ended.**

Go to step 5: Termination

STEP 5 – TERMINATION AND FOLLOW UP, Ending Response and Reporting

Whenever you have activated the EAP, you must take actions to conclude the EAP once the event is over and you have followed all the needed procedures (steps 1 through 4).

Termination responsibilities:

- It is the responsibility of the person who made the original calls to inform each person contacted earlier that the event has concluded. Use the Contact Checklist created during the event to ensure that you have notified everyone.
- The dam owner uses the information gathered during the event (Event Log, Contact Checklist) to complete a **Dam Emergency Event Report** (**Appendix B-4**) at the conclusion of an emergency.
- It is the dam owner's responsibility to distribute copies of the completed report to Ecology's Dam Safety Office, and to the local Emergency Manager.

Unusual or Emergency Event Log

(Dam owner/operator completes during event)

Date: _____

Dam Name: _____, DAM ID Number: _____

_____ County, Washington

When and how was the event detected? _____

_____

Weather conditions: _____

General description of the event: _____

_____

_____

Emergency level determination: _____ Made by: _____

Actions and Event Progression

Date	Time	Action/event progression	Taken/witnessed by

(Attach additional sheets as necessary)

Report prepared by: _____ Date: _____

Emergency Level 2: Potential Dam Failure, Rapidly Developing

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STEP 1 - EVENT DETECTION

Unusual or emergency events may be indicated by:

- Observations at or near the dam by the public, landowner, or employee of the company.
- Strong earthquakes felt or reported at or near the dam.
- Forewarning of conditions that may cause an unusual event or emergency event at the dam. For example, a forecast of a severe weather event, flash flood, or _____.

Go to Step 2: Emergency level Determination

STEP 2 - ***EMERGENCY LEVEL DETERMINATION***

After an unusual or emergency event is detected or reported, the dam owner is responsible for classifying the event into one of the three emergency levels. Confirm the emergency level by using the chart below.

Emergency Level 2 Table – *further guidance is in Appendix B-1.*

Event	Emergency Level 2 Events
Flooding	The reservoir elevation reaches the predetermined notification trigger elevation of ___ inches below dam crest
Seepage	Boils observed downstream of dam with cloudy discharge
Sinkholes	New seepage areas with cloudy discharge or increasing flow rate
	Observation of new sinkhole in reservoir area or on embankment
Embankment Cracking	Cracks in the embankment with seepage emerging
Embankment Movement	Sudden or rapidly proceeding slides of the embankment slopes
Earthquake	Earthquake resulting in visible damage to the dam or appurtenances
Security Threat	Verified bomb threat that, if carried out, could result in damage to the dam
Sabotage/Vandalism	Damage to the dam or appurtenances that has resulted in seepage flow

These situations may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. This emergency level also applies when flow through the spillway may result in flooding of downstream areas where people near the channel could be endangered.

Go to Step 3: Notification and Communication

STEP 3 – NOTIFICATION AND COMMUNICATIONS

Notification:

- **Contact the 911 dispatcher** and inform him/her that the **EAP has been activated.**

***911 Script:** the following message may be used to help describe the situation to the **911** dispatcher and the _____ County Emergency Manager:

"This is _____ We have an emergency condition located _____ miles _____ of city/landmark _____

We have activated the Emergency Action Plan for this dam and are currently under Emergency Level 2. We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure.

Reference the Inundation Map in your copy of the Emergency Action Plan if an evacuation is necessary.

We will advise you as soon as the situation is resolved or if the situation gets worse.

You can call me at _____.

If you cannot reach me, please call _____.

- **Contact the Local Emergency Manager or _____** to inform him/her that the **EAP has been activated** and, if current conditions get worse, the emergency level may increase and evacuation may be necessary.

- **Contact the Department of Ecology, Dam Safety Supervisor and the Dam Owner's Engineer (if applicable)**. Describe the situation, and request technical assistance on the next steps to take.

Go to Step 3: Communication

Communication:

Emergency Level 2

- **Report any changes** in the condition of the dam to the **Local Emergency Manager**. If the dam condition worsens and failure becomes imminent, your Local Emergency Manager must be notified immediately of the change in the emergency level to evacuate the people at risk downstream.

- **Monitor the dam** to detect any further development of a potential or imminent dam failure.

- **The local Emergency Manager prepares to contact people and facilities at risk. Evacuation list (page___).**

- **Be aware of roads and highways in the path of floodwaters.** See **Inundation map Appendix A-2** and **Roadways at risk - page___,** for locations and approximate time that floodwaters will reach the roadways.

Emergency Level 2: Notifications - Level 2 Contact List

Potential Dam Failure - Rapidly Developing

You must use the Contact Checklist (next page) to record all contacts made.

1) Dam owner or representative:

Name/ Organization:_____

Office (_____)_____-_____

Home (_____)_____-_____

Cell (_____)_____-_____

2) (Prepare to start evacuation procedures, contact numbers page___)

Call 911*

and/or

Name:_____
(Local/County Emergency Manager)

Phone (_____)_____

3) Washington State Department of Ecology, Dam Safety Office

Emergency Number at: (360) 407-6208 (Office) or (360) 971-6347 (24 hr.)

Lead Geotechnical Engineer: (360) 407- (office) or (360) (cell)

4) Engineering Firm (if applicable):

Name/ Organization:_____

Office (_____)_____-_____

Home (_____)_____-_____

5) _____

Name/ Organization:_____

Office (_____)_____-_____

Home (_____)_____-_____

6) U.S. Forest Service (if dam is on USFS land)

Ranger/District_____

Name/number_____

7) Other contact numbers:

Name/number_____

(_____)_____-_____

Contact Checklist – Emergency Level 2

(Dam owner/operator to complete during event)

Date: _____

Dam Name: _____, Dam ID Number: _____

_____ County, Washington

Contact Ecology's Dam Safety Office and your engineering firm immediately after you are alerted to an unusual or emergency situation if you need assistance in determining the emergency level (see **Appendix B-1** for additional guidance).

The person making the contacts should initial and record the time of the call and whom they notified for each contact made.

Local Emergency Manager	**Washington State Department of Ecology, Dam Safety Office:**	**Engineering Firm** (if applicable)
Name: _____ Office (_____) _____-_____ Home (_____) _____-_____ Cell (_____) _____-_____ Or call **911**	Dam Safety Emergency Number: Office (360) 407-6208 24 hr.: (360) 971-6347 Lead Geotechnical Engineer: Office: (360) 407· Cell: (360)	Name: _____ Firm: _____ Office (_____) _____-_____ Home (_____) _____-_____ Cell (_____) _____-_____ E-mail _____

Person Contacted	**Time of Contact** (Record and Initial)					

(Attach additional sheets as necessary)

Summary of People and Structures at Greatest Risk (list in order of proximity to the dam)

Residence/Business/ Structure	Address	Phone Number	Approximate depth & time flood may arrive
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____

Summary of Roads at Risk (list in order of proximity to the dam)

Roads or Highways at risk	Location, intersections etc. (directions)	Approximate depth & time flood may arrive
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____

(Attach additional sheets as necessary; also see Appendix A-4 & A-5 for extra contact lists)

Go to Step 4: Expected Actions

STEP 4 - EXPECTED ACTIONS

Once you have determined the emergency level and made needed contacts, follow the steps below:

Emergency Level 2 - *(Potential dam failure, rapidly developing)*

Record all information, observations, and actions taken on the Event Log Form (after this section or in **Appendix B-3**) as it happens or at a minimum daily. Note the time of changing conditions. Document the situation with photographs and video, if possible.

Stay safe! Until conditions at the dam have been evaluated, take precautions for your safety!

- If time permits, the dam owner or a representative will inspect the dam. If you observe piping, increased seepage, erosion, cracking, or settlement, immediately report this to the Local Emergency Manager and State Dam Safety Engineer. Refer to the emergency level table for guidance in determining the appropriate event level for the new condition and recommended actions.

  A. Inspect the full length of the upstream slope, crest, downstream toe, and downstream slope of the dam.

  B. Check the reservoir area, abutments, and downstream channel for signs of changing conditions.

- The dam owner will contact the State Dam Safety Engineer and Dam Owner's Engineer and request technical staff to investigate the situation and recommend corrective actions.

- Take emergency remedial actions, if appropriate.

Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam. Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions.

  A. Close monitoring of the dam must be maintained to confirm the success of any remedial action taken at the dam.

  B. If possible, remedial action should be developed through consultation with the Department of Ecology, Dam Safety Supervisor.

- Refer to the Resources Available list **(Appendix A-3)** for sources of equipment and materials

Embankment overtopping:

- Place sandbags along the low areas of the top of the dam to reduce the likelihood of overtopping and safely direct more water through the spillway.

- Cover the weak areas of the top of the dam and downstream slope with riprap, sandbags, plastic sheets, or other materials to provide erosion-resistant protection.

Seepage and sinkholes:

- 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, pumping or siphoning may be required. Continue lowering the water level until the seepage stops.

- If the entrance to the seepage origin point is visible in the reservoir (possible whirlpool) and accessible, attempt to reduce the flow by plugging the entrance with readily available materials, such as hay bales, bentonite, soil, rock, or plastic sheeting.

  A. 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.

  B. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

Embankment movement:

- Open outlet(s) and lower the reservoir to a safe level at a rate commensurate with the urgency and severity of the condition of the slide or slump. If the outlet is damaged, blocked or of limited capacity, pumping or siphoning may be required.

- Repair settlement of the crest by placing sandbags or fill materials in the damaged area to restore freeboard.

- Stabilize slides on the downstream slope by creating a soil or rock buttress against the toe area of the slide.

Earthquake:

- Immediately conduct a general overall visual inspection of the dam.

- Perform field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.

- Drain reservoir if required. If the low-level outlet is damaged, consider pumping or siphoning.

Go to Step 5: Termination

Unusual or Emergency Event Log

(Dam owner/operator completes during event)

Date: _____

Dam Name: _____, DAM ID Number: _____

_____ County, Washington

When and how was the event detected? _____

_____

Weather Conditions: _____

General description of the event: _____

_____

_____

Emergency level determination: _____ Made by: _____

Actions and Event Progression

Date	Time	Action/event progression	Taken/witnessed by

(Attach additional sheets as necessary)

Report prepared by: _____ Date: _____

STEP 5 – TERMINATION AND FOLLOW UP, Ending Response and Reporting

Whenever the EAP has been activated and an emergency declared, the Local Emergency Manager and the dam owner must take actions to conclude the EAP once the event is over and all necessary procedures (steps 1 through 4) have been followed.

Termination responsibilities:

Your Local Emergency Manager is responsible for terminating the EAP operations for a Level-2 emergency, and relaying this decision to the dam owner.

- Prior to termination of an Emergency Level 2 or 3 events, the Washington State Dam Safety Engineer must assure the dam is inspected to determine if any hazardous conditions exist.

- If it is determined that hazardous conditions no longer exist, the Washington State Dam Safety Supervisor will advise the Local Emergency Manager to terminate EAP operations.

- The person who made the original calls must inform each person contacted that the emergency is now concluded. Use the Contact Checklist **(Appendix B-2)** created during the event to verify everyone has been contacted.

- The dam owner will use the information that was gathered during the event (Event Log and Contact Checklist) to complete a Dam Emergency Event Report (**Appendix B-4**) at the conclusion of an emergency.

- The dam owner must distribute copies of the completed report to Ecology's Dam Safety Office and to the local Emergency Manager.

Emergency Level 3: Urgent, Dam Failure Appears Imminent or is in Progress

(Place a Red Colored Tab that extends over the edge of the page to aid in locating this section)

STEP 1* - *EVENT DETECTION

Unusual or emergency events may be indicated by:

- Observations at or near the dam by the public, landowner, or employee of the company.
- Severe earthquakes felt or reported in the vicinity of the dam.
- Forewarning of conditions that may cause an unusual event or emergency event at the dam. For example, a severe weather event, flash flood forecast, or _____.

Go to Step 2: Emergency level Determination

STEP 2* - *EMERGENCY LEVEL DETERMINATION

Once detected or reported, the dam owner is responsible for classifying the event into one of the three emergency levels. Confirm the emergency level 3 with the table below.

Emergency Level 3 – Urgent – *further guidance is in Appendix B-1.*

Event	Situation	Emergency Level*
Flooding	The reservoir elevation reaches the predetermined notification trigger elevation of ___ inches below the dam crest	3
	Spillway flow is flooding roads and buildings downstream	3
	Flood flows are overtopping the dam	3
Seepage	Seepage with discharge greater than a predetermined rate of flow of _____ (gallons per minute)	3
Sinkholes	Rapidly enlarging sinkhole in reservoir area or embankment	3
Earthquake	Earthquake resulting in uncontrolled release of water from the dam	3
Security Threat	Detonated bomb that has resulted in damage to the dam or appurtenances	3
Sabotage/Vandalism	Damage to the dam or appurtenances that has resulted in uncontrolled water release	3

These situations are typical examples of emergency dam conditions.

- Extreme weather events that exceed dam design can cause significant flow through the emergency spillway or overtopping of the embankment.

- Not all emergency conditions are listed above and the dam owner is urged to use safety as a priority in determining whether a specific condition should be defined as an emergency. See the "*Examples of Emergency Situations"* section in **Appendix B-1** for a more complete discussion of potential emergency conditions.

Go to Step 3: Notification and Communications

STEP 3* – *NOTIFICATION AND COMMUNICATIONS

Providing Notice: *(Urgent; dam failure appears imminent or is in progress)*

- **Utilize the Level 3 Contact list – page __ to record contacts made and time of contact.**

- **Contact the 911 dispatcher** inform him/her that the **EAP has been activated** (*911 script below).

> ***911 Script:** the following message may be used to help describe the situation to the **911** dispatcher and the _____ County Emergency Manager:
>
> *"This is). We have an emergency condition at located _____ miles city/landmark ."*
>
> *We have activated the Emergency Action Plan for this dam and are currently under Emergency Level 3. We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure. Reference the Inundation Map in your copy of the Emergency Action Plan if an evacuation is necessary.*
>
> *We will advise you as soon as the situation is resolved or if the situation gets worse.*
>
> *You can call me at (_____)_____-_____,*
>
> *If you cannot reach me, please call (_____)_____-_____.*

- **Notify the Local Emergency Manager** or _____to inform him/her that the **EAP has been activated** and the potentially flooded area must be evacuated and potential inundated roads closed.

- **Inundation map (Appendix A-2** and **Roadways at risk - page__),** for locations and approximate times floodwaters will reach the roadways.

- **Local Emergency Manager or_____ begins contacting people and facilities at risk. Evacuation list (page __)** Emergency personal may use the following scripted message to communicate the emergency status to the public:

> *"Attention: This is an emergency message from the _____County Emergency Manager. Listen carefully. Your life may depend on immediate action. (name of dam)_____ is failing. Repeat, (name of dam) _____ is failing.*
>
> *If you are in or near this area, proceed immediately to high ground away from the valley. Do not travel on (names of roads or highways) _____ or return to your home to recover your possessions.*
>
> *You cannot outrun or drive away from the flood wave. Move immediately to high ground away from the valley."*
>
> **Repeat message.**

- **Contact Ecology's Dam Safety Supervisor and the Dam Owner's Engineer (if applicable).** Describe the situation, and request technical assistance on the next steps to take.

Emergency Level 3 Notifications

Urgent Event --- Dam failure is imminent or in progress!

You must use the Contact Checklist (next page) to record all contacts made.

1) Dam owner or representative:

Name/ Organization:_____

Office (_____)_____-_____

Home (_____)_____-_____

Cell (_____)_____-_____

2

2) Washington State Department of Ecology, Dam Safety Office

Emergency Number at:
(360) 407-6208 (Office) or (360) 971-6347 (24 hr.)

**Lead Geotechnical Engineer: (360) 407-
(office) or (360) (cell)**

Engineering Firm (if applicable):

**Name/
Organization:_____**

Office (_____)_____-_____

Home (_____)_____-_____

Other contact numbers:

Name/number_____

(_____)_____-_____

Name/number_____

(_____)_____-_____

1

1) (This starts evacuation procedures, see contact numbers page___)

Call *911

and/or

Name:_____
(Local/County Emergency Manager)

Phone (_____)_____-_____

1) Regional Emergency Manager

Name:_____

Phone (_____)_____-_____

24-hr No.:(____)_____-_____

Secondary Call

National Weather Service

Name:_____

Phone (_____)_____-_____
or
24-hr No.: (____)_____-_____

Secondary Call

U.S. Forest Service (if dam is on USFS land)
Ranger/District_____

Name/number_____

(_____)_____-_____

Contact Checklist – Emergency Level 3

Dam owner/operator to complete during event)

Date: _____

Dam Name: _____, Dam ID Number: _____

_____ County, Washington

Contact Ecology's Dam Safety Office and your engineering firm immediately after you are alerted to an unusual or emergency situation if you need assistance in determining the emergency level (see **Appendix B-1** for additional guidance).

The person making the contacts should initial and record the time of the call and whom they notified for each contact made.

Local Emergency Manager

Name: _____

Office (_____) _____-_____

Home (_____) _____-_____

Cell (_____) _____-_____

Or call 911

Washington State Department of Ecology, Dam Safety Office:

Dam Safety Emergency Number:
Office (360) 407-6208
24 hr.: (360) 971-6347

Lead Geotechnical Engineer:
Office: (360) 407-
Cell: (360)

Person Contacted	**Time of Contact** (Record and Initial)					

(Attach additional sheets as necessary)

Summary of People and Structures at Greatest Risk (list in order of proximity to the dam)

Residence/Business/ Structure	Address	Phone Number	Approximate Depth & time flood may arrive
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____
		(___)____-_____ (___)____-_____	Depth: _____ Time: _____

Summary of Roads at Risk (list in order of proximity to the dam)

Roads or Highways at risk	Location, intersections etc. (directions)	Approximate Depth & time flood may arrive
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____

(Attach additional sheets as necessary. Also see Appendix A-4 & A-5 for extra contact lists)

Go to Step 4: Expected Actions

STEP 4- EXPECTED ACTIONS

Once the emergency level has been established and contacts have been made, follow the steps below:

Emergency Level 3 – *Urgent: dam failure is imminent or in progress*:

The Local Emergency Manager, 911 dispatcher, or other emergency personal is responsible for following their own emergency procedures. Completion of the **Section 3, Roles and Responsibilities** contact list will outline ***who*** is responsible for notification, evacuations and road closures.

The Dam Owner/Operator will:

- ***Stay safe! Until conditions at the dam have been evaluated, take precautions for your safety!***
- Continue to use the Contact Checklist (**Appendix B-2**) to record each person contacted and when.
- Record all information, observations, and each step taken on the Event Log Form (after this section or in **Appendix B-3**) as they happen or at least daily. Document the situation with photographs and video if possible.
- Keep in frequent contact with the Local Emergency Manager, providing with updates of the situation to assist in timely decisions concerning warnings and evacuations. If all means of communication are lost:

  (a) Try to find out why.

  (b) Try to get to another radio or telephone that works.

  (c) Get someone else to try to reestablish communications.

  (d) If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with the Local Emergency Manager and emergency services.
- Do whatever is necessary to bring people in immediate danger to safety if directed by the Local Emergency Manager (anyone on the dam, downstream from the dam, boating on the reservoir, or evacuees).
- Advise people monitoring the dam to follow safe procedures. Everyone should stay away from any of the failing structures or slopes and out of the potential breach inundation areas.
- Contact the Washington State Dam Safety Engineer and Dam Owner's Engineer and request technical staff to investigate the situation and recommend corrective actions.
- Initiate emergency remedial actions, if appropriate. Refer to the Resources Available list (**Appendix A-3**) for sources of equipment and materials.
- Continue to inspect the full length of the upstream slope, crest, downstream toe, and downstream slope, to the extent it can be done safely. Check the reservoir area, abutments, and downstream channel for signs of changing conditions. If you observe piping, increased seepage, erosion, cracking, or settlement, immediately report changing conditions to the Local Emergency Manager and State Dam Safety Engineer.

Go to Step 5: Termination

Unusual or Emergency Event Log:

(Dam owner/operator completes during event)

Date: _____

Dam Name: _____, DAM ID Number: _____

_____ County, Washington

When and how was the event detected? _____

_____

Weather Conditions: _____

General description of the event: _____

_____

_____

Emergency level determination: _____ Made by: _____

Actions and Event Progression

Date	Time	Action/event progression	Taken/witnessed by

(Attach additional sheets as necessary)

Report prepared by: _____ Date: _____

STEP 5 – TERMINATION AND FOLLOW UP, Ending Response and Reporting

Whenever the EAP has been activated and an emergency declared, the EAP will need to be concluded once the event is over.

Termination responsibilities:

Your Local Emergency Manager is responsible for terminating an emergency Level 3 Response and relaying this decision to the dam owner.

- Prior to termination of an Emergency Level 3 event, the Washington State Dam Safety Engineer will assure the dam is inspected to determine if any hazardous conditions remain.

- If it is determined that there are no remaining hazardous conditions, the Washington State Dam Safety Supervisor will advise the Local Emergency Manager to terminate EAP operations.

- It is then the responsibility of the individual who made the original calls to inform each person contacted during the emergency that the event is now concluded. Use the **Contact Checklist** (**Appendix B-2**) created during the event to verify that everyone receives notice.

- The dam owner will use the information gathered during the event (Event Log and Contact Checklist) to complete a **Dam Emergency Event Report** (**Appendix B-4**) at the conclusion of an emergency.

- The dam owner will distribute copies of the completed report to Ecology's Dam Safety Office and the local Emergency Manager.

MAINTENANCE (Training, Reviewing, and Updating the EAP)

Introduction:

Emergency Action Plans should be considered "Living Documents." This means that:

- They will never be complete.
- They should be reviewed and updated at least once a year.
- The local emergency manager should take part in the annual review.
- All updates should be promptly distributed to all plan holders, (owners keep the "master" Emergency Action Plan, and record where copies of the EAP's are located).

Dam emergency events and failures are not common events. Therefore, training and exercises are necessary to maintain emergency response readiness, timeliness, and effectiveness. The EAP therefore requires periodic maintenance to remain current and as useful and effective as possible.

Review the information in the "Emergency Action Plan Guidelines" for additional information on how to develop exercise and review procedures.

EAP Training:

Periodic training and exercises are necessary to ensure that people involved are thoroughly familiar with all elements of the plan, as well as their related duties and responsibilities. An appropriate number of people should receive training to ensure adequate coverage at all times.

EAP exercises can include:

- Orientations
- Phone drills
- Table top exercises
- Functional exercises

The level of detail associated with testing and how often plans are tested depends on the size of the facility, the population at risk, and what is located in the floodplain. For low risk dams, testing could consist of reviewing the EAP and verifying that the telephone numbers on the notification chart and the resource list is current.

At a minimum, owners of high and significant hazard dams should conduct an annual orientation and phone drill. The orientation can be a simple meeting where those individuals and entities with a stake in the EAP come together to review the roles and responsibilities described in the EAP. Orientations are especially useful for bringing new staff and leadership within any of the various organizations up to speed with regard to the components of the EAP.

Owners of high hazard dams should maintain a comprehensive exercise program that includes all the components listed above. Tabletop and Functional exercises are typically complex, but should be conducted about every five years.

Key personnel from the Dam Safety Office and local emergency management agencies should be invited to participate in orientation and exercises provided by the dam owner.

Reviewing and Updating the EAP:

The EAP should be reviewed and updated annually, including:

- Calling all contacts on the notification charts in the EAP to verify that names and phone numbers are current.
- Contacting the Local Emergency Management Agency to verify where the EAP is kept and if responsibilities as described in the EAP are understood.
- Calling the locally available resources to verify that the phone numbers, addresses, and services are current.
- Review information on the people and structures at risk and incorporate changes in development within the flood inundation area.
- ***Any deficiencies found during training and exercises should be noted and the plan revised.***

The dam owner is responsible for updating the EAP documents to revise any changes of contact information, services, service providers, or people, structures, or roads at risk. When revisions occur, the dam owner should provide the revised pages and a revised Revision Summary Page to all the EAP document holders. Record where copies of the EAP are maintained in the NAME form on the next page.

The plan holders are responsible for updating their copies of the EAP whenever they receive revisions. Discard out of date pages to avoid confusion with the revisions.

Emergency Action Plan Locations:

Copy Number	Organization Name and Address	Person(s) receiving copy
I	Owner or Representative _____ Phone: (____)_____-_____ Address_____ _____ e-mail _____	
2	_____ Local/County Emergency Manager Phone: (____)_____-_____ Address_____ _____ e-mail _____	
3	Dept of Ecology - Dam Safety Office Office: (360) 407- PO Box 47600 Olympia, WA 98504-7600 @ecy.wa.gov	Dam Safety Office Name of lead engineer
4	_____ Phone: (____)_____-_____ Address_____ _____ e-mail_____	

(Attach additional sheets as necessary)

Record of Revisions and Updates Made to this Emergency Action Plan

Revision Date	Revisions made	By whom and Phone number
1 ----------		
2 ----------		
3 ----------		
4 ----------		
5 ----------		
6 ----------		
7 ----------		
8 ----------		
9 ----------		
10 ----------		

(Attach additional sheets as necessary)

APPENDIXES: MAPS, SUPPORTING DATA, FORMS & GLOSSARY

Appendix A

Page ____

Appendix A-1 Location and Vicinity Maps

Location and Vicinity Maps

(Attach additional sheets as necessary)

Appendix A-2 Inundation Maps

Inundation Map

(Attach additional sheets as necessary)

Appendix A-3 Resources Available

Locally available equipment, labor, and materials:
(Revised: _____)

Heavy equipment service and rental	***Sand and gravel supply***	***Ready-mix concrete supply***
Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____
Sand Bags	***Diving Contractor***	***Pumps***
Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____
Other	***Other***	***Other***
Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____	Name: Address: Phone: (____)_____-_____

Notes:

_____

_____

_____

Appendix A-4

Summary of People and Structures at Greatest Risk (list in order of proximity to the dam)

Residence/Business/ Structure	**Address**	**Phone Number**	**Approximate depth & time flood may arrive**
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________
		(___)____-________ (___)____-________	Depth: __________ Time: ___________

Appendix A-5

Summary of Roads at Risk (list in order of proximity to the dam)

Roads or Highways at risk	**Location, intersections etc. (directions)**	**Approximate depth & time flood may arrive**
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____
		Depth: _____ Time: _____

Appendix A-6 Plan and Profile Views of the Dam

Plan and Profile Views of the Dam

(Attach additional sheets as necessary)

Appendix A-7 Reservoir Elevation, with Area and Capacity Data

Reservoir Elevation, with Area and Capacity Data

(Attach additional sheets as necessary)

Appendix B

Page No.____

Appendix B-1

Examples of Emergency Situations:

The following are examples of conditions that may occur at a dam that usually constitute an emergency. Adverse or unusual conditions that can cause the failure of a dam are typically related to aging, or design and construction oversights. Extreme weather events that may exceed design conditions can cause significant flow through the emergency spillway or can overtop the embankment. Accidental or intentional damage to the dam may also result in an emergency situation. We have grouped the examples below to identify the more likely emergency level conditions. They are provided as guidance only. Not all emergency conditions are listed and the dam owner is urged to use conservative judgment in determining whether a condition at the dam constitutes an emergency.

Emergency Spillway Flows:

Emergency Level 2 - Potential dam failure; rapidly developing:

1. Significant erosion or head cutting of the spillway is occurring, but a breach of the spillway crest that would result in an uncontrolled release from the reservoir does not seem imminent.
2. Flow through the emergency spillway is likely to cause flooding that threatens harm to any person, home, or road downstream from the dam.

Emergency Level 3 - Urgent; dam failure is imminent or in progress:

1. Significant erosion or head cutting of the spillway is occurring at a rapid rate and a breach of the control section appears imminent.
2. Flow through the emergency spillway is causing flooding that threatens harm to any person, home, or road downstream from the dam.

Embankment Overtopping:

Emergency Level 2 - Potential dam failure; rapidly developing:

1. The reservoir level has reached the top of the dam and is projected to continue to rise.
2. Flow is occurring over the embankment, but it is not eroding the embankment slope, and the reservoir is expected to continue to recede.

Emergency Level 3 - Urgent; dam failure is imminent or in progress:

1. Flow is occurring over the embankment and is causing erosion damage to the embankment slope.
2. The reservoir level has exceeded the top of the dam and is expected to continue to rise.

Seepage and Sinkholes:

Emergency Level 2 - Potential dam failure; rapidly developing:

1. Cloudy seepage or soil deposits are observed at seepage exit points or from internal drain outlet pipes.
2. New or increased areas of wet or muddy soils are present on the downstream slope, abutment, and/or foundation of the dam, and there is an easily detectable and unusual increase in volume of downstream seepage.
3. Significant new or enlarging sinkhole(s) on or near the dam.
4. Reservoir level is falling without apparent cause.

5. The following known dam defects are or soon will be inundated by a rise in the reservoir:
    a. Sinkhole(s) located on the upstream slope, crest, abutment, and/or foundation of the dam; or
    b. Transverse cracks extending through the dam, abutments, or foundation.

Emergency Level 3 - Urgent; dam failure is imminent or in progress:

1. Rapid increase in cloudy seepage or soil deposits at seepage exit points, to the extent that failure appears imminent or is in progress.
2. Rapid increase in volume of downstream seepage, to the extent that failure appears imminent or is in progress.
3. Water flowing out of holes in the downstream slope, abutment, and/or foundation of the dam, to the extent that failure appears imminent or is in progress.
4. Whirlpools or other evidence exists indicating that the reservoir is draining rapidly through the dam or foundation.
5. Rapid enlargement of sinkhole(s) is forming on the dam or abutments, to the extent that failure appears imminent or is in progress.
6. Rapid increase in flow through crack(s) which is eroding materials, to the extent that failure appears imminent or is in progress.

Embankment Movement and Cracking

Emergency Level 2 - Potential dam failure; rapidly developing:

1. Settlement of the crest, slopes, abutments and/or foundation of the dam that may eventually result in breaching of the dam.
2. Significant increase in length, width, or offset of cracks in the crest, slopes, abutments, and/or foundation of the dam, which may eventually result in breaching of the dam.

Emergency Level 3 - Urgent; dam failure is imminent or in progress:

1. Sudden or rapid progression of slides, settlement, or cracking of the embankment crests, slopes, abutments, and/or foundation, where breaching of the dam appears imminent or is in progress.

Appendix B-2

Contact Checklist – Emergency Level ____

(Dam owner/operator to complete during event)

Date_____

Dam Name:_____, Dam ID Number: _____

_____ County, Washington

Contact Ecology's Dam Safety Office and your engineering firm immediately after you are alerted to an unusual or emergency situation if you need assistance in determining the emergency level (see Appendix B-1 for additional guidance).

The person making the contacts should initial and record the time of the call and whom they notified for each contact made.

Local Emergency Manager	**Washington State Department of Ecology, Dam Safety Office:**	**Engineering Firm** (if applicable)
Name: _____ Office (_____) _____-_____ Home (_____) _____-_____ Cell (_____) _____-_____ Or call **911**	Dam Safety Emergency Number: Office (360) 407-6208 24 hr.: (360) 971-6347 Lead Geotechnical Engineer: Office: (360) 407- Cell: (360)	Name: _____ Firm: _____ Office (_____) _____-_____ Home (_____) _____-_____ Cell (_____) _____-_____ E-mail _____

Person Contacted	**Time of Contact** (Record and Initial)					

Continue on back, as necessary

Person Contacted	**Time of Contact** (Record and Initial)					

Notes:

Appendix B-3

Unusual or Emergency Event Log, *(to be completed during an emergency)*

Date:_____

Dam Name: _____, DAM ID Number: _____

_____ County, Washington

When and how was the event detected? _____

_____

Weather conditions: _____

General description of the emergency event: _____

_____

_____

Emergency level determination: _____ Made by: _____

Actions and Event Progression

Date:	**Time:**	**Action/event progression**	**Taken by:**

Continue on back, as necessary
Report prepared by: _____ Date: _____

Date:	Time:	Action/event progression	Taken by:

Appendix B-4

Dam Emergency Event Report, *(Dam owner must complete and submit to Ecology once emergency has concluded)*

Dam name: _____ State DAM ID: _____

Dam location: _____ County _____ _____
(City) *(County)* *(Stream/River)*

Date of event: _____ Time:_____

Weather conditions: _____

General description of event: _____

_____

_____

Area(s) of dam affected: _____

Extent of dam damage: _____

Possible cause(s): _____

Effect on dam's operation: _____

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 B-5

Dam Hazard Classification Table

The downstream hazard classification for your dam will be determined by the Dam Safety Office and is provided to the dam owner. The table below is one of the tools that are used to assess the risk of a dam failure on downstream areas. Each hazard classification level is an estimation of the damage that would occur from a hypothetical dam failure occurring with the reservoir at normal storage elevation and maximum storage elevation.

Downstream Hazard Potential	Downstream Hazard Classification	Population at Risk	Economic Loss Generic Descriptions	Environmental Damages
Low	**3**	**0**	**Minimal** No inhabited structures. Limited agriculture development.	No deleterious materials in water
Significant	**2**	**1 to 6**	**Appreciable** 1 or 2 inhabited structures. Notable agriculture or work sites. Secondary highway and/or rail lines.	Limited water quality degradation from reservoir contents and only short-term consequences.
High	**1C**	**7 to 30**	**Major** 3 to 10 inhabited structures. Low density suburban area with some industry and work sites. Primary highways and rail lines.	Severe water quality degradation potential from reservoir contents and long-term effects on aquatic and human life.
High	**1B**	**31-300**	**Extreme** 11 to 100 inhabited structures. Medium density suburban or urban area with associated industry, property and transportation features.	Severe water quality degradation potential from reservoir contents and long-term effects on aquatic and human life.
High	**1A**	**More than 300**	**Extreme** More than 100 inhabited structures. Highly developed, densely populated suburban or urban area with associated industry, property, transportation and community lifeline features.	Severe water quality degradation potential from reservoir contents and long-term effects on aquatic and human life.

Appendix B-6

Glossary of Terms

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 in the downstream direction from the dam.
Acre-foot	A unit of (volumetric) measure that would cover one acre with water (or other fluid) to a depth of one foot. One acre-foot is equal to 43,560 cubic feet or 325,850 gallons.
Appurtenant structures	Ancillary features of a dam such as outlets, spillways, power plants, tunnels, etc.
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.
Breach	An opening through a dam that allows the uncontrolled draining of a reservoir. A controlled breach is a constructed opening. An uncontrolled breach is an unintentional opening caused by discharge from the reservoir. A breach is generally associated with the partial or total failure of the dam.
Conduit	A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.
Control section	A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.
Dam	A man-made barrier, together with appurtenant structures, constructed above the natural surface of the ground for the purpose of impounding water.
Dam failure	The uncontrolled release of a dam's impounded water.
Dam Owner	Any person, private or non-profit company, special district, federal, state, or local government agency, or any other entity in direct routine control of a dam and reservoir, and/or directly involved in the physical operation and maintenance of a dam.
Drain, blanket	A layer of pervious material placed to facilitate drainage of the foundation and/or embankment.
Drain, chimney	A vertical or inclined layer of pervious material in an embankment to facilitate and control drainage of the embankment fills.
Drain, toe	A system of pipe and/or pervious material along the downstream toe of a dam used to collect seepage from the foundation and embankment and convey it to a free outlet.

Drainage area (Watershed)	The area that drains to a particular point on a river or stream.
Drawdown	The difference between a water level and a lower water level in a reservoir within a particular time.
Emergency	A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.
Emergency Action Plan	A written document prepared by the dam owner, describing a detailed plan of actions for response to emergency or unusual events, including alerting and warning emergency officials in the event of a potential or imminent dam failure or other emergency related to the safety of the dam and public.
Engineer	A Professional Engineer registered and licensed in the State of Washington. The engineer must be sufficiently qualified and experienced in the design, construction, and safety evaluation of the type of dam under consideration.
Filter	One or more layers of granular material graded (either naturally or by selection) so as to allow seepage through or within the layers while preventing the migration of material from adjacent zones.
Freeboard	The vertical dimension between the crest (or invert) of the emergency spillway and the crest of the dam.
Groin	That area along the intersection of the face of a dam and the abutment.
Hazard Classification	The placement of a dam into one of three categories (High, Significant & Low) based on the hazard potential derived from an evaluation of the probable adverse consequences due to failure or improper operation of the dam.
Height, Jurisdictional	The vertical dimension measured from the elevation of the lowest point of the natural surface of the ground, or from the invert of the outlet pipe if excavated below the natural surface of the ground, whichever is lower, where the low point occurs along the longitudinal centerline of the dam, up to the spillway crest of the emergency spillway.
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	A map depicting the area downstream from a dam that would reasonably be expected to be flooded in the event of a failure of the dam.
Local Emergency Manager	Person(s) responsible for developing, organizing, and exercising a community's emergency operations plan. Typically, City Police or Fire Department, or County Sheriff's Department personnel act as the Local Emergency Manager.
Notification	Immediately inform appropriate individuals, organizations, or agencies about a potential emergency event so they can initiate appropriate actions.

Outlet	A conduit (usually regulated by gates or valves) used for controlled or regulated releases of impounded water from the reservoir.
Piping	The progressive destruction of an embankment or embankment foundation by internal erosion of the soil by seepage flows.
Reservoir	A body of water impounded by a dam.
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	An appurtenant structure that conducts overflows from a reservoir.
Spillway (principal)	The overflow structure designed to limit or control the operating level of a reservoir, and first to be activated in runoff conditions.
Spillway (emergency)	The appurtenant structure designed to pass the Inflow Design Flood in conjunction with the routing capacity of the reservoir and any principal or service spillway(s).
Spillway crest	The elevation of the floor of a spillway, grade control structure, or ogee crest above which spillway flow begins.
State Dam Safety Engineer	For purposes of this EAP, the Washington State, Department of Ecology, Dam Safety Office engineer(s) responsible for safety inspections, plan review and determining the safe reservoir storage level of assigned dams.
Toe of dam	The junction of the upstream or downstream face of an embankment with the ground surface.
Top of dam (dam crest)	The elevation of the uppermost surface of an embankment which can safely impound water behind the dam.

Water Equivalents Table

An acre-foot covers one acre of land one foot in depth.

1 cubic foot…….7.48 gallons…….6.25 lbs of water
1 acre foot……...43,560 cubic feet…….325,851 gallons
1 cubic foot per second (CFS)……..7.48 gallons per second
1 CFS…..448.8 GPM…..646,272 GPD…..1.98 acre-ft./day
1,000 GPM…….2.23 CFS…….4.42 acre-ft./day
1 million gallons per day……..694 GPM……..1.55 CFS

Appendix B-7

Signature Page, Concurrences

By my signature, I acknowledge that I, or my representative, have reviewed this plan and concur with the tasks and responsibilities assigned herein for my organization and myself.

1. _____
Signature *Organization* *Date*

Dam Owner: _____
Printed title and name

2. _____
Signature *Organization* *Date*

Washington State Dam Safety Office:_____
Printed title/organization and name

3. _____
Signature *Organization* *Date*

County Emergency Management Coordinator: _____
Printed title/organization and name

4. _____
Signature *Organization* *Date*

_____: _____
Printed title/organization and name

5. _____
Signature *Organization* *Date*

_____: _____
Printed title/organization and name

6. _____
Signature *Organization* *Date*

_____: _____
Printed title/organization and name