



2023 Dam Safety Workshop

- Emergency Action Plans & Tabletop Exercises

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Emergency Action Plans

EAPs required for:

- High hazard dams
- Non-exempt significant hazard dams

EAPs recommended for:

- Exempt significant hazard dams



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Emergency Action Plans

EAP guidelines and templates available

- Updated in 2019
- <https://www.tceq.texas.gov/compliance/investigation/damsafety/prog.html>



Guidelines for Developing Emergency Action Plans for Dams in Texas

Dam Safety Program
Critical Infrastructure Division
Texas Commission on Environmental Quality
GI-394
Revised December 2019

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Emergency Action Plans

- EAPs must be reviewed and updated annually – letter/email acknowledgement sent to TCEQ with Log Sheet (preferred)
- Update as often as needed
- Don't forget!
 - Log Sheet of Changes (send to TCEQ with email/letter)
 - Annual Review Checklist (keep on file)
 - Plan Review & Update page (keep on file)
 - Training Records-Annual (keep on file)
- Approval & Implementation page
 - Signatures must match Notification Flowchart Names

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Emergency Action Plans

YOUR DAM NAME, TX0000
LOG SHEET OF CHANGES

Date	Change Made	Signature
4/4/23	2023-Annual Forms completed	

TAB 7
ANNUAL EAP EVALUATION CHECKLIST

Was the annual dam inspection conducted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, has the EAP been revised to include any signs of failures observed during the inspection?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was brush clearing, animal burrow removal, or other maintenance required?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe actions taken and date:	
Was the outlet gate operable?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If no, describe actions taken and date:	
Do the Notification Flowcharts require revision?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes, list the dates of the contact information revision and redistribution:	
(Note that revision of the contact information will not require EAP approval; however, the revised contact information pages will need to be redistributed as a replacement pages.)			
Was annual training or an exercise conducted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Circle training exercise Date conducted: 4/1/2023	
Are inspection and training records included in the EAP?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Was the EAP reviewed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, review date:	
Were changes required to the EAP?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes, date of revised EAP approval:	

4/4/2023

(Name and Title of Appropriate Manager for Owner) Date



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Emergency Action Plans

TAB 8
PLAN REVIEW AND UPDATE

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

Date of review: 4/1/23 Participants: Suzy Que
Joe Prescott
Mabel Right
John Star

Date of review: _____ Participants: _____

Date of review: _____ Participants: _____

Date of review: _____ Participants: _____

Date of tabletop exercise: _____ Participants: _____

TAB 9
TRAINING RECORD

Use this form to record training sessions. File the completed form in the appropriate Tab of the EAP. All items in the EAP should be thoroughly reviewed during training. Appropriate [Owner] employees and EAP team members should attend a training session annually (or participate in a simulated exercise).

TRAINING LOCATION	ABGB County Office
DATE	4/1/2023
INSTRUCTOR	Suzy Que
CLASS SIGN-IN:	
Name A	
Name B	
Name C	
Name D	
Type of Simulation Conducted:	
Circle Emergency Type: Emergency water release Watch condition Possible dam failure Imminent dam failure Actual dam failure	
Comments, Results of Exercise:	
Revisions Needed to EAP Based on Results of Exercise? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, list revisions required:	

4/4/2023



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Emergency Action Plans

Draft EAPs - Use the template in the Guidelines

Common Mistakes -

- A&I Page Signatures missing or don't match flowchart
- Resident notification block missing from flowchart
- Department of Public Safety block (verify if it should be Texas Division of Emergency Management – TDEM)
- Submittal of only one Notification Flowchart
 - Watch condition
 - Potential/ Imminent Failure Condition
 - *HB26 – Gate Release Condition (only HB26 Dams)

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Emergency Action Plans

Annual Updated EAPs

Common Mistakes -

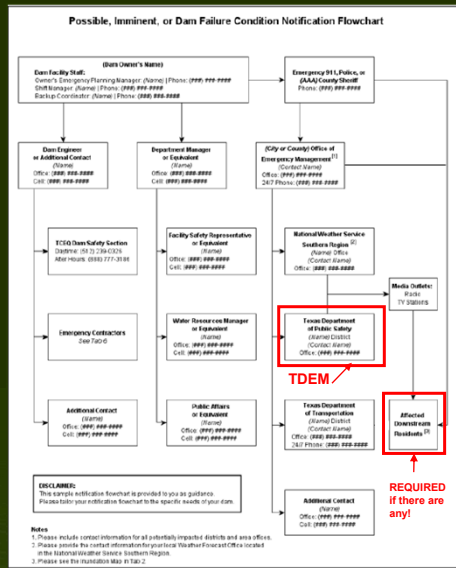
- Sending new pdf without page changes indicated
- A&I Page Signatures missing or don't match flowchart
- Previous TCEQ comments ignored
- Blank Log Sheet of Changes or none submitted

Changes –

- Distribution list: Warren Samuelson >>> Trina Lancaster
- May submit annual forms to TCEQ or keep them on file
- If only annual forms are updated, may submit Log Sheet only with changes recorded EX: "2023-Annual Forms completed"

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Emergency Action Plans



APPROVAL AND IMPLEMENTATION

EMERGENCY ACTION PLAN

YOUR DAM NAME, TX0000

This Emergency Action Plan is hereby approved. This plan is effective immediately and supersedes all previous editions.

_____ Date

Mr. So AndSo,
Dam Manager/Owner

I have received a copy of this Emergency Action Plan and concur with the notification procedures.

_____ Date

Mr. Jon Doe,
Emergency Management Coordinator,
CountyName

Emergency Action Plans

EAPs should be the go-to document in an emergency

- Ensure everyone is familiar with the contents
- Use the information during an event
- Update anything that isn't working or is out-of-date
- **Ensure inundation maps have enough details**
- Ensure notification flowcharts include a block for downstream residents

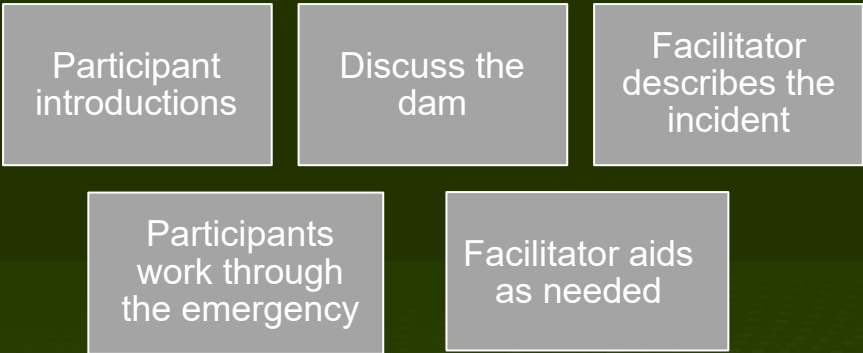
Tabletop Exercises

- Required every 5 years
- Facilitator guide available
- Notify TCEQ before the event
- Complete an after-action report and submit to TCEQ along with the attendance sheet to document the exercise



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Example Exercise Agenda



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Example Scenarios

1. Seepage observed during a rain event

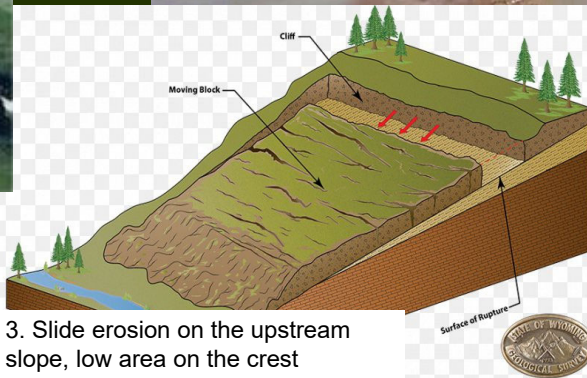


4. Lake level rising, cloudy seepage, muddy conditions



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2. Whirlpool is observed in the reservoir



3. Slide erosion on the upstream slope, low area on the crest

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Tabletop Exercises

- Facilitator should keep participants on task and encourage participation
- Remember to refer to your EAP on what steps to take
- What if your engineer or the EMC is unavailable?
- What if your main dam contact is unavailable?



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EAP & Takeaway

Get to know your local
Emergency Management
Coordinator



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Real-Life Scenario

- Lawn Lake Dam & Cascade Dam Failures
 - July 15, 1982
 - Rocky Mountain National Park

Data & Figures from: *Association of State Dam Safety Officials (ASDSO) Lessons Learned and GoogleEarth*

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Real-Life Scenario - Map

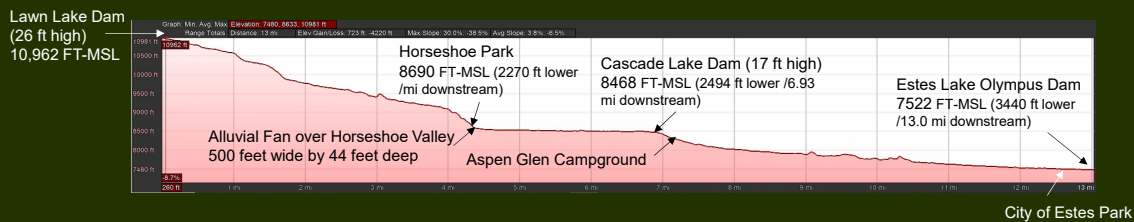


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Real-Life Scenario



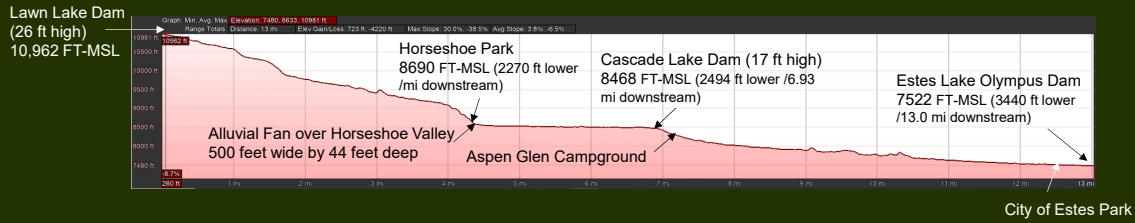
- Saturday July 15, 1982 – around 6:00am dam fails releasing 674 acre-feet of water at 20,000 cfs
- Scours landscape in Roaring River to 50-feet deep
- Releases boulders and trees in Horseshoe Valley creating a 40 acre alluvial fan in the relatively flat area but continues over the valley overwhelming the Fall River

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Real-Life Scenario



- Further downstream the Cascade Lake Dam is overwhelmed and adds a new surge of water downstream
- The town of Estes Park is overwhelmed and suffers damage to 90% of the towns business district

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Real-Life Scenario - History

Lawn Lake Breach



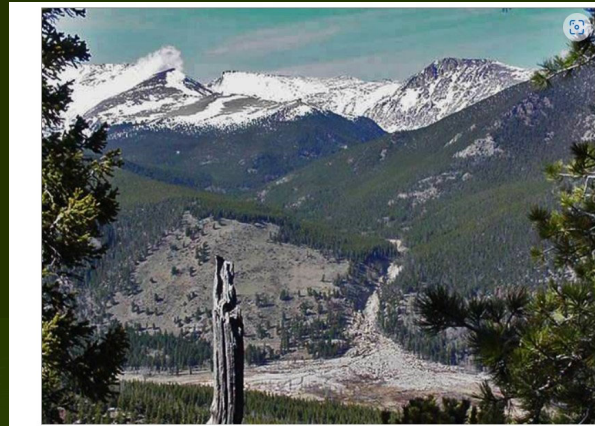
Lawn Lake Dam Breach morning of failure July 15, 1982 (Photo source: the United States Bureau of Reclamation).

- Dam built in 1903 to increase volume of water for irrigation
- Park was established in 1915
- In 1931, dam was raised to 24-feet high with a 3-foot diameter outlet pipe near the crest for releases
- Due to its remote location, inspections were infrequent

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Real-Life Scenario – Alluvial Fan

- Waters rushed down the Roaring River valley killing one camper and scouring a gully to 50-feet deep
- Flood waters produced an Alluvial Fan over Horseshoe Valley (500 feet wide by 44 feet deep)
- The flood continues downstream overwhelming Fall River

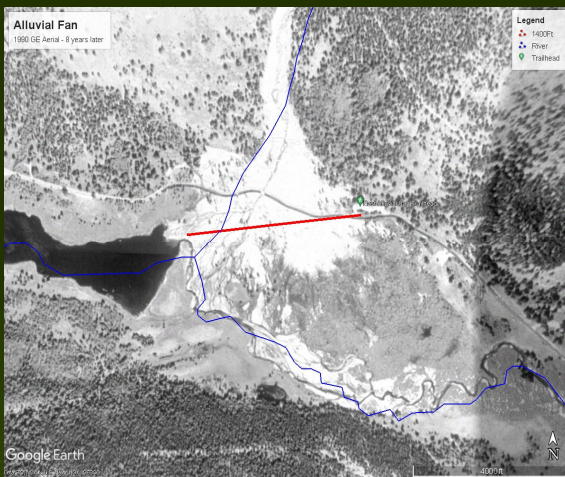


44 acre alluvial fan from Roaring Creek erosion (Photo source: the National Park Service).

Real-Life Scenario – Alluvial Fan

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2023



Real-Life Scenario – Cascade Dam Failure

- The flood continues downstream overwhelming Fall River
- Cascade Dam (17-foot concrete dam) overtops and subsequently fails
- Two people in Asplen Glen Campground, just downstream, are killed



Cascade Dam overtopping. The dam was a 17-foot-high gravity concrete dam (Photo source: G. D. George from USGS files).



Cascade Dam failing (Photo source: G. D. George from USGS files).



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Real-Life Scenario – Estes Park

The flood continues downstream and 5-6 feet deep waters flow through the town of Estes Park leaving two feet of mud in its wake and millions of dollars of devastation.



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Real-Life Scenario

Emergency Response (and some 'luck')

- A maintenance man began his route 1-hour early on the day of the flood
- By arriving at the Lawn Lake trailhead at 6:15 and seeing the flood roaring downstream, he was able to call from an emergency park phone and alert Park Rangers (phone didn't always work)
- Road barricades were set up, campers near Falls River removed, and citizens of Estes Park evacuated

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Real-Life Scenario

Lessons learned

- Lack of dam maintenance can lead to major destruction and loss of lives
- Regular, thorough, dam inspections can provide valuable information on the status of the dam
- Emergency Action Plans (EAPs) save lives and give emergency responders a plan of action in the event of a dam failure
- A little luck can go a long way 😊

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Questions???

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