



## 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

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 -

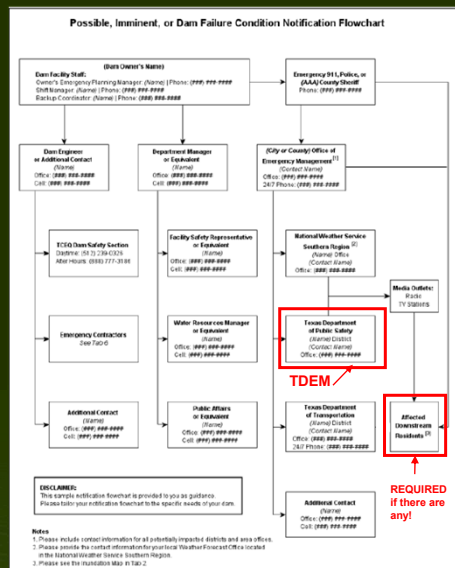
- Sending new pdf without page changes indicated
- A&I Page Signatures missing or don't match flowchart
- Previous TCEQ comments ignored
- Blank Log Sheet of Changes or none submitted

## 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.

Mr So AndSo,  
Dam Manager/Owner

Date

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

Mr Jon Doe,  
Emergency Management Coordinator,  
CountyName

Date

# 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

Participant  
introductions

Discuss the  
dam

Facilitator  
describes the  
incident

Participants  
work through  
the emergency

Facilitator aids  
as needed

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## Example Scenarios

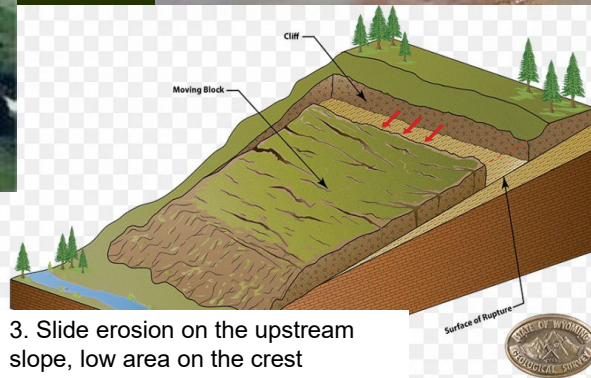
1. Seepage observed during a rain event



2. Whirlpool is observed in the reservoir



4. Lake level rising, cloudy seepage, muddy conditions



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

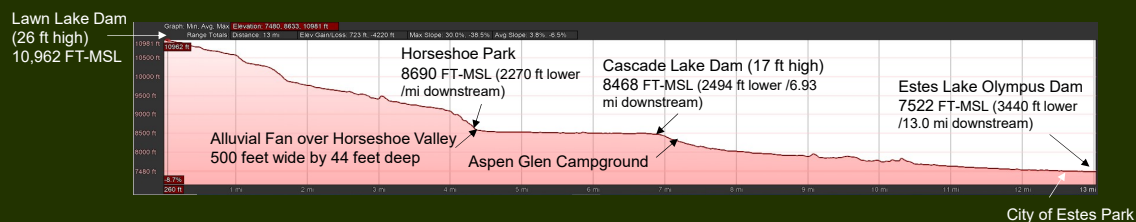


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## Real-Life Scenario



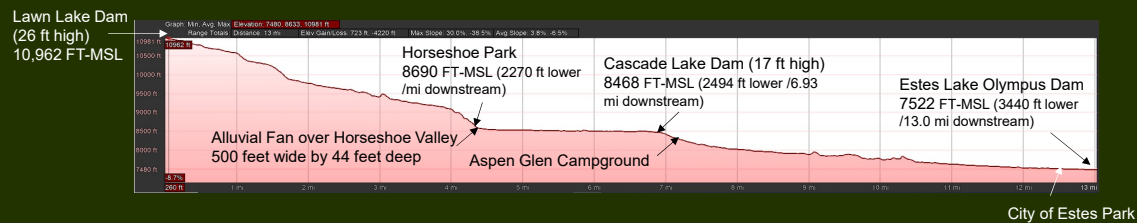
- Saturday July 15, 1982 – around 6:00am dam fails releasing 674 acre-feet of water at 20,000 cfs
- Scours landscape in Roaring River to 50-feet deep
- Releases boulders and trees in Horseshoe Valley creating a 40 acre alluvial fan in the relatively flat area but continues over the valley overwhelming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

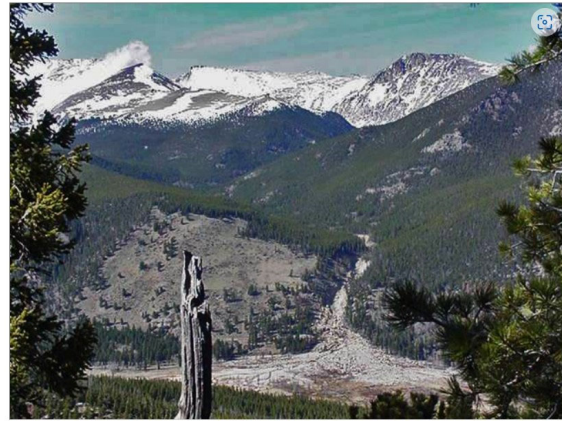
- Dam built in 1903 to increase volume of water for irrigation
- Park was established in 1915
- In 1931, dam was raised to 24-feet high with a 3-foot diameter outlet pipe near the crest for releases
- Due to its remote location, inspections were infrequent

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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

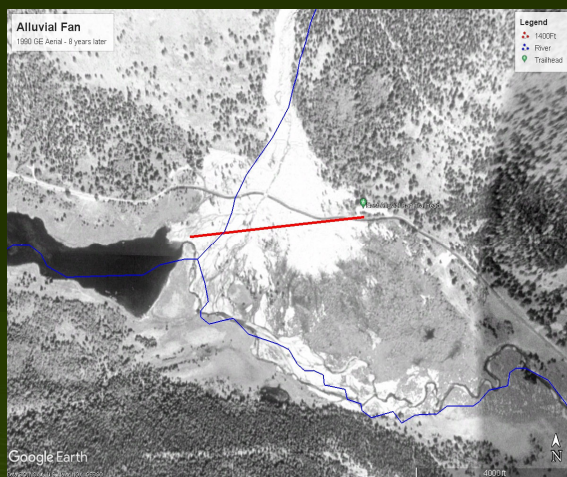


44 acre alluvial fan from Roaring Creek erosion (Photo source: the National Park Service).

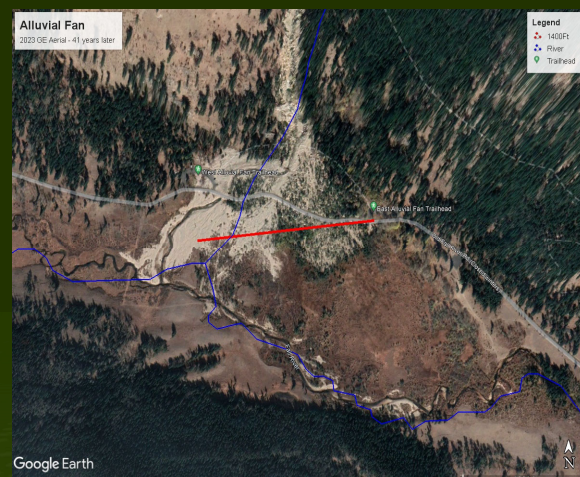
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## Real-Life Scenario – Alluvial Fan

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2023



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## 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



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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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