Emergency Action Plans for Dams in Texas
‘Potpourri’

Presented By: Megan Dutton, P.E.
Agenda

- Introduction to the Dam Safety Program
- Overview of an EAP
- Components of an EAP
- Tabletop Exercises
- Roles/Responsibilities for EAP’s
- Tips and Tricks for Dam Owners
TCEQ Dam Safety Program:

Who We Are

What We Do
Dam Safety Program

Who We Are

• Under the Critical Infrastructure Division in the Office of Compliance and Enforcement at the Texas Commission on Environmental Quality

• Mission:
  – To protect the lives, safety, and health of the public from dam failures or improper operation and to preserve the beneficial uses of dams and reservoirs.
  – To reduce these risks with an understanding of the limitations placed by technical, economic, political, and social concerns.
  – Provide Guidance and Recommendations in order to help dam owners protect their investment.
Dam Safety Program
Mandated by Law

• Texas Water Code Chapter 12.052
  – (a) The commission shall make and enforce rules and orders and shall perform all other acts necessary to provide for the safe construction, maintenance, repair, and removal of dams located in this state.

Sec. 1.001. PURPOSE OF CODE. (a) This code is enacted as a part of the state's continuing statutory revision program, begun by the Texas Legislative Council in 1963 as directed by the legislature in Chapter 448, Acts of the 58th Legislature, Regular Session, 1963 (Article 5429b-1, Vernon's Texas Civil Statutes). The program contemplates a topic-by-topic revision of the state's general and permanent statute law without substantive change.
Dam Safety Program Regulations

Texas Administrative Code (TAC) Title 30 Chapter 299- Dams and Reservoirs

“The TAC is a compilation of all state agency rules in Texas”

-Created in 1977 by the Texas Legislature
-Maintained by the Office of the Secretary of State
Dam Safety Program

• Section Manager- Warren Samuelson, P.E.

• Team Leaders-
  – Johnny Cosgrove, P.E.
  – Debra Rankin, P.E.
  – Jeff Thomas, P.E., P.G.

• 21 Full Time Staff (Engineers, EITs, Technicians)
  – 1 Summer Intern
  – 1 Vacancy
Dam Safety Program

• Over 7,000 Total Dams in Texas
• Nearly 4,000 Dams Regulated by Dam Safety Program
  – 1,600 High and Significant Hazard, Non-Exempt
• Inspect Dams Every 5 Years
Dam Exemptions

- Focus on high risk dams.
- Effective September 1, 2013. No expiration date.
- Per Legislation Passed, Exempt Dams Must Meet All 5 Criteria:
  - Privately owned
  - Less than 500 acre-feet maximum capacity
  - Located in a county with population less than 350,000 (per 2010 Census)
  - Located outside city limits
  - Low or significant hazard

- If you would like to know if your dam is exempt, submit a request in writing (i.e. hard copy letter or email)
Dam Exemptions

• Exempt dams are not regulated by Dam Safety Program
  – Will not be inspected every 5 years (unless requested by owner)
  – Should continue any maintenance

• Although there is no expiration date, an exempt dam may become non-exempt if any one of the 5 criteria change
  – Would most likely be due to downstream development and hazard classification
What is an acre-foot?

The amount of water covering one acre of surface area to a depth of one foot.

*1.3 total acres including end zones, 1.1 acres excluding end zones.

The amount of water covering one acre of surface area to a depth of one foot.
Hazard Classification

Based on potential damage to downstream life, property, and infrastructure

NOT based on the condition of the dam
Hazard Classification
TAC §299.14

- Low Hazard
  - No loss of human life expected
    - No permanent habitable structures downstream of the dam
  - Minimal economic loss
    - Dams located in rural areas where failure may damage:
      - Occasional farm buildings
      - Limited agricultural improvements
      - Minor highways
Hazard Classification
TAC §299.14

• **Significant Hazard**
  
  – Possible loss of human life located in the breach inundation area downstream of the dam
    • 1 to 6 lives or
    • 1 to 2 habitable structures
  
  – Appreciable economic loss
    • Damage to isolated homes
    • Damage to secondary highways (defined by TCEQ)
    • Damage to minor railroads
    • Interruption of service or use of public utilities
Hazard Classification
TAC §299.14

• **High Hazard**
  
  – Expected loss of life located in the breach inundation area downstream of the dam
    • 7 or more lives or
    • 3 or more habitable structures

  – Excessive economic loss to
    • Public facilities (i.e. water/wastewater plants, pump stations, power transmission facilities, etc.)
    • Agricultural, industrial, or commercial facilities
    • Main highways (defined by TCEQ)
    • Railroads used as major transportation
Dam Safety Program
What We Do

• Inspect Dams Every 5 Years
  – Routine, Construction, Complaint, Breached/Failed
• Review H&H Studies and Breach Analyses
• Review Plans and Specifications For New Dams or Dam Modifications/Repairs
• Review Emergency Action Plans
• Attend Tabletop Exercises
• Dam Owner Outreach
Hydrologic and Hydraulic Study

- Performed by a licensed Texas professional engineer
- Computer program HEC-HMS typically used
- Used to determine the hydraulic adequacy of the dam and its spillways
- Hydrologic criteria for dams found in Texas Administrative Code (TAC) §299.15(a)(1)(A)
- Based on the Probable Maximum Flood (PMF) — NOT based on frequency storms (i.e. 100 year storm)
Breach Analysis

• Performed by a licensed Texas professional engineer
• Computer program HEC-RAS typically used
• Used to estimate the inundation limits if the dam were to breach/fail
  – Resulting map can be used in EAP
  – Can be used to determine hazard classification
Emergency Action Plans

What, Why, Who, When, Where, How
Emergency Action Plans

What

• An EAP is a formal, dynamic document that identifies potential emergency conditions at a dam and specifies preplanned actions and communications to be followed to minimize property damage and loss of life.
Emergency Action Plans
Why

• Required by TCEQ Regulations (TAC §299)
• Expedite effective responses to prevent a dam failure
• Prevent property damage and save lives
• Reduce dam owner’s potential liability
Emergency Action Plans

Who

• All high and significant hazard dams are required to have an EAP

• Exempt dams are not required to have an EAP
  – Although it is a good idea to have one even if not required
Emergency Action Plans
When

- TAC §299 originally had a deadline of January 1, 2011
- Granted extension requests
- No more extension requests - now the Dam Safety Program will work with owners to determine a reasonable deadline
Emergency Action Plans

When

• Recurring requirements after EAP is accepted:
  – Annual Updates
    • Send in pages that were updated
    OR
    • Send in a letter stating no changes were necessary
  – Tabletop Exercises
    • Required at least once every 5 years
    • Will discuss later in presentation
Emergency Action Plans
Where

- Owners may submit EAP’s via email or hardcopy
  - Send electronic copy to:
    Megan.Dutton@tceq.texas.gov
  - Send hardcopy to:
    TCEQ Dam Safety Program
    Mail Code 177, P.O. Box 13087
    Austin, Texas 78711-3087

For FedEx/UPS/etc:
TCEQ Dam Safety Program
12100 Park 35 Circle, Building A, Mail Code 177
Austin, Texas 78753
Emergency Action Plans

Where

• Recommend keeping copy of EAP in an easily accessible location so it may be found quickly during an emergency
  – Some owners have suggested electronic copies

• TCEQ keeps EAP’s in locked file cabinets and does not release them to anyone
  – We tell requestors/non-owners if they want a copy of the EAP, it needs to be requested from the dam owner. Dam owners have the right to not release information at their discretion.
Emergency Action Plans
How

• *Guidelines for Developing Emergency Action Plans for Dams in Texas (GI-394)*
  – PDF and Word copies on our website
    http://www.tceq.texas.gov/field/damsafetyprog.html

• TCEQ Dam Safety Staff will answer any questions and help however they can
Guidelines for Developing Emergency Action Plans for Dams in Texas

Dam Safety Program
Critical Infrastructure Division
Texas Commission on Environmental Quality

GI-394
Revised March 2012
EAP Guidelines

• Updated in March 2012
• Major Changes include:
  – Added an additional notification flowchart to address different emergency conditions
  – Removed Ben Weiger as the National Weather Service contact and replaced with a NWS Region
  – Removed Warren Samuelson’s office, home and cell number and replaced with general TCEQ Dam Safety numbers
    • Daytime: (512)239-0326 AND 24Hour: (888)777-3186
  – Provided additional guidance for Vicinity and Inundation Maps
  – Additional minor changes
Old Comment/Acceptance Letters

• EAP acceptance letters were sent out to dam owners without the Approval and Implementation page signed by BOTH the owner and the local emergency management coordinator.

• TCEQ will verify that the signature page was signed when annual updates are received. If there are no signatures, a comment will be made in the annual update acknowledgement letter requesting the signature(s).
Old Comment/Acceptance Letters

• Around 2009/2010 TCEQ sent some EAP comment letters that stated “..your EAP is now in compliance with TAC Chapter 299..” and others were sent stating that the EAP was accepted but both letters included TCEQ review comments.

• If a letter was sent with comments listed, we ask that owners send in a revised version for further review and acceptance

• Contact TCEQ if you are not sure if you received one of these letters
Components of an EAP
EAP Components

Title Page
Notification Flowcharts
Approval and Implementation Page
Purpose
General Description
Responsibilities
Emergency Detection, Evaluation, and Classification
Preventive Actions
Supplies and Resources
Training
Inundation Maps
Notification Flowcharts

Watch Condition
• Intended for internal communication
• No evacuations

Possible/Imminent Dam Failure
• Notify local authorities so they can make evacuations
• Include local news outlets and National Weather Service to get messages out to the public

*Include 24-hour contact information for everyone on both flowcharts
Watch Condition Notification Flowchart

Dam Facility Staff:
- Owner’s Emergency Planning Manager: (Name) | Phone: (###) ###-####
- Shift Manager: (Name) | Phone: (###) ###-####
- Backup Coordinator: (Name) | Phone: (###) ###-####

(Dam Owner’s Name)

Dam Engineer or Additional Contact
- (Name)
- Office: (###) ###-####
- Cell: (###) ###-####

Department Manager or Equivalent
- (Name)
- Office: (###) ###-####
- Cell: (###) ###-####

(City or County) Office of Emergency Management
- (Contact Name)
- Office: (###) ###-####
- 24/7 Phone: (###) ###-####

TCEQ Dam Safety Section
- Daytime: (512) 239-0326
- After Hours: (888) 777-3185

Facility Safety Representative or Equivalent
- (Name)
- Office: (###) ###-####
- Cell: (###) ###-####

National Weather Service Southern Region
- (Name) Office
- (Contact Name)
- Office: (###) ###-####

Additional Contact
- (Name)
- Office: (###) ###-####
- Cell: (###) ###-####

Water Resources Manager or Equivalent
- (Name)
- Office: (###) ###-####
- Cell: (###) ###-####

Texas Department of Public Safety
- (Name) District
- (Contact Name)
- Office: (###) ###-####

DISCLAIMER:
This sample notification flowchart is provided to you as guidance. Please tailor your notification flowchart to the specific needs of your dam.

Notes:
1. Please include contact information for all potentially impacted districts and area offices.
2. Please provide the contact information for your local Weather Forecast Office located in the National Weather Service Southern Region.
Possible, Imminent, or Dam Failure Condition Notification Flowchart

**Possible, Imminent, or Dam Failure Condition Notification Flowchart**

- **Dam Facility Staff:**
  - Owner’s Emergency Planning Manager (Name) | Phone: (###) ###-####
  - Shift Manager (Name) | Phone: (###) ###-####
  - Backup Coordinator (Name) | Phone: (###) ###-####

  > **Emergency #11, Police, or (AAA) County Sheriff**
  > Phone: (###) ###-####

- **Dam Engineer or Additional Contact**
  - (Name)
  - Office: (###) ###-####
  - Cell: (###) ###-####

  > **Department Manager or Equivalent**
  > (Name)
  > Office: (###) ###-####
  > Cell: (###) ###-####

- **National Weather Service**
  - Southern Region
  - (Name)
  - Office: (###) ###-####
  - 24/7 Phone: (###) ###-####

- **Facility Safety Representative or Equivalent**
  - (Name)
  - Office: (###) ###-####
  - Cell: (###) ###-####

- **Water Resources Manager or Equivalent**
  - (Name)
  - Office: (###) ###-####
  - Cell: (###) ###-####

- **Texas Department of Public Safety**
  - (Name)
  - Office: (###) ###-####
  - 24/7 Phone: (###) ###-####

- **Public Affairs or Equivalent**
  - (Name)
  - Office: (###) ###-####
  - Cell: (###) ###-####

- **Texas Department of Transportation**
  - (Name)
  - Office: (###) ###-####
  - 24/7 Phone: (###) ###-####

- **Affected Downstream Residents**

- **Additional Contact**
  - (Name)
  - Office: (###) ###-####
  - Cell: (###) ###-####

**DISCLAIMER:**
This sample notification flowchart is provided to you as guidance. Please tailor your notification flowchart to the specific needs of your dam.

**Notes:**
1. Please include contact information for all potentially impacted districts and area offices.
2. Please provide the contact information for your local Weather Forecast Office located in the National Weather Service Southern Region.
3. Please see the inundation map in Tab 1.
Approval and Implementation Page

APPROVAL AND IMPLEMENTATION
EMERGENCY ACTION PLAN
[NAME] DAM, [TX#####]

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

[Name and Title of Appropriate Manager for Owner]  Date

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

[Name and Title of Emergency management Coordinator]  Date

Required to be signed by both the owner and the local EMC
Approval and Implementation Page
Authority

• §299.61(a) requires that “The owners of all high- and significant-hazard dams ... shall prepare an emergency action plan to be followed by the owner in the event or threat of a dam emergency.”

• §299.61(d) indicates that the EAP shall be prepared “using guidelines provided by the executive director or using a format approved by the executive director before the plan is prepared”.
  – The Guidelines for Developing Emergency Action Plans for Dams in Texas (TCEQ Publication GI-394, revised March 2012), under Chapter 2, Section 2.8c. Approval, indicate that the EAP should “Include a form on which the dam owner and local emergency management coordinator sign a statement that they have reviewed the EAP and concur with the notification procedures.”
Purpose

• Identify emergency conditions that could cause a dam failure
• Expedite effective responses during an emergency
• Prevent and/or reduce loss of life and property damage
# General Description

<table>
<thead>
<tr>
<th>TAB 3</th>
<th>DAM DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official Dam Name:</td>
<td>[ ]</td>
</tr>
<tr>
<td>Dam Location:</td>
<td>[ ]</td>
</tr>
<tr>
<td>Latitude/Longitude:</td>
<td>[ ]</td>
</tr>
<tr>
<td>Dam Owner:</td>
<td>[ ] Phone Number:</td>
</tr>
<tr>
<td>Dam Owner's Address:</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

**Embankment**
- Type: [ ] (ex-earthen embankment)
  - Year Constructed: [ ]
  - Length: [ ] feet
  - Maximum Height: [ ] feet
  - Top Width: [ ] feet
  - Top of Embankment Elevation: [ ] feet-mil
  - Drainage Area: [ ] square miles

**Principal Spillway**
- Type: [ ] (ex-Uncontrolled ogee weir)
  - Location: [ ] (ex-Right abutment)
  - Crest Length: [ ] feet
  - Crest Elevation: [ ] feet

**Emergency Spillway**
- Type: [ ] (ex-Excavated, broad-crested weir)
  - Location: [ ] (ex-Left abutment)
  - Crest Length: [ ] feet
  - Crest Elevation: [ ] feet-mil

**Inlet-Outlet Works**
- Type: [ ] (ex-Right end of the dam)
  - Location: [ ]
  - Inlet Elevation (Inlet): [ ] feet-mil (bottom of pipe)
  - Inlet Elevation (Outlet): [ ] feet-mil (bottom of pipe)

**Reservoir**
- Elev. Top of Conservation Pool: [ ] feet-mil
- Capacity Conservation Pool (Normal Pool): [ ] acre-feet
- Capacity at Top of Dam (Maximum): [ ] acre-feet
- Surface Area: [ ] acres

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(1) If the dam is known by more than one name, it is recommended that all names be listed (i.e. Official TCEQ name, City name, common name known by locals, etc.).

(2) If the dam has multiple spillways, create additional subsections as necessary to include information on all spillways.
Responsibilities

- Dam Owner’s Responsibilities
- Notification
- Evacuation
- Duration, Security, Termination, Follow-Up
- Communications
- Emergency Operations Center
Emergency Detection, Evaluation, and Classification

Detection
- Severe Storms/Inclement Weather
- Tornadoes
- Earthquakes
- Sabotage

Signs of Failure
- Seepage
- Sliding
- Structural
- Overtopping

[Image of a map showing earthquakes in North Texas with magnitudes and locations indicated.]
Emergency Detection, Evaluation, and Classification

- Watch
- Possible Dam Failure
- Imminent Dam Failure
- Dam Failure

Same Flowchart
Watch Condition

• Issue first detected
• Repair issue, if possible
• Monitor the dam
• Downstream residents not notified on flowchart
Possible Dam Failure Condition

• The ‘Watch’ condition continues to worsen
• Save the dam
• Consider notifying downstream residents, depending on how much the condition worsens
Imminent Dam Failure Condition

• Someone has determined that conditions will continue to progress and there will be an uncontrollable release of water from the reservoir
• Save lives
• Notify/evacuate downstream residents
Dam Failure Condition

• The dam has failed and a flood wave is moving downstream
• Save lives
• Evacuate downstream residents
Preventive Actions

• Include a routine inspection schedule and identify the person responsible for conducting inspections
  – Important to inspect after significant rain events
• Specify actions to be taken before and after development of emergency conditions to prepare for an emergency (alternate routes, surveillance, dark )
  – Evidence of Distress (Tab 5 in Guidelines template)
• Indicate procedures and measures for timely:
  – Emergency Detection
  – Emergency Evaluation
  – Emergency Classification
<table>
<thead>
<tr>
<th>General Observation</th>
<th>Specific Observation</th>
<th>Condition</th>
<th>Emergency Action</th>
<th>Equipment, Material and Supplies</th>
<th>Data to Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boils</td>
<td>Small boils, no increase of water flow, flowing clear water</td>
<td>Watch</td>
<td>Closely check all of downstream toe, especially in the vicinity of boil for additional boils, wet spots, sinkholes, or seepage. Closely monitor entire area for changes or flow rate increases.</td>
<td>None</td>
<td>Site and location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Large or additional boils near previously identified ones, without increasing flow rate, but carrying small amount of soil particles</td>
<td>Watch</td>
<td>Initiate 24-hour surveillance. Monitor as described above. Construct sandbag ring dikes around boils, to cover them with water to retard the movement of soil particles. Filter cloth may be used to retard soil movement, but do not retard the flow of water.</td>
<td>Sandbags, filter cloth</td>
<td>Site and location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Large or additional boils near previously identified ones, increasing flow rate, carrying soil particles</td>
<td>Possible Failure</td>
<td>Continue 24-hour surveillance. Continue monitoring and remedial action as described above. Initiate emergency lowering of the reservoir. Issue a warning to downstream residents.</td>
<td>Sandbags, pump</td>
<td>Site and location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Rapidly increasing size of boils and flow increasing and muddy water</td>
<td>Imminent Failure</td>
<td>Downstream evacuation. Employ all available equipment to attempt to construct a large ring dike around the boil area.</td>
<td>Dozer, shovels, source of earthfill</td>
<td>Site and location, approximate flow</td>
</tr>
<tr>
<td>Seepage</td>
<td>Minor seepage of clear water at toe, on slope of embankment, or at the abutments</td>
<td>Watch</td>
<td>Closely check entire embankment for other seepage areas. Use wooden stakes or flagging to delineate seepage area. Try to channel and measure flow. Look for upstream whirlpools.</td>
<td>Wooden stakes, flagging</td>
<td>Site, location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Additional seepage areas observed flowing clear water and/or increasing flow rate.</td>
<td>Watch</td>
<td>Initiate 24-hour surveillance. Monitor as described above. Construct measuring weir and channel all seepage through weir. Attempt to determine source of seepage.</td>
<td>Dozer, shovels</td>
<td>Site, location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Seriously or rapidly increasing seepage, underseepage, or drain flow.</td>
<td>Possible Failure</td>
<td>Continue 24-hour monitoring and remedial action as described above. Initiate emergency lowering of the reservoir. Construct a large ring dike around the seepage area.</td>
<td>Dozer, shovels, source of earthfill</td>
<td>Site location, approximate flow</td>
</tr>
<tr>
<td></td>
<td>Additional seepage areas with rapid increase in flow and muddy water.</td>
<td>Imminent Failure</td>
<td>Downstream evacuation. Employ all available equipment to attempt to construct a large ring dike around the seepage area.</td>
<td>Dozer, shovels, source of earthfill</td>
<td>Site location, approximate flow</td>
</tr>
</tbody>
</table>
## Supplies and Resources

**Important to establish list before an emergency**

High demand of supplies and resources during a flood event

<table>
<thead>
<tr>
<th>EQUIPMENT/SUPPLIES</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backhoes</td>
<td>[Names, addresses, and phone numbers of contractors]</td>
</tr>
<tr>
<td>Dump trucks</td>
<td></td>
</tr>
<tr>
<td>Portable welding equipment</td>
<td></td>
</tr>
<tr>
<td>Generators</td>
<td></td>
</tr>
<tr>
<td>Bulldozers</td>
<td></td>
</tr>
<tr>
<td>Excavators</td>
<td></td>
</tr>
<tr>
<td>Loaders</td>
<td></td>
</tr>
<tr>
<td>Motor graders</td>
<td></td>
</tr>
<tr>
<td>Crane</td>
<td>[Names, addresses, and phone numbers of contractors]</td>
</tr>
<tr>
<td>Sandbags</td>
<td>[Names, addresses, and phone numbers of suppliers]</td>
</tr>
<tr>
<td>Rock riprap</td>
<td>[Names, addresses, and phone numbers of suppliers]</td>
</tr>
<tr>
<td>Fill Material</td>
<td>[Names, addresses, and phone numbers of suppliers]</td>
</tr>
<tr>
<td>Other - __________________</td>
<td>[Names, addresses, and phone numbers of suppliers]</td>
</tr>
</tbody>
</table>
### TAB 7 
**ANNUAL EAP EVALUATION CHECKLIST**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>If yes, has the EAP been revised to include any signs of failure observed during the inspection?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the annual dam inspection conducted?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was brush clearing, animal burrow removal, or other maintenance required?</td>
<td>Yes</td>
<td>No</td>
<td>If yes, describe actions taken and date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the outlet gate operable?</td>
<td>Yes</td>
<td>No</td>
<td>If no, describe actions taken and date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do the Notification Flowcharts require revision?</td>
<td>Yes</td>
<td>No</td>
<td>If yes, list the dates of the contact information revision and redistribution:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(• 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.)

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>[Name and Title of Appropriate Manager for Owner] Date conducted:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was annual training or an exercise conducted?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are inspection and training records included in the EAP?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Was the EAP reviewed?</td>
<td>Yes</td>
<td>No</td>
<td>If yes, review date:</td>
</tr>
<tr>
<td>Were changes required to the EAP?</td>
<td>Yes</td>
<td>No</td>
<td>If yes, date of revised EAP approval:</td>
</tr>
</tbody>
</table>
**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.

<table>
<thead>
<tr>
<th>Date of review: __________________________</th>
<th>Participants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of review: __________________________</td>
<td>Participants:</td>
</tr>
<tr>
<td>Date of review: __________________________</td>
<td>Participants:</td>
</tr>
<tr>
<td>Date of review: __________________________</td>
<td>Participants:</td>
</tr>
<tr>
<td>Date of tabletop exercise: __________________________</td>
<td>Participants:</td>
</tr>
</tbody>
</table>
# 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).

<table>
<thead>
<tr>
<th>TRAINING LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLASS SIGN-IN:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Type of Simulation Conducted:</th>
<th>Circle Emergency Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency water release</td>
<td>Emergency water release</td>
</tr>
<tr>
<td>Watch condition</td>
<td>Watch condition</td>
</tr>
<tr>
<td>Possible dam failure</td>
<td>Possible dam failure</td>
</tr>
<tr>
<td>Imminent dam failure</td>
<td>Imminent dam failure</td>
</tr>
<tr>
<td>Actual dam failure</td>
<td>Actual dam failure</td>
</tr>
</tbody>
</table>

**Comments, Results of Exercise:**

**Revisions Needed to EAP Based on Results of Exercise?**

- [ ] Yes
- [ ] No

If yes, list revisions required:
Inundation Maps

• Required for every EAP

• Depicts areas that could potentially flood if the dam fails

• Used for evacuation planning by the local authorities
  – It is critical that local authorities review and provide input on necessary content and map scale

• Level of detail depends on the size of the dam and complexity of the floodplain
  – General
  – Detailed
Inundation Maps

• Requirements for all maps:
  – Label the dam
  – Label all applicable street names
  – Include north arrow and scale bar
  – Use aerial image (such as Google or Bing)
  – Label potential hazards
    • Provide resident names, address, phone number if able to
  – Annual Updates should address any changes in downstream development
Detailed Inundation Map

• Determined after a PE conducts a breach analysis
  – Breaches are generally required when hazards are not easily identified or a dam failure could impact densely developed area
• Include a note that states “Because of the method, procedures, and assumptions used to determine the flooded areas; the limits of flooding shown and flood wave travel times are approximate and should be used only as a guideline for establishing evacuation zones. Areas inundated in an actual event will depend on actual failure conditions and may differ from areas shown on the maps.”

NOTE- The dam breach is based on the Probable Maximum Flood, which is NOT the same as the FEMA floodplain map or the 100-year floodplain
Detailed Inundation Map
Breach Analysis

• Final result of a breach analysis is the inundation area
• Won’t change unless significant changes/modifications to dam
• Owners should get the resulting ‘shape file’ of the inundation area for use in future EAP updates (especially in areas that expect downstream development)
Generalized Inundation Map

• Best used when there are a limited number of potential hazards known (about a dozen or so).
• Can be used for High Hazard dams with a small, concise inundation area.
• Be cautious not to identify too many hazards just to be conservative. Not efficient for emergency services and personnel.
Tabletop Exercises
Failing to Plan is Planning to Fail
Tabletop Exercise Requirement

• §299.61(h) indicates that “The owner shall perform a table top exercise of the emergency action plan on the frequency provided in the owner’s emergency action plan, or at least every five years. A table top exercise is a meeting of the owner and the state and local emergency management personnel in a conference room setting.”
Why Are Exercises Important?

- Comply with States Rules and Guidelines
- Reduce owner’s potential liability
- Meet key players
- Confirm names, positions, contact information
- Establish clear lines of communication
- Identify unforeseeable problems
- Reduces false alarms
‘An EAP is not worth the paper it’s printed on unless it works’
Types of Exercises

• Orientation Seminar/Workshop
• Drill
• Tabletop Exercise
• Functional Exercise
• Full-Scale Exercise

Less Involvement

More Involvement
What is a Tabletop Exercise

• Informal meeting of key players involved with the EAP.
• A hypothetical (but possible) scenario is provided and emergency actions/procedures are then discussed.
• Focused more on problem-solving than decision making.
Benefits of a Tabletop Exercise

• All responsible parties are together
• Informal meeting with low stress
• EMC can determine best available evacuation routes
  – Will flooding block important access roads or evacuation routes?
• Problems/issues with EAP are found and fixed that day
• Required by TCEQ
How to Put Together a Tabletop Exercise
10 Steps to Put Together a Tabletop Exercise

Step 1: Decide Who Will Facilitate/Moderate and Decide What Type of Exercise Will Be Performed

Step 2: Determine Who Should Attend

Step 3: Develop Mock Scenario

Step 4: Dry Run Scenario

Step 5: Contact Attendees

Step 6: Arrange for Meeting Space

Step 7: Develop Agenda

Step 8: Review Dam Data

Step 9: Review Inundation Maps

Step 10: Review EAP
Example Mock Scenarios
Sample Tabletop Exercise Agenda

- Introductions
- EAP and Dam Overview
- Inundation Map Overview
- Describe and Discuss Scenario
- Describe And Discuss Actions And Procedures, Especially As They Pertain To Specific Personnel
- Discuss Strengths, Weaknesses, Improvements, Etc. With The EAP
After the Tabletop Exercise

• Owner should implement any changes found and discussed during the exercise
• Any changes/modifications should be submitted to the distribution list in the EAP
• Remember to schedule the next exercise in at least 5 years
Roles and Responsibilities for EAP’s
## Responsibilities

<table>
<thead>
<tr>
<th>Dam Owner</th>
<th>TCEQ</th>
<th>EMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write EAP</td>
<td>Review and Accept EAP</td>
<td>Sign EAP/Acknowledge Roles and Responsibilities</td>
</tr>
<tr>
<td>Operation and Maintenance of Dam</td>
<td>Provide Aide as Needed/Able</td>
<td>Issue Warnings to Affected Area(s)</td>
</tr>
<tr>
<td>Detect a Problem/Emergency Situation at the Dam</td>
<td>Follow-Up</td>
<td>Evacuations, as Necessary</td>
</tr>
<tr>
<td>Decision Making/Notification of Emergency Response Agencies</td>
<td></td>
<td>Coordination With Additional Emergency Response Agencies, as Necessary</td>
</tr>
</tbody>
</table>
Tips and Tricks for Dam Owners
Writing An EAP

• Use the Word template provided on the TCEQ Dam Safety Website
• Easy to ‘Cut and Paste’ dam/owner information

http://www.tceq.texas.gov/field/damsafetyprog.html
Multiple Dam EAP’s

• If an owner owns multiple dams that will require an EAP:
  – The owner can have 1 EAP that covers multiple dams as long as the notification flowcharts are the same. Specific information for each dam will still be required (i.e. dam information page, vicinity map, and inundation map).
Multiple Dam Tabletop Exercises

• Owners may hold 1 Tabletop Exercise that covers multiple dams as long as the personnel involved are the same.

• Beneficial since all key players will be present at once. No need to hold several tabletops for the same audience.
Have Someone You Trust

• During an emergency, it is useful to have someone who you trust verifying the information at the dam.

• It is helpful for them to be familiar with the dam and its appurtenances (i.e. spillways).
DISCUSSION/QUESTIONS?
Contact Information:

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