



Guidelines for Developing Emergency Action Plans for Dams in Texas

Dam Safety Program
Texas Commission on Environmental Quality

GI-394
May 2009



Guidelines for Developing Emergency Action Plans for Dams in Texas

Dam Safety Program
Field Operations Support Division

GI-394
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Buddy Garcia, *Chairman*
Larry R. Soward, *Commissioner*
Bryan W. Shaw, Ph.D., *Commissioner*

Mark R. Vickery, P.G., *Executive Director*

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CHAPTER 1. OVERVIEW

1.1. General

The primary goal of the state's dam-safety program is to reduce the risk to lives and property from the consequences of dam failure. Although most dam owners have a high level of confidence in the structures they own and are certain their dams will not fail, history has shown that on occasion dams do fail and that often these failures cause extensive property damage—and sometimes death. A dam owner is responsible for keeping these threats to a minimum. A carefully conceived and implemented emergency action plan (EAP) is one positive step you, the dam owner, can take to accomplish dam safety objectives, protect your investment, and reduce potential liability.

An emergency action plan is not a substitute for proper maintenance or remedial construction, but it facilitates recognition of dam safety problems as they develop and establishes nonstructural means to minimize risk of loss of life and reduce property damage. These guidelines define the requirements of an acceptable EAP and facilitate its preparation, distribution, annual testing, and update.

1.2. Requirements for Emergency Action Plans

These guidelines were written to assist dam owners in developing an EAP for their dams. The need for these guidelines was prompted by the new state dam-safety regulations (30 TAC 299.61,¹ effective January 1, 2009):

(a) The owners of all high- and significant-hazard dams, as defined in §299.13 of this title (relating to Size Classification Criteria) and §299.14 of this title (relating to Hazard Classification Criteria), shall prepare an emergency action plan to be followed by the owner in the event or threat of a dam emergency.

(b) The owner of an existing high- or significant-hazard dam shall submit the emergency action plan to the executive director for review within two years after the effective date of the rules unless an extension of the

time frame is requested and approved by the executive director as described in subsection (d) of this section.

(c) The owner of a proposed high- or significant-hazard dam shall submit the emergency action plan to the executive director before either requesting closure of the dam or upon completion of construction of the dam, if the dam does not require a closure section.

(d) The owner shall prepare the emergency action plan using guidelines provided by the executive director or using a format approved by the executive director before the plan is prepared. If an owner owns more than one dam, the owner shall prepare a plan, with timelines, for preparing emergency action plans based on priority determined by hazard and submit the plan to the executive director for review. If an owner cannot complete the emergency action plan within the two years required in subsection (b) of this section, the owner shall request an extension of time showing cause or a reasonable basis for the need for an extension and providing a time frame to complete. The request shall be submitted to the executive director for review and approval.

(e) The executive director shall review the emergency action plan and provide any comments in writing to the owner.

(f) The executive director shall file the emergency action plan in the agency's confidential, permanent records.

(g) The owner shall review the emergency action plan annually, update the emergency action plan as necessary, and submit a copy of the updated portions of the emergency action plan to the executive director annually beginning three years after the effective date of this section. If the emergency action plan was reviewed by the owner and no updates were necessary, the owner shall submit written notification to the executive director that no updates to the emergency action plan have been adopted or implemented.

(h) 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.

¹ In this document, "30 TAC [number]" refers to Title 30, Texas Administrative Code, Section (or Subsection, etc.) [number].

Make use of the portions of these guidelines that apply to your own dam. The Texas Dam Safety Program has prepared separate outlines of an EAP for small, intermediate, and large dams. Submit a draft copy of the plan to the Texas Dam Safety Program for review prior to final publication at the following address:

Dam Safety Program, MC 174
Texas Commission on
Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087
Telephone: 512-239-5195

It is recommended that the plan be kept in a three-ring binder as it will allow the quick and easy replacement of revised pages and the removal of obsolete ones.

An owner with several dams in the same area may develop one EAP to cover all of the dams. Each dam will need to be described separately, and there will need to be separate inundation or vicinity maps (or both) and possibly notification flowcharts for each dam.

1.3. Overall Process for Developing an Emergency Action Plan

Careful research and coordinated planning with all parties will lay the foundation for a responsible and thorough EAP. Development of an EAP generally follows the steps listed below.

Step 1. Determine the potentially inundated area by defining dam-break flood profiles downstream from the dam. Conditions to be considered may include:

- dam failure with reservoir level at normal storage elevation
- dam failure with reservoir level at the top of the dam
- dam failure with reservoir level at the level of the design flood

Detailed information on dam failure and inundation analyses can be found in the *Hydrologic and Hydraulic Guidelines for Dams in Texas*. The guidelines outline a simplified procedure for estimating dam-break inundation

for small and intermediate-size dams and dams with limited downstream development.

Step 2. Prepare inundation maps which clearly depict the flooded areas from a dam break. For dams with limited downstream development, a narrative description and/or generalized map may suffice.

Step 3. Identify those situations or triggering events that could trigger an emergency condition and require action.

Step 4. Evaluate the warning time available for the various triggering events.

Step 5. Identify all jurisdictions, agencies, and individuals who will be involved in the EAP. Contact the local Emergency Management Coordinators for assistance. Coordinate the development of the EAP with these other parties.

Step 6. Identify primary and auxiliary communications systems, both internal (between persons at the dam) and external (between dam personnel and outside entities).

Step 7. List and prioritize the order of notification for all persons and entities involved in the notification process, and draft the Notification Flowchart.

Step 8. Develop a draft of the EAP. A recommended format for an EAP is described on the following pages, along with sample EAPs in the appendices.

Step 9. Hold one or more coordination meetings with all local agencies and other parties on the notification list to receive their review and comments for the draft EAP.

Step 10. Submit a draft to the TCEQ Dam Safety Program for comments.

Step 11. Make any necessary revision, obtain the necessary signatures for plan approval, and distribute the EAP to those who have responsibilities under the plan.

1.4. Format for an Emergency Action Plan

The format of these guidelines parallels the layout of a typical EAP. Each section offers an overview of the general purpose, intent, and

contents of the corresponding chapter of the plan. Appendix A contains a sample EAP for a large dam; Appendix B contains a sample EAP for an intermediate-size dam; and Appendix C contains a sample EAP for a small dam.

Size is defined in 30 TAC 299.13:

A large-size dam is a dam that has a height equal to or greater than 100 feet or has a maximum capacity equal to or greater than 50,000 acre-feet.

An intermediate-size dam is a dam that has a height equal to or greater than 40 feet and less than 100 feet or has a capacity equal to or greater than 1,000 acre-feet but less than 50,000 acre-feet.

A small-size dam is a dam that has a height equal to or greater than 25 feet and less than 40 feet with a maximum capacity equal to or greater than 15 acre-feet and less than 1,000 acre-feet or a height greater than 6 feet and less than 40 feet with a maximum capacity equal to or greater than 50 acre-feet and less than 1,000 acre-feet.

Additional information on EAPs for large dams can be found at the Federal Emergency Management Agency Web site: <www.fema.gov/library/viewRecord.do?id=1672>

Information and a template for use for dams designed and built under the Natural Resources Conservation Service can be found at the NRCS Web site: <policy.nrcs.usda.gov/M_180_500_F.htm>.

An EAP should, at a minimum, contain the following:

- title page
- purpose
- general description of dam
- responsibilities
- notification flowchart
- inundation maps
- possible emergency conditions
- preventive actions to be taken
- supplies and resources
- implementation

1.5. Acknowledgments

These guidelines have drawn liberally upon the work of several agencies and companies. Appreciation is expressed to the following agencies, organizations, and firms that supplied information and input:

Agencies

Natural Resources Conservation Service
Federal Emergency Management Agency
Washington State Department of Ecology

Owner

York Creek Improvement District

Consultants

Freese & Nichols, Inc.
Enprotec / Hibbs & Todd

CHAPTER 2. EMERGENCY ACTION PLAN FORMAT

2.1. Introduction

The introduction should briefly describe the purpose of the EAP and provide general information about the dam.

2.1a. Title Page

The title page shall identify the document as an EAP and specify the dam for which it is developed. Include the owner's name and the inventory number for the dam.

2.1b. Purpose

The purpose of an EAP is to provide a systematic means to:

- identify emergency conditions threatening a dam.
- expedite effective responses to prevent a dam failure.
- prevent or reduce loss of life and property damage should a dam failure occur.

This purpose should be stated concisely in the EAP.

2.1c. General Description of Dam

A description of the dam and its location shall include:

- name of dam
- name of stream
- location
- owner's name
- type of dam
- dam height, length, crest width
- downstream hazard classification

2.1d. Responsibilities

This section of the EAP should identify:

- who is responsible for operation and maintenance of the dam;
- who is responsible for observing the dam during extreme flooding events, during holidays, on weekends, and during normal conditions;
- who is responsible for implementing each of the required various phases of the EAP;
- who is in charge of emergency response;
- communication and coordination channels;

- the location of the incident command center or emergency operating center; and
- lines of succession and assumptions of responsibility necessary to ensure uninterrupted emergency-response actions under any conditions.

2.2. Notification Flowcharts

The dam owner is responsible for identifying distress conditions at the dam and notifying all affected political jurisdictions and appropriate state and federal agencies of such conditions and possible consequences. Use *Notification Flowcharts* to identify the jurisdictions and agencies.

The Notification Flowcharts should be located near the front of the EAP and be clearly marked with tabs or other means to set them apart. Typically, three emergency conditions are considered, each having a separate flowchart:

- (1) slowly developing (watch)
- (2) possible dam failure
- (3) imminent failure

The flowcharts should clearly summarize the following information for each of the three conditions:

- who is responsible for notifying each owner representative and public official
- who is to be notified
- the order in which individuals or offices are to be notified
- individual names, position titles, office and home telephone numbers, alternative contacts, and means of communication

It is normally the responsibility of local governments, upon receiving such notification, to warn the public, make recommendations about evacuation, carry out the evacuations, and offer shelter to area residents. Sometimes, however, it is more appropriate for the dam owner to warn certain individuals instead of, or in addition to, relying on local government officials,

particularly with small dams that may only affect a few people.

When developing Notification Flowcharts, call the following parties to determine the appropriate contacts and phone numbers for key agencies to be notified in an emergency:

National Weather Service
Ben Weiger
817-978-1100 x 118

TCEQ Dam Safety Program
Warren D. Samuelson, P.E.
512-239-5195

The National Weather Service can assist with the development of warning messages if the NWS is contacted as the EAP is developed.

2.3. Inundation Maps

An inundation map is used to depict areas that will flood if a dam fails. Inundation maps shall include the time to flood (the time from the breach to the time that critical structures are flooded) and the time to peak flow.

The detail and complexity of inundation maps depends on the level of development located downstream from a dam. For small dams with limited downstream development, a narrative description of the affected areas and a general vicinity map may suffice. For large and many intermediate-size dams or dams with significant development downstream, detailed inundation maps may be warranted. The following discussion describes the different types of inundation maps and how they are used in evacuation planning.

2.3a. Generalized Inundation Maps

Development in the floodplain below some dams is sparse and the expense of preparing detailed inundation maps is not warranted. Instead, a description of the potential flooding can be included, and supplemented by generalized inundation maps with pertinent information at key locations. Simplified procedures for estimating dam failure inundation for small and intermediate-size dams is contained in *Hydrologic and Hydraulic Guidelines for Dams in Texas* (TCEQ publication GI-364). Information on approximate depth of flooding

and travel time for floods to reach specific locations should also be included. USGS topographic maps, county road maps, or city street maps often have sufficient detail for use as generalized inundation maps. Aerial photographs, if available with reasonable clarity and scale, can also be used as a background for inundation maps. Topographic and aerial maps for Texas can be found online courtesy of the Texas Natural Resource Information Service, <www.tnris.state.tx.us>.

2.3b. Detailed Inundation Maps

Whenever communities or significant numbers of dwellings are located in the floodplain downstream of a dam, or for large dams with complex floodplains, detailed inundation maps are usually needed for the development of an adequate evacuation plan. These maps should show an outline of the area covered by the dam-break flood at sufficient scale and in enough detail to identify areas, including dwellings and other significant features, likely to be directly affected. (Dam-break inundation mapping is described in greater detail in *Hydrologic and Hydraulic Guidelines for Dams in Texas*.) Generally, mapping involves superimposing the dam-break flood outline on an existing map. Clarity and simplicity are important.

As a basis for detailed inundation maps, the program recommends using the best available maps—often topographic maps, aerial photographs, or city street maps. The lines delineating the inundated areas should be thick enough or distinct in form (e.g., solid, dashed, dotted) to identify the dam-failure inundation limits as the main feature of the map, but not bold enough to mask features that would be inundated by a dam failure.

Since local officials are likely to use the inundation maps for evacuation, a note should be included stating that—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.

2.4. Possible Emergency Conditions

The EAP should indicate procedures and list conditions, triggering events, or measures for timely and reliable detection, evaluation, and classification of an existing or potential emergency. The EAP should incorporate an assessment of the dam, including its vulnerability to all appropriate known emergency conditions such as severe thunderstorms with lightning and excessive rains, hurricanes, tornadoes, earthquakes, etc., as well as a list and explanation of problem indicators.

The dam owner is responsible for regularly monitoring the condition of the dam and correcting any deficiencies. The plan must include a routine inspection schedule and name the person or position responsible for the inspection; it should emphasize indicators of the onset of problems that might cause failure of the dam:

- slumping, sloughing, or slides on the dam or the abutment
- cloudy or dirty seepage or seepage with an increase in flow, boils, piping, or bogs
- seepage around conduits
- cracks, settlement, misalignment, or sinkholes
- erosion or riprap displacement
- animal burrows, especially those associated with beavers or nutria
- growth of trees and brush
- failure of operating equipment
- abnormal instrument readings
- leakage of water into the intake tower or drop inlet
- undermining of spillways
- overtopping of the dam
- sabotage

The plan must address what action to take and what resources will be used when one of these indicators is observed and how quickly you or your responsible agent is to report the problem. Keep records relating to any of the

indicators listed above to determine if changes are occurring. This will permit an intelligent assessment of the problems and the proper implementation of the emergency action plan. However, if you determine that failure is at all possible, report the situation immediately to the Texas Dam Safety Program and immediately implement all applicable notification procedures and emergency actions.

At dams that are normally unattended, give special consideration to providing for full-time surveillance during and after emergencies such as a major flood or earthquake. Since an EAP has little value unless it can be implemented quickly, surveillance at the dam helps ensure enough time to warn the public.

2.5. Preventive Actions

This section should discuss actions at the dam to prevent or delay failure after an emergency is first discovered. **These actions should only be undertaken under the direction of the owner's engineer.** Because of uncertainties about their effectiveness, preventive actions are usually carried out at the same time as notification of an impending failure.

The EAP should identify ways of preparing for an emergency, increasing response readiness in a uniform and coordinated manner, and helping to reduce the effects of a dam failure. The goal is maximum readiness to respond in minimum time.

The EAP should categorize potential emergencies into phases or conditions and identify specific actions to reduce the possibility of either underreacting or overreacting. List anticipated failure situations and appropriate responses, such as:

- **“Watch” Condition**—A problem has been detected at the dam which requires constant monitoring or immediate action to repair or correct. At this time, the distress condition is manageable by dam personnel. A “watch” condition will continue until the problem is corrected, or a “possible dam failure” warning is issued.
- **“Possible Dam Failure” Warning**—A “watch” condition that is progressively

getting worse. Efforts to correct the situation will continue but a possibility now exists that the dam could fail if these efforts are unsuccessful. There is no immediate danger; however, if conditions continue to deteriorate, the dam could fail.

- **“Imminent Dam Failure” Warning**—The owner or the operator has determined that conditions will progress to failure of the dam and an uncontrollable release of the reservoir. The dam will most likely fail regardless of what immediate measures are taken.
- **Dam Failure**—The dam has failed and a flood wave is now moving downstream. Flooding will start immediately and will continue to move downstream until water levels at the reservoir are stabilized. Massive destruction can be expected from the flood wave and evacuation of downstream areas should continue in accordance with local plans.

For large dams, owners may want to include a section related to emergency water release, a release in excess of normal that could flood certain downstream areas.

2.6. Supplies and Resources

The EAP should also identify:

- support capabilities, such as personnel or organizations that can render assistance and the procedures for contacting them;
- the existence and location of supplies and equipment available for use in remedial actions, preferably as close as possible to the dam;
- procedures for emergency purchase or procurement of supplies and equipment needed for remedial actions; and
- remedial construction and other activities to prevent a failure of the dam and who will carry them out.

For each applicable item, include specific contacts and their business and any other contact information.

2.7. Implementation

After completing the draft EAP and before owner’s approval, submit the draft to the TCEQ Dam Safety Program for comment. After receiving comments from TCEQ, complete the plan and take steps to implement it. Supply copies of the completed plan to the TCEQ and other appropriate officials—and a copy of the inundation maps, if any have been prepared, to the local National Weather Service office, to allow development of customized watch and warning messages. (These messages can be used instead of those given as examples in Appendixes A–C.) Schedule briefings with local officials to facilitate the incorporation of dam-break planning information into local-government emergency-management plans.

2.7a. Updating

Update the EAP promptly after each change in personnel involved or their telephone numbers. Likewise, conduct a comprehensive review of the adequacy of the EAP with local emergency-management officials when there is a significant change in project operation, downstream development, or other conditions which affect the plan. For large dams and complex downstream settings, scheduled annual reviews may be appropriate to maintain the viability of the EAP.

Furnish copies of any revisions that do result from updating or from periodic testing of the EAP to all who received the original EAP. Establish a procedure to ensure that all copies of the EAP get revised.

2.7b. Location

A copy of the complete up-to-date EAP should be available to the dam operator, local emergency-management personnel, and other local officials. The location of each copy should be stated in the EAP.

2.7c. Approval

Include a form on which the dam owner and local emergency-management personnel sign a statement that they have reviewed the EAP and concur with the notification procedures.

2.7d. Testing

It is required by 30 TAC 299.61(h) that a dam owner periodically review the EAP. The level of detail and frequency of reviewing depend on the size of the facility and the complexity of the downstream setting. For small dams and others with only a few homes in the floodplain, a simple review of the EAP, including validating numbers on the notification chart, may suffice.

For dams with significant development downstream, a more detailed review is appropriate, such as developing a drill for owner personnel that rehearses the EAP. (Coordinate with state and local officials before any test of the EAP.) The review should be annual to keep the owner's employees familiar with the EAP and to eliminate any potential problems. At the same time, the notification procedures should be updated to include any changes in names and telephone numbers of personnel, local officials, and downstream residents, and to include any new problems. Submit revisions of the EAP to the TCEQ and to appropriate state and local government officials.

The owner should conduct a tabletop exercise at least once every five years in the form of a meeting with state and local emergency-management officials in a conference room. The exercise should begin with a description of a simulated event and proceed to discussions among the participants to evaluate the EAP and response procedures, and to resolve concerns about coordination and responsibilities.

2.7e. Training

Training of the people involved in the EAP should ensure that they are thoroughly familiar with all elements of the plan, the availability of equipment, and their responsibilities and duties under it. Again, the level of detail involved in training is dependent upon the size and complexity of a dam. For small dams with simple EAPs, training may simply involve having responsible persons read the EAP annually.

In the case of larger, more complex dams, training may be much more involved. Training for the employees associated with the dam should be scheduled to familiarize them with the EAP by addressing:

- how to use the EAP
- how to identify problems and their severity
- how to use the notification procedures and the communications equipment
- what resources are available
- the importance of employees' roles during emergencies
- the importance of updating downstream information

Enough people should be trained to ensure adequate coverage at all times. Exercises simulating dam failures are excellent training mechanisms for ensuring readiness. Cross-training in more than one responsible position for each individual is advisable. Keep a record of training completed by key personnel.

APPENDIX A

Example Emergency Action Plan for a Large Dam

(NAME) DAM
TXO####
EMERGENCY ACTION PLAN

Date

Prepared for

(Name)

Prepared by

(Name)

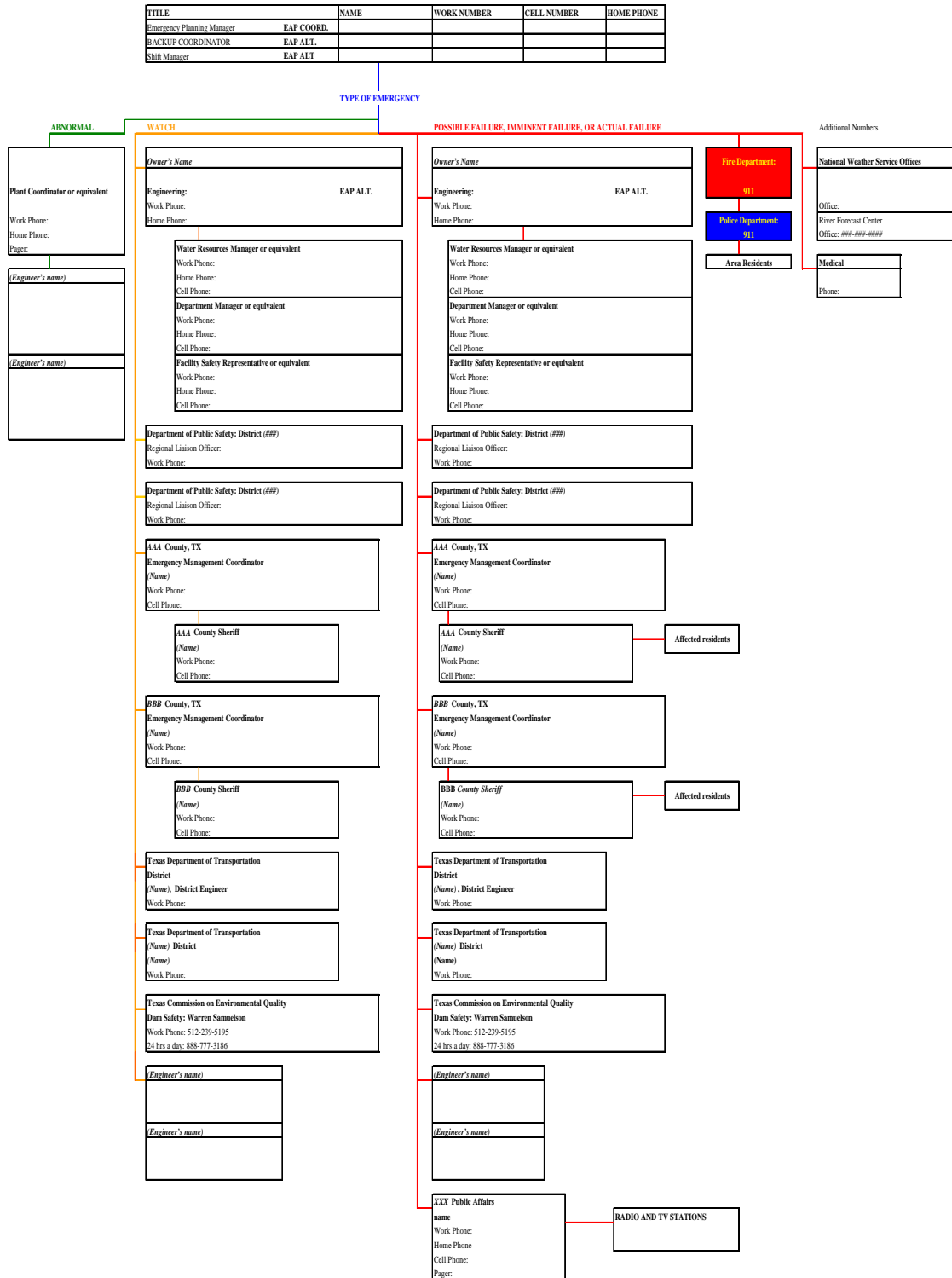
Emergency Action Plan
(Name) Dam
(Owner), Inc.

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NOTIFICATION FLOWCHART



(NAME) DAM
LOG SHEET OF CHANGES

Date	Change Made	Signature

APPROVAL AND IMPLEMENTATION

EMERGENCY ACTION PLAN

(NAME) DAM

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

Name and Title of Emergency Planning Manager

Date

Name and Title of Appropriate Manager for Owner

Date

EMERGENCY ACTION PLAN

(NAME) DAM

1. Introduction

(Name) Dam and Reservoir are owned and operated by (Owner). It is located on (Stream) in (Name) County, approximately (##) miles (direction) of (City), Texas. (Stream) is a tributary of the (Name of Main Tributary), located in the (Name) River Basin. The dam was completed in (year) and was constructed under Permit No. (#####), Application No. (#####), granted by the Texas Water Rights Commission to Owner in (year). The lake was constructed to serve as (purpose).

According to the (Name) Dam Breach Analysis (Tab 10), if a breach of the dam were to occur, a (##)-foot opening could form in as little as (##) minutes. The subsequent flood wave would flow downstream through the floodplain of (Name) with significant effects on the (Stream) and the (Stream). A breach of the dam has the potential to result in the loss of human life and loss of property.

1.1 Authority

The Texas Commission on Environmental Quality (TCEQ) is the regulatory agency responsible for the dam-safety laws in Texas. The primary goal of the state's dam-safety program is to save lives and reduce property damage that may result from a dam failure. The development and implementation of an Emergency Action Plan (EAP) is a positive step dam owners can take to accomplish dam-safety objectives, to protect their investment, and to reduce the potential liability associated with a dam failure. Title 30, Texas Administrative Code, Chapter 299, gives the state the authority to direct the owner of a dam, pursuant to Texas Water Code 12.052, to take immediate and appropriate action to remedy situations posing serious threat to human life or health, or risk of property damage. In addition, the following authorities formulate organization and operational concepts for emergency planning:

Texas Disaster Act of 1975, Executive Order of the Governor (GWB 95-1a).

Guidelines for Operation and Maintenance of Dams in Texas, Texas Commission on Environmental Quality, November 2006. Publication no. GI-357.

1.2 Purpose

The purpose of this Emergency Action Plan is to identify emergency situations that could threaten (Name) Dam, and to plan for an expedited, effective response to prevent failure of the dam. This plan defines the notification procedures to be followed in the event of a potentially hazardous situation or the potential failure of the dam. The procedures are intended to protect lives and prevent property damage from an uncontrolled release of water from the reservoir.

2. Project Description

2.1. General (example—modify as necessary)

(Name) Reservoir has a drainage area of approximately (##) square miles, and is designed to be operated at a normal pool elevation of (##) feet msl. The storage capacity of the reservoir at the normal operating level is (#####) acre-feet.

The dam is a (####)-foot-long zoned earth-fill embankment with a (##)-foot-wide crest. The top of the dam is at elevation (####) feet msl and has a maximum height above the streambed of (####) feet. The upstream and downstream slopes are (#) horizontal to 1 vertical. The upstream slope is protected with rock riprap and the downstream slope is a random and rock-fill zone with sparse vegetation.

The service spillway is composed of an uncontrolled concrete ogee structure with a crest elevation of (####) feet msl. The width of the spillway is (####) feet. Flow over the spillway is discharged into a conventional stilling basin with a floor elevation of (###) feet msl containing chute blocks and an end sill. The width of the basin is (####) feet and the total length of the chute and basin is (####) feet from the crest.

The emergency spillway is located at the left end of the dam and is an excavated, broad-crested weir measuring (####) feet in width, with a crest elevation of (####) feet msl.

2.2. Reservoir Operations (*example—modify as necessary*)

Releases from the reservoir are uncontrolled.

3. Responsibilities

3.1. Emergency-Response Procedures

When conditions at the dam have caused the declaration of an emergency, actions are to begin immediately with the notification of the (*title of dam emergency planner*). An Emergency Operations Center will be set up in the (*office or location*) to monitor the progression of the situation and to coordinate remediation activities. Alternate phone numbers are available. Provisions for light may be necessary due to darkness, and alternate access to the dam from both sides should be available.

Immediately upon determination of a “watch” or more serious condition, this Emergency Action Plan will be implemented. Surveillance of the problem will be maintained on a 24-hour basis. The Department of Public Safety Regional Liaison office; the *AAA* County, *BBB* County, and *CCC* County civil emergency-management officials; the owner’s engineer; and the TCEQ Dam Safety Program will be notified according to the Notification Flowchart by the (*title of dam emergency planner*). The following are possible actions at the dam to prevent or delay failure after an emergency is first discovered:

Seepage Failure

1. Plug the flow with whatever material is available (hay, bentonite, or plastic) if the entrance is in the reservoir.
2. Lower the water level in the reservoir by using the low-flow outlet and pumping if necessary, until the flow decreases to a non-erosive velocity or until it stops. Place an inverted filter (a protective layer of sand and gravel) on the exit area to hold the material in place.
3. Continue operating at a lower level until a repair is made.

Embankment or Foundation Sliding

1. Lower the water level in the reservoir by pumping if necessary at a rate and to an elevation considered safe, given the slide condition.
2. Stabilize the slide, if on the downstream slope, by weighting the toe area below the slide with soil, rock, or gravel.
3. Continue operating at a lower level until a repair is made.

Structural Failure

1. Implement temporary measures to protect the damaged structure, such as placing rock riprap in the damaged area.
2. Lower the water level to a safe elevation through the low-flow release valve and by pumping if necessary.

Preventive measures can be taken in an emergency to prevent the catastrophic failure of the dam, but such repairs should be undertaken with extreme caution. The repairs are only temporary, and a permanent repair should be designed by an engineer as soon as possible.

3.2. Responsibilities for Notification

The (*title of dam emergency planner*) shall make all initial notifications. As indicated in Section 5, technical advice shall be sought when time allows. However, for rapidly developing situations, immediate notification of the Department of Public Safety Regional Liaison office and the *AAA* County, *BBB* County, and *CCC* County civil emergency-management officials may be necessary for quick action. Sample notification messages appear in Tab 3. The county officials will in turn notify local law-enforcement officials for appropriate action. The (*Owner*) public-affairs representative will issue news releases. Sample news releases appear in Tab 4.

3.3. Responsibilities for Evacuation

Local law-enforcement officials shall be responsible for evacuating residents in the event of a dam emergency. After notification by the (*title of dam emergency planner*) through the Department of Public Safety Regional Liaison office and the *AAA* County, *BBB* County, and *CCC* County civil emergency-management officials, local law-enforcement officials will be responsible for the warning and evacuation of people in the threatened areas.

3.4. Responsibilities for Duration, Security, Termination, and Follow-up

The (*title of dam emergency planner*) or his or her designated representative will be responsible for on-site monitoring of the situation and for keeping local authorities informed of developing conditions at the dam from the time that an emergency starts until it ends. Local law-enforcement agencies shall maintain security at the dam. The (*title of dam emergency planner*) shall be responsible for declaring the situation terminated and for a follow-up evaluation of the emergency.

3.5. Plan Coordinator

The (*title of dam emergency planner*) who takes care of the day-to-day operations of the dam is responsible and has the authority to implement and carry out all procedures and surveillance found in this Plan. He shall be responsible for initiating the notification procedures when signs of distress or failure are noted. All participating parties should be familiar with this plan and their responsibilities during an emergency. Precautionary measures shall be taken to prevent the uncontrolled release of water from the reservoir. In the event that a failure is imminent, proper notification of persons in the downstream area shall be made. Any resources available to the (*title of dam emergency planner*) shall be used to minimize uncontrolled releases. The (*title of dam emergency planner*) alternates listed on the Notification Flowchart shall implement and carry out these procedures in his absence.

3.6. Emergency Operations Center

In the event of a “watch” or more serious condition, the (*title of dam emergency planner*) shall activate the Emergency Operations Center for the overall direction and response activities. The Emergency Operations Center shall be established at the (location of office). The (*title of dam emergency planner*) will be responsible for initiating actions from this location.

3.7. Communications

Local officials and downstream residents will be notified by landline telephone, if available; otherwise via cell phones or emergency personnel (in person or using their radios). The various radio networks for emergency use include the informal ham-radio network, and networks belonging to:

- The AAA County Sheriff's office
- The BBB County Sheriff's office
- The CCC County Sheriff's office
- The Texas Department of Public Safety
- The Texas Department of Transportation

Sample notification messages appear in Tab 3. Verification or authentication of the situation can be made by contacting the Department of Public Safety Regional Liaison office and the AAA County, BBB County, and CCC County civil emergency-management coordinators. Television and radio can be used as much as possible to notify area residents of the possible dangers. **Sample news releases appear in Tab 4.** News releases are to be issued by the (*Owner*) public-affairs officer. The following summarizes the notification procedures for different levels of alert:

"Abnormal" Condition

1. The (*title of dam emergency planner*) will be notified.
2. The (*title of dam emergency planner*) will notify officials at corporate headquarters.
3. (*Owner*) will contact (*Owner's engineer*) to inspect the situation.

"Watch" Condition

1. The (*title of dam emergency planner*) will notify the Department of Public Safety Regional Liaison office and officials at corporate headquarters.
2. (*Owner*) will contact (*Owner's engineer*) to inspect the situation.
3. A "watch" message will be issued by local emergency management officials to downstream contacts, if so directed by (*Owner*) officials.
4. State dam safety officials will be notified by (*Owner*) officials.

Possible Dam Failure

1. The (*title of dam emergency planner*) will notify the Department of Public Safety Regional Liaison office and the AAA County, BBB County, and CCC County civil emergency-management officials, (*Owner*) officials, and representatives of the Texas Department of Transportation (XXX and YYY Districts).
2. (*Owner*) will contact (*Owner's engineer*).
3. Local emergency-management officials will send a "possible dam failure" warning message to downstream residents, if so directed by (*Owner*).
4. (*Owner*) will notify state dam-safety officials.

Imminent Dam Failure

1. The (*title of dam emergency planner*) will notify the Department of Public Safety Regional Liaison office and the AAA County, BBB County, and CCC County civil emergency-

management officials, (*Owner*) officials, and representatives of the Texas Department of Transportation.

2. (*Owner*) officials will contact (*Owner's engineer*).
3. Local emergency-management officials will issue a “failure” message to downstream residents and evacuation programs shall begin.
4. (*Owner*) will notify state dam-safety officials.

The (*title of dam emergency planner*) shall ensure notification of personnel in the event of an emergency at the dam, and may delegate contacting some personnel to other (*Owner*) personnel. The delegation of contacts should be very specific as to which ones are to be made. The Notification Flowchart at the beginning of this report contains contact information for (*Owner*) staff, as well as the other officials which may be involved in the event of a situation at the dam.

4. Possible Emergency Conditions

4.1. Situations

Many dam conditions can lead to emergency situations, not all of which will necessitate the implementation of the Emergency Action Plan; however, if any of them occur, the appropriate action must be taken.

- **Severe storms:** Although generally not in themselves a threat to the dam, severe storms can contribute to an existing problem and hinder any remediation efforts. Severe storms also cause the uncontrolled release of floodwater, and increase flow in already rain-swollen areas.
- **Earthquakes:** (*Dam Name*) is located in a seismic zone with low activity. An earthquake is, however, a possibility, and appropriate post-earthquake inspections should be performed.
- **Tornadoes:** Tornadoes do occur in the area, with the potential for structural damage to the dam, possibly resulting in its failure. If a tornado has struck in the area, an inspection of the dam for any signs of damage will be appropriate.
- **Sabotage:** A threat to damage the dam has been made. Appropriate actions must be taken to protect the dam.

4.2. Signs of Failure

The following sections describe some of the different types of failure which could lead to a dam breach. The impacts of a dam breach have been evaluated and the results are included in this report.

- **Seepage Failure:** Although all earthen embankments allow some minor seepage through the dam or the foundation, excessive, uncontrolled seepage can result in piping (or the movement of embankment material in the seepage flow) and lead to failure. Piping can occur for years at a slow rate. If the piping has progressed to a dangerous level, it will be evident by increased flow or the discharge of muddy water (or both). At that stage, immediate action to stop the piping is needed. Fully developed piping is difficult to control and is very likely to result in failure. A whirlpool in the reservoir is a sign of uncontrollable piping and necessitates immediate emergency action.
- **Embankment or Foundation Sliding:** Sliding is usually first apparent when cracks or bulges in the embankment appear. Slides with progressive movement can cause failure of the embankment.

- **Structural Failure:** The structural failure or collapse of any portion of the service spillway or spillway gates could result in loss of the reservoir. A structural failure of a portion of the spillway could cause piping and possibly embankment failure.
- **Overtopping Failure:** Overtopping of the embankment results in erosion of the dam crest. Once erosion begins, it is very difficult to stop. [If (*Dam Name*) passes 100 percent of the Probable Maximum Flood, an overtopping failure need not be considered.]

4.3. Previously Known Problems

(Identify any known problems.)

4.4. Emergency Identification

A. Signs of Failure

In an emergency, the (*title of dam emergency planner*) is responsible for the dam's operation, maintenance and inspection. The early identification of potentially dangerous conditions can allow time for the implementation of emergency action plans. It is important to understand how distress can develop into failure. With appropriate action, distress need not lead to a catastrophic failure of the dam. Early identification, close monitoring, planned action and remedial measures will help alleviate a potentially dangerous situation. The following sections describe some of the different levels of distress which could lead to a dam breach.

B. "Abnormal" Conditions

The conditions listed below are not normal occurrences. These conditions, as well as those listed in the next three sections, are summarized in Tab 2, along with recommended actions. When these conditions are present, they should be noted, and action should be taken to prevent the possible failure of the dam.

- piping or boils in the area of any structure such as the embankment, spillway, or in the vicinity of the toe of the embankment, as evidenced by muddy water
- slides or sloughs in the embankment, discharge channel or abutments
- a significant increase in seepage quantities through or under the embankment, abutments or emergency spillway
- unusual vertical or horizontal movement or cracking of the embankment or abutments
- small sinkholes or subsidence within 500 feet of the embankment or spillway
- excessive displacement of the soil cement on the embankment slope
- an earthquake
- a severe storm
- a tornado
- threat of sabotage

In the event that any of these items are observed, the (*Owner's engineer*) should be contacted to inspect the dam to document the distress and determine whether remedial action is necessary. Notification of local authorities is not necessary for "abnormal" conditions.

C. "Watch" Conditions

A "watch" indicates that a significant problem that may potentially progress to a dangerous situation has been detected, but that a breach is considered unlikely and no flooding is imminent.

This situation will require monitoring and repair or correction as soon as possible. Upon detection, the notification procedures must be implemented in accordance with the instructions in Tab 2. The *(title of dam emergency planner)* shall institute all practicable measures to mobilize personnel to control the situation. The following is a list of conditions which constitute “watch” conditions:

- small boils if conditions are muddy, on the downstream slope of the embankment or downstream from the toe, or if there is flowing muddy water downstream from the embankment
- large sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe
- any slide that degrades the crest of the embankment or that is progressively increasing in size
- significantly increasing seepage or flow
- cracking or movement of any concrete structure
- the engagement of the emergency spillway

D. Possible Dam Failure

A “possible dam failure” warning is issued when a “watch” condition is becoming progressively worse, and a dam failure is considered possible. The *(title of dam emergency planner)* will immediately notify the Department of Public Safety Regional Liaison office and city and county emergency-management officials and others in accordance with the Notification Flowchart. He or she will continue all practicable measures to correct the problem, including lowering the reservoir level if appropriate. The existence of any of the following conditions constitutes possible dam failure:

- large boils, increasing in size and flow rate, especially if there is flowing muddy water
- significantly increasing seepage, especially flowing muddy water
- slides involving a large mass of material that impairs the crest of the dam and is continuing to move
- sinkholes with seepage flowing muddy water
- large cracks, movement or failure of a portion of any major concrete structure that forms an integral part of the dam
- an increase in the reservoir level to near the top of the dam
- overtopping of a concrete dam that is not designed for overtopping

E. Imminent Dam Failure

“Imminent failure” is the determination that a “warning” condition will most likely progress to a failure of the dam and the reservoir will be uncontrollably released, regardless of the actions taken. When this determination is made, immediate notification and warning of downstream areas becomes the primary concern. The existence of any of the following conditions constitutes imminent failure:

- rapidly increasing boils or the presence of new, significantly flowing boils, particularly muddy ones near previously identified ones
- rapidly increasing seepage, especially flowing muddy water

- slides involving a large mass of material or which have degraded the crest of the embankment to a level that approaches the water surface level, or if significant seepage is observed through the slide area
- settlement that is predicted to degrade to the reservoir level
- cracks that extend to the reservoir level
- significant movement or failure of any major concrete structure that forms an integral part of the dam
- overtopping of an earthen dam

5. Preventive Actions

This section lists the conditions and actions which may be used to classify the level of emergency response, as a guide for *(Owner)* personnel.

5.1. Abnormal Condition

Periodic inspections of the dam by *(titles of personnel making inspections)* will evaluate its structural safety, stability, and operational adequacy. If *(Owner)* personnel who visit the dam site notice visual evidence of distress, the structure should be inspected by a registered engineer specializing in dam design and construction. In the event of an abnormal occurrence, such as a tornado, earthquake, or unusually heavy rainfall, special inspections by an engineer of the embankment and spillway are warranted. An abnormal condition can generally be repaired or corrected in the next few months with no immediate action necessary.

5.2. “Watch” Condition

If a problem has been detected at the dam which requires constant monitoring or immediate action to repair and the condition is manageable by *(Owner)* staff, a “Watch” condition exists. A “watch” will continue until the problem is corrected or a “possible dam failure” warning is issued. The *(title of dam emergency planner)* should notify the Texas Department of Public Safety Regional Liaison office and state dam-safety officials.

5.3. Possible Dam Failure

A “watch” condition that is progressively getting worse is considered a possible dam failure. Efforts to correct the situation will continue, and—although there is no imminent danger—if conditions continue to deteriorate, a dam failure could occur. A “possible dam failure” condition generally has already involved extensive efforts by *(Owner)* personnel and potentially other contractors. A “possible dam failure” condition will continue until the problem is corrected, or until an “imminent dam failure” warning is issued. Notifications have been issued and local law-enforcement personnel are ready to begin evacuation of threatened areas.

5.4. Imminent Dam Failure

If the *(title of dam emergency planner)* has determined that the condition at the dam will continue to progress to failure and result in the uncontrolled release of water, an “imminent dam failure” condition exists. Dam failure will most likely occur regardless of what actions are taken. Numerous forces are involved in trying to correct the situation. Evacuation has begun and will continue until the situation is stabilized.

5.5. Dam Failure

A dam failure has occurred and a flood wave is moving downstream. Flooding will occur immediately and will continue to move downstream until water levels in the reservoir are stabilized. Considerable destruction can be expected, and evacuation of low-lying areas should continue.

5.6. Other Considerations

Alternate Access

Alternate access routes should be planned in the event of an emergency at the dam. The access road which runs along the crest of the dam is reachable from SH (##) on the north and from (*Name of Road*) on the south.

Darkness

In a nighttime emergency, the (*title of dam emergency planner*) should arrange for access to generators and lights to adequately monitor the situation.

Adverse Weather (*example—modify as necessary*)

The road across the dam is a gravel roadway with grassed edges which should allow discharge across the road as the emergency spillway does. The north and east alternate routes should be used instead under such conditions. All-weather access to the downstream toe of the dam will also be unavailable. For developing situations near the downstream toe of the dam, gravel may need to be brought in to stabilize a road in that area.

6. Supplies and Resources

6.1. Contracts

Should (*Owner*) personnel and resources prove to be inadequate during an emergency, requests will be made for assistance from other local jurisdictions, other agencies, and industry, as needed. Such assistance may include equipment, supplies, or personnel. All agreements will be entered into by authorized officials and should be in writing whenever possible. The (*title of dam emergency planner*) shall have the authority to enter into agreements as deemed necessary to prevent the failure of the dam.

6.2. Equipment and Supplies

Equipment which is available for use in the event of an emergency includes the equipment listed in Tab 5. Other contractors in the area may be needed. Possible contractors are listed in Tab 6.

6.3. Reports

Technical Data

Periodic inspections of the dam will be made to evaluate its structural safety, stability, and operational adequacy. In the event of an abnormal occurrence, reference to these reports, particularly the photographs, can be beneficial in the evaluation of a potential problem.

Technical records such as drawings and inspection reports should be stored and carefully maintained at the (*Owner*) Site offices. Alternate personnel shall be familiar with the location of the documents in the event of an emergency situation.

Emergency Operations Center Activity Log

Any unusual or emergency condition should be documented, including the following:

- activation or deactivation of emergency facilities

- emergency notifications to other local governments and to state and federal agencies
- significant changes in the emergency
- major commitments of resources or requests for additional resources from external sources
- telephone calls should be recorded in chronological order
- issuance of protective action recommendations to the public
- evacuations
- casualties
- termination of the incident

Costs of the Emergency Operations Center

For major emergencies, the emergency operations center shall maintain detailed records of costs expended. These records may be used to recover costs from the responsible party or insurers, or as a basis for requesting financial assistance for certain allowable response and recovery costs from the state or federal government. Documented costs should include:

- personnel costs, especially overtime
- equipment operation
- equipment leasing and rental
- contract services to support emergency operations
- specialized supplies expended in emergency operations

7. Inundation Area

The impacts of a dam breach have been evaluated and the results are included in *(Name)* Dam Breach Analysis (Tab 10). The inundation mapping resulting from the breach analysis is included in a tab at the back of this report. It illustrates the areas subject to flooding under severe storm conditions, a failure of the dam, or both. Also included on these maps are the times to flood associated with bridge crossings.

After examining the results of the breach analysis of *(Name)* Dam, it has been determined that there were a significant number of structures that could be affected either due to a PMF event alone with no dam breach, or due to a PMF or sunny-day dam breach. These structures are located along the *(Stream)*, the *(Stream)*, and the *(Stream)*. *(City or Town)* can suffer a dramatic impact from a breach of the dam. In addition, water resulting from a breach, and associated damages, will travel up the *(Stream)*.

(Name) Dam-Breach Analysis (Tab 10) contains profiles of the peak flood levels expected, as well as an estimation of the time from the beginning of the breach to the peak flood elevations. A comparison of the areas that are likely to be flooded with the plots showing the times from the start of the breach to the flooding shows the areas of evacuation and the time constraints involved. Figures in Appendix B of *(Name)* Dam Breach Analysis (Tab 10) include information on the estimated impact of flooding on the bridges along the *(Stream)*, the *(Stream)*, and the *(Stream)*. These structures may suffer such impacts before the peak elevation of the flood wave.

7.1. Local Evacuation Plan

If imminent failure of the dam with uncontrolled downstream flooding is anticipated, local emergency-management and law-enforcement personnel should notify those downstream of evacuation in the most expedient manner possible. The organizations and personnel on the Notification Flowchart should be contacted immediately. Local law-enforcement officials, along with radio and television stations, can best spread the notice for evacuation. The immediate impact will be to rural areas along (*Name of stream*) downstream of the dam. For sunny-day and PMF breaches, the following actions should be taken:

- Barricading all bridges that could possibly be flooded to prevent access to the affected area. These bridges include the (*Stream*) crossings of (*Highway or Road*). See the maps at the end of this report (Tab 11) to determine appropriate barricade locations.
- The Department of Public Safety Regional Liaison office can assist with the notification of all persons and agencies involved, with the possibility of additional support—including contacting others not accessible by radio or telephone.
- County officials are generally familiar with developed areas in their jurisdiction. Such knowledge, coupled with the requirements of state law that they respond to disasters, make them the logical officials to be notified and to spread the warning message to all areas subject to flooding.

8. Implementation

8.1. Development

The draft Emergency Action Plan was sent to the TCEQ for review, and agency comments were incorporated into this document, copies of which are currently on file with TCEQ.

8.2. Testing

The Emergency Action Plan will be reviewed annually for contacts and numbers and will be tested every five years using a tabletop exercise conducted under the direction of the (*title of dam emergency planner*). The purpose of this exercise is to review the plan with key personnel. Any revisions to the plan will be implemented after the exercise. The timing and frequency of testing can be adjusted as needed by the (*title of dam emergency planner*). The table top exercise should include emergency scenarios; notification of participants, including verification of all phone numbers and personnel; and notification of local officials. Area residents should not be included.

8.3. Training

The (*title of dam emergency planner*) is responsible for training personnel as necessary for dam safety and emergency response and planning.

8.4. Updating

This plan should be reviewed every five years and revised as necessary. A distribution list for this plan is included in Tab 9. The Notification Flowchart should be updated once a year. Approval of the plan is provided at the front of the report. A new approval should be attached to each annual update of the plan, as well as a log of any sheet changes.

TAB 1
PERTINENT DATA

Embankment

Type	Earth fill
Length	___ feet
Maximum Height	___ feet
Top Width	___ feet
Top of Embankment Elevation	___ feet msl
Drainage Area	___ square miles

Service Spillway

Type	Uncontrolled ogee weir
Location	Right abutment
Crest Length	___ feet
Crest Elevation	___ feet msl

Emergency Spillway

Type	Excavated, broad-crested weir
Location	Left abutment
Crest Length	___ feet
Crest Elevation	___ feet msl

Inlet-Outlet Works

Type	_____
Location	Right end of the dam
Invert Elevation	_____ feet msl, respectively

Reservoir

Elev. Top of Conservation Pool	___ feet msl
Capacity Conservation Pool	_____ acre-feet

TAB 2

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Boils	Small boils, no increase of water flow, flowing clear water	Abnormal	Notify (<i>Owner identifies titles of employees to be contacted</i>) during normal work hours. Call (<i>Owner's engineer</i>) for inspection.	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	None	Site and location, approximate flow
	Large or additional boils near previously identified ones, without increasing flow rate, but carrying small amount of soil particles	Watch	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	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.	Sandbags, filter cloth	Site and location, approximate flow
	Large or additional boils near previously identified ones, increasing flow rate, carrying soil particles	Possible Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Continue 24-hour surveillance. Continue monitoring and remedial action as described above. Initiate emergency lowering of the reservoir. Issue a warning to downstream residents.	Sandbags, pump	Site and location, approximate flow
	Rapidly increasing size of boils and flow increasing and muddy water	Imminent Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Downstream evacuation. Employ all available equipment to attempt to construct a large ring dike around the boil area.	Dozer, shovels, source of earthfill	Site and location, approximate flow

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Date to Record
Seepage	Minor seepage of clear water at toe, on slope of embankment, or at the abutments	Abnormal	Notify (<i>Owner identifies titles of employees to be contacted</i>), Plant Coordinator and Plant Engineer during normal work hours. Call (<i>Owner's engineer</i>) for inspection.	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.	Wooden stakes, flagging	Site, location, approximate flow
	Additional seepage areas observed flowing clear water and/or increasing flow rate.	Watch	Notify (<i>Owner identifies titles of employees to be contacted</i>), Department of Public Safety Regional Liaison office, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Initiate 24-hour surveillance. Monitor as described above. Construct measuring weir and channel all seepage through weir. Attempt to determine source of seepage.	Dozer, shovels	Site, location, approximate flow
	Seriously or rapidly increasing seepage, underseepage, or drain flow.	Possible Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	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.	Dozer, shovels, source of earthfill	Site location, approximate flow
	Additional seepage areas with rapid increase in flow and muddy water.	Imminent Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county/city emergency management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Downstream evacuation. Employ all available equipment to attempt to construct a large ring dike around the seepage area.	Dozer, shovels, source of earthfill	Site location, approximate flow

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Slides or severe erosion	Skin slide or slough on slope of embankment. No further movement of slide and embankment crest not degraded.	Abnormal	Notify (<i>Owner identifies titles of employees to be contacted</i>) during normal work hours. Call (<i>Owner's engineer</i>) for inspection.	Examine rest of embankment for other slides. Place stakes in slide material and adjacent to it for determining if further movement is taking place.	Stakes, tape measure	Distance between stakes
	Slide or erosion involving large mass of material, crest of embankment is degraded, no movement or very slow continuing movement.	Watch	Notify (<i>Owner identifies titles of employees to be contacted</i>), Department of Public Safety Regional Liaison office, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Initiate 24-hour surveillance. Mobilize all available resources and equipment for repair operations to increase freeboard and to protect the exposed embankment material. Start filling sandbags and stockpile near slide area.	Dozer, shovels, sources of earthenfill, sandbags.	Distance between stakes
	Slide or erosion involving large mass of material, crest of embankment is degraded, progressively increasing in size.	Possible Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Continue monitoring and remedial actions as described above. Place additional material at the toe of the slope to stop the slide.	Dozer, shovels, source of earthenfill, pump.	Distance between stakes
	Slide or erosion involving large mass of material, crest of embankment is severely degraded, movement of slide is continuing and may reach pool level.	Imminent Failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam safety officials, and (<i>Owner's engineer</i>) immediately.	Downstream evacuation. Utilize all available equipment and personnel to sandbag the degraded slide area to prevent it from overtopping.	Dozer, shovels, sandbags, pump.	Distance between stakes

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Sinkholes	Sinkholes anywhere on the embankment or within 500 feet downstream from the toe.	Abnormal	Notify <i>(Owner identifies titles of employees to be contacted)</i> during normal work hours. Call <i>(Owner's engineer)</i> for inspection.	Carefully walk the entire embankment and downstream area looking for additional sinkholes, movement, or seepage.	Stakes, flagging	Size, location
	Sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe.	Watch	Notify <i>(Owner identifies titles of employees to be contacted)</i> , Department of Public Safety Regional Liaison office, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Initiate 24-hour surveillance. Monitor as above. Construct sandbag dike around the seepage exit point to reduce the flow rate. Start filling sandbags and stockpile near sinkhole.	Dozer, shovels, pump	Size, location
	Large sinkholes with corresponding seepage anywhere on the embankment or downstream from the toe.	Possible failure	Notify <i>(Owner identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Continue monitoring and remedial action as described above. Utilize sandbags to increase the freeboard on the dam if necessary.	Sandbags, dozer, pump	Size, location
	Sinkholes rapidly getting worse, seepage flowing muddy water and increasing flow.	Imminent failure	Notify <i>(Owner identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Downstream evacuation. Utilize all available equipment and personnel to attempt to construct a large ring dike around the area.	Dozer, shovels, pump	Size, location

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Settlement	Obvious settlement of the crest of the embankment, especially adjacent to concrete structures.	Abnormal	Notify (<i>Owner identifies titles of employees to be contacted</i>) during normal work hours. Call (<i>Owner's engineer</i>) for inspection.	Look for bulges on slope or changes in crest alignment.	None	Size, location
	Settlement of crest of embankment that is progressing, especially adjacent to concrete structures or if any corresponding seepage is present.	Watch	Notify (<i>Owner identifies titles of employees to be contacted</i>), Department of Public Safety Regional Liaison office, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Initiate 24-hour surveillance. Mobilize all available resources for repair operations to increase freeboard. Fill and stockpile sandbags. Identify any boils near settlement points for flowing material and pursue action for boils.	Sandbags, dozer, shovels, source of earthfill.	Size, location
	Settlement of crest of embankment that is rapidly progressing especially adjacent to concrete structures or if any corresponding seepage is flowing muddy water or increasing flow.	Possible failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Continue monitoring and remedial actions as described above. Use sandbags to increase the freeboard on the dam if necessary.	Sandbags, shovels, dozer, source of earthfill.	Size, location
	Progressing settlement that is expected to degrade the embankment to reservoir level.	Imminent failure	Notify (<i>Owner identifies titles of employees to be contacted</i>), National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency management coordinators, state dam-safety officials, and (<i>Owner's engineer</i>) immediately.	Downstream evacuation. Utilize all available equipment and personnel to build up the crest in the area that is settling. Identify any boils near settlement points for flowing material and pursue action for boils.	Dozer, shovels, source of earthfill, sandbags.	Size, location

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Cracking	Cracks in the embankment crest or on slopes.	Abnormal	Notify <i>(Owner identifies titles of employees to be contacted)</i> during normal work hours. Call <i>(Owner's engineer)</i> for inspection.	Walk on entire crest and slope and check for additional cracking.	Stakes, tape measure	Size, location
	Numerous cracks in crest that are enlarging, especially those perpendicular to the centerline of the dam.	Watch	Notify <i>(Owner identifies titles of employees to be contacted)</i> , Department of Public Safety Regional Liaison office, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Initiate 24-hour surveillance. Carefully monitor and measure cracking to determine the speed and extent of the problem. Mobilize to fill cracks. Cracks parallel to the centerline indicate a slide. Follow remedial action for slides.	Stakes, tape measure, dozer, shovels, source of earthfill.	Size, location
	Large cracks in the crest that are rapidly enlarging, especially those perpendicular to the centerline of the dam.	Possible failure	Notify <i>(Owner identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Continue monitoring and remedial action as described above.	Dozer, shovels, source of earthfill.	Size, location
	Cracking that extends to pool elevation.	Imminent failure	Notify <i>(Owner identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Owner's engineer)</i> immediately.	Downstream evacuation. Continue remedial actions as described above.	Dozer, shovels, source of earthfill.	Size, location

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Cracking or movement of concrete structure	Minor cracking and/or movement.	Abnormal	Notify <i>(Ommer identifies titles of employees to be contacted)</i> during normal work hours. Call <i>(Ommer's engineer)</i> for inspection.	Immediately install measuring device to monitor movement.	Crack Monitors, stakes, tape measure.	Size, location
	Significant cracking and/or movement.	Watch	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , Department of Public Safety Regional Liaison office, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Initiate 24-hour surveillance. Lower burlap on upstream face of crack to reduce flow of soil particles. Dump rockfill downstream of moving concrete structure monolith to resist the movement.	Burlap, rockfill, dozer, shovels.	Size, location, flow rate
	Serious cracking and/or movement	Possible failure	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Continue monitoring and remedial action as described above.	Dozer, rockfill, burlap, crack monitors	Size, movement, flow rate
	Major cracking and/or movement	Imminent failure	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Downstream evacuation. Continue monitoring and remedial actions as described above.	Dozer, shovels, rockfill	Size, location, flow rate

TAB 2 (continued)

EVIDENCE OF DISTRESS

General Observation	Specific Observation	Condition	Notification	Emergency Action	Equipment, Material and Supplies	Data to Record
Upstream Whirlpool	Whirlpool in the lake in the vicinity of the embankment	Imminent Failure	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Downstream evacuation. Attempt to plug the entrance of the whirlpool with riprap from the slope of the embankment. Search downstream for an exit point and construct a ring dike to retard the flow of soil particles	Dozer, source of earthfill, sandbags, filter cloth, straw, rocks	Size, location, flow rate
Broken gate	Structural member of a gate or gate operator broken or severely damaged so as to prevent operation of the gate	Possible failure	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Initiate 24-hour surveillance. Immediately place stop logs in front of gate and initiate necessary actions to get gate repaired.	Crane and welder	Type of problem, location
Rapidly rising lake	Lake level rising and rain continuing	Watch	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , Department of Public Safety Regional Liaison office, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Initiate 24-hour surveillance of lake level and rainfall.		Lake level, rainfall
Dam being overtopped	Water flowing over the dam and lake continuing to rise	Possible failure	Notify <i>(Ommer identifies titles of employees to be contacted)</i> , National Weather Service, Department of Public Safety Regional Liaison office, county-city emergency-management coordinators, state dam-safety officials, and <i>(Ommer's engineer)</i> immediately.	Downstream evacuation. Continue monitoring.		Lake level, rainfall

TAB 3

SAMPLE NOTIFICATION MESSAGES

Note: These notification messages will be coordinated through the *(Owner)*, *(title of dam emergency planner)*, the National Weather Service, the Department of Public Safety Regional Liaison office, and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties before they are disseminated to downstream organizations. Messages developed with the assistance of the National Weather Service may be used instead.

“Watch” Condition Message

This is an emergency message. *(Owner)* has declared a “watch” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however, the potential does exist. We request that you initiate appropriate emergency-management procedures. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety District (###) Regional Liaison Office has been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Possible Dam Failure” Warning

This is an emergency message. *(Owner)* has declared a “possible failure” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is a possibility that the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. Emergency water releases to lower the lake *(are/are not)* being made. We request that you initiate appropriate emergency management procedures and prepare for evacuation of the threatened areas. If *(Name)* Dam does fail, flooding will occur along the *(Stream)*, the *(Stream)*, and the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison office and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Imminent Dam Failure” Warning

Urgent! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, is in imminent danger of failing. Attempts to save the dam will continue, but their success is unlikely. We request that you initiate appropriate emergency management procedures and begin evacuation of threatened areas. It is probable that the dam will fail in *hours*. If *(Name)* Dam fails, a flood wave will move down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison Office and Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures.

Dam Failure Message

Emergency! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, has failed. A flood wave is moving down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)* toward *(City)* and *(City)*. The flood waters have already reached *(Road)*, *(Road)*, and *(Road)* on *(Stream)*. The City of *(Name)* will begin flooding at *(time—give number of hours after PMF breach)*. FM (###) on the *(Name)* River will begin flooding at *(time—prior to a PMF breach, give*

number of minutes after a sunny-day breach). The flood wave will go up the *(Stream)* and flood areas along the river. *(Road)* in *AAA* County will begin flooding at *(time—prior to a PMF breach and three hours after a sunny-day breach)*. SH *(##)* at *(landmark)* will begin flooding at *(time—give number of hours after a PMF breach)*. Evacuate threatened areas immediately. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison office and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition.

TAB 4

SAMPLE NEWS RELEASES

Note: Coordinate with the National Weather Service, the Department of Public Safety (*Location*) District Regional Liaison office, and the emergency management directors for *AAA*, *BBB*, and *CCC* counties prior to release. Messages developed with the assistance of the National Weather Service may be used instead.

Announcement for a Slowly Developing "Watch" Condition

(Owner) has declared a "Watch" condition for *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however the potential does exist. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)*

Announcement for a Possible Dam Failure

(Owner) has declared a possible dam failure at *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* It is possible the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)* Additional news will be made available as soon as it is received.

Announcement for an Imminent Dam Failure

Urgent! *(Owner)* has announced that *(Name)* Dam is in imminent danger of failing. *(Describe what actions are being taken to monitor and control the situation.)* It is possible that the dam will fail in *(##)* hours. Residents in low lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*, as well as the town of *(Name)*, should prepare for immediate evacuation. Additional news will be made available as soon as it is received.

Announcement of a Dam Failure

Emergency! *(Name)* Dam failed at *(time and date)*. Residents who have not yet done so should immediately evacuate the city of *(Name)* and low-lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*. The flood waters have already reached *(Highway)* and *(Road)*. Additional news will be made available as soon as it is received.

TAB 5
EQUIPMENT AND SUPPLIES

The following equipment and supplies may be necessary for use during emergencies.

EQUIPMENT	LOCATION
backhoes dump trucks portable welding equipment generators dozers excavators loaders motor graders	<i>(Names and addresses of contractors)</i>
crane	<i>(Name and address of contractor)</i>
sandbags	<i>(Names and addresses of businesses)</i>
rock riprap	<i>(Names and addresses of sources of rock)</i>

TAB 6

EMERGENCY CONTRACTOR SUPPORT

CONTRACTOR	EQUIPMENT	CONTACT	ADDRESS	PHONE
<i>(Names)</i>	dozers trackhoe dump trucks grader steel mechanical repairs electrical repairs small crane large crane backhoe emergency lighting generators			

TAB 7 (continued)
SIMULATED-EMERGENCY EXERCISE

Date of Exercise:	
Participant Sign-In:	
Type of Simulation Conducted:	Circle Emergency Type: emergency water release watch condition imminent dam failure actual dam failure
Comments, Results of Exercise:	
Revisions Needed to EAP Based on Results of Exercise?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list revisions required:

TAB 7 (continued)
PLAN REVIEW AND UPDATE

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

Date of review: _____ Participants:

Date of review: _____ Participants:

Date of review: _____ Participants:

Date of review: _____ Participants:

Date of tabletop exercise: _____ Participants:

TAB 8

ANNUAL EAP EVALUATION CHECKLIST

Was the annual dam inspection conducted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is the checklist signed and included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was brush clearing, animal-burrow removal, or other maintenance required?	<input 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:	
Does the Notification Flowchart require revision?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date revised Contact Information pages were distributed: (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 type="checkbox"/> Yes <input type="checkbox"/> No	Circle: training exercise Date conducted:	
Are inspection and training records included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Was the EAP reviewed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, review date:	
Were changes required to the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date of revised EAP approval:	

Signature of dam supervisor: _____ Date completed: _____

TAB 9
DISTRIBUTION LIST

Authority	Name, Title, Phone	Address
Owner(s)		
National Weather Service	<i>(Name of Contact)</i>	
Department of Public Safety	Regional Liaison Officer Phone ###-###-####	
AAA County	Emergency-Management Director	
BBB County	Civil Emergency- Management Director	
CCC County	Emergency-Management Director	
Texas Department of Transportation District (###)	<i>(Name of Contact)</i> Phone ###-###-####	
Texas Department of Transportation District (###)	<i>(Name of Contact)</i> Phone ###-###-####	
State of Texas Texas Commission on Environmental Quality Dam Safety Program	Warren Samuelson, P.E. Dam Safety Program Coordinator 512-239-5195	Field Operations Support Division, MC 174 P.O. Box 13087 Austin, TX 78711
Engineers	<i>(Names)</i>	

TAB 10
BREACH ANALYSIS

TAB 11
INUNDATION MAPS

TAB 12
GATE-OPERATION PLAN

APPENDIX B

Example Emergency Action Plan for an Intermediate-Size Dam

(NAME) DAM
TXO####
EMERGENCY ACTION PLAN

Date

Prepared for

(Name)

Prepared by

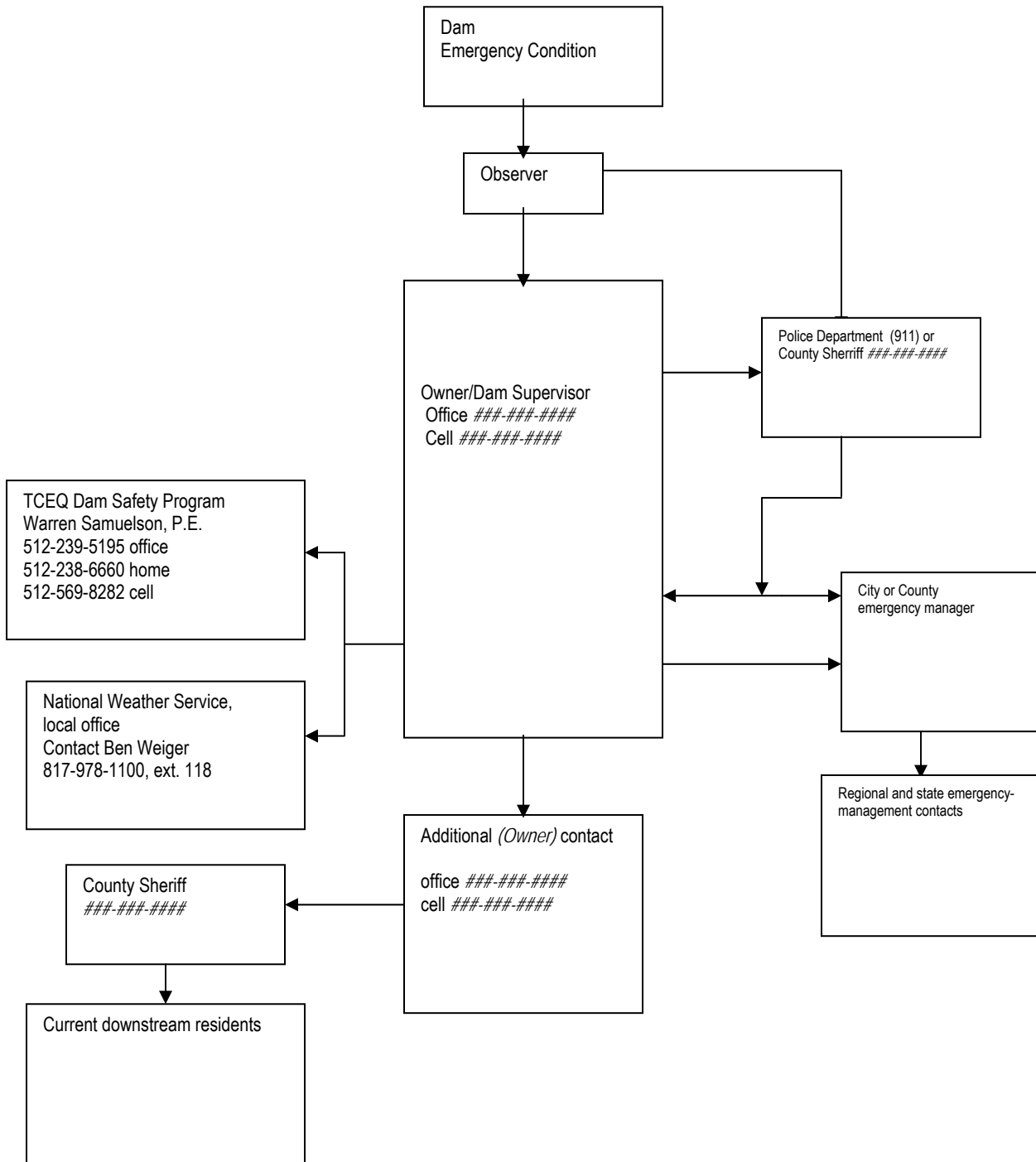
(Name)

Emergency Action Plan
(Name) Dam
(Owner), Inc.

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NOTIFICATION FLOWCHART



APPROVAL AND IMPLEMENTATION

EMERGENCY ACTION PLAN

(NAME) DAM

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

Name and Title of Emergency Planning Manager

Date

Name and Title of Appropriate Manager for Owner

Date

EMERGENCY ACTION PLAN

(NAME) DAM

1. Purpose

This Emergency Action Plan defines responsibilities and prescribes procedures designed to identify unusual and unlikely conditions that may endanger (Name) Dam.

2. Project Description

The owner of (Name) Dam is (Owner). (Name) Dam is located (distance) from (nearest city) in AAA County, Texas. (Name) Dam is designated by the National Inventory of Dams ID number TX0####. The latitude and longitude of the dam are (##)° N and (##)° W, respectively. (Name) Creek flows into (Stream). A vicinity map for the dam and surrounding area is found in Tab 1.

(#####) persons reside in the floodplain below (Name) Dam. The residents are identified in the Notification Flowchart of this EAP. The hazard potential classification is (high or significant).

(Name) Dam is made from earthen material. Its length is approximately (####) feet; its height is (###) feet. The embankment crest is approximately (##) feet wide. The upstream and downstream embankment slopes are approximately (#):1. The upstream embankment is covered with (covering), and the downstream embankment slope is covered with (covering). The service spillway is located on (location). The service spillway is approximately (###) feet wide and is (type). The emergency spillway, located on the (location), is covered with (covering).

The gate valve on the dam is inoperable. The service and emergency spillways drain into the downstream channel of (Name) Creek.

3. Responsibilities

3.1. Dam Owner's Responsibilities

(Owner) is responsible for dam operation and all maintenance.

The dam supervisor (or other appropriate title) is listed on the Notification Flowchart. The Notification Flowchart will be updated with person-specific names and contact numbers as necessary. The remaining portions of this EAP will not designate specific persons but instead will designate duties or job descriptions.

The dam operators are (Owner) employees. They should be advised of the necessity of the EAP. The operators are the first line of dam observers and are the persons responsible to initiate implementation of the EAP protocols.

The dam supervisor (or other appropriate title) is in the first line of dam observers and is the person responsible to initiate implementation of the EAP protocols. The dam supervisor (or other appropriate title) is responsible for conducting routine maintenance activities (such as annual brush control), conducting integrity inspections, and notifying the appropriate emergency personnel in any emergency (or situation that could lead to an emergency). The dam supervisor (or other appropriate title) is responsible for contacting appropriate emergency personnel if a dam failure is imminent.

The dam supervisor (or other appropriate title) is also responsible for ensuring the dam maintenance and inspection activities are conducted and updating the EAP. An annual EAP review should be conducted to ensure that contact names and numbers are current on the Notification Flowchart.

The dam supervisor (*or other appropriate title*) is responsible for directing the specific actions that (name of owner) employees must take during an emergency condition. The actions specified should be incident appropriate, such as opening or closing water intakes, implementing remedial construction activities such as dirt moving, etc. Specific scenarios are not listed in this EAP. The dam supervisor (*or other appropriate title*) will direct the actual measures to be implemented based on the conditions at the dam.

3.2. Responsibilities for Notification

The dam supervisor (*or other appropriate title*) is responsible for conducting an inspection of the dam in the event of a potential emergency such as high waters or a tornado. The dam supervisor (*or other appropriate title*) will contact the appropriate emergency personnel (the owner or the owner's representative, the AAA County emergency manager, and the AAA County sheriff). Those emergency personnel will determine if an emergency declaration is warranted. Sample notifications and sample news releases are found in Tab 4 and Tab 5.

If warranted, the dam supervisor (*or other appropriate title*) will notify the TCEQ Dam Safety Program. The AAA County sheriff will notify downstream residents. The AAA County emergency manager will implement the notification flowchart for regional and state emergency-management contacts.

3.3. Responsibilities for Evacuation

Appropriate emergency personnel are responsible for determining if a directive to evacuate must be issued. The potential Inundation Map in Tab 3 should be used for the evacuation.

Upon a directive from appropriate emergency personnel, the AAA County sheriff's office is responsible for initiating evacuations.

3.4. Responsibilities for Duration, Security, Termination, and Follow-up

The dam supervisor (*or other appropriate title*) is responsible for monitoring of emergency situations at the dam and for reporting to the appropriate emergency personnel, which will keep authorities informed based on the Notification Flowchart.

The AAA County sheriff's office is responsible for cordoning off the affected area per the directives of the appropriate emergency personnel.

The appropriate emergency personnel are responsible for declaring that the emergency at the dam is terminated. Applicable authorities will be notified based on the Notification Flowchart.

The appropriate emergency personnel are responsible for the follow-up evaluation after an emergency. The dam supervisor (*or other appropriate title*) will be responsible for the written report that should be maintained in this EAP.

4. Possible Emergency Conditions

4.1. Situation Awareness and Emergency Detection

(*Owner or Owner's Representative*) is responsible for monitoring the condition of the dam regularly and during situations that could lead to an emergency, including:

- severe thunderstorms with excessive rains
- tornadoes
- other potential breaches in the earthen dam
- terrorist actions

Severe thunderstorms may result in flash flooding that may raise the water level in the dam above the spillway. A single rainfall, or multiple rainfalls, may cause such a rise in water level. Tornadoes generally occur with little warning and can compromise the integrity of a dam. Should heavy rains cause problems, or a tornado strike at or near *(Name)* Dam, the dam supervisor *(or other appropriate title)* will conduct a visual inspection of the dam and complete a written checklist of evidence of distress.

Such a checklist appears in Tab 2. The completed checklist should be maintained in this EAP. **Any areas with leaks, seepage, or other visible signs of an integrity breach should be reported immediately to the dam supervisor (or other appropriate title) and local emergency personnel should be contacted if dam failure is imminent.**

Other breaches in the earthen dam may have various causes such as animal burrows, cracks in the dam structure, leakage, etc. These types of potential breaches will be assessed during the routine annual inspection discussed below.

In addition to potential emergency detection, the dam supervisor *(or other appropriate title)* should conduct an annual inspection for dam integrity. Annual brush-clearing activities along the dam will be conducted prior to or during the inspection. These inspection and maintenance activities are conducted by the dam supervisor *(or other appropriate title)* to ensure the stability of the dam structure. During the brush-clearing maintenance, the dam structure should be inspected for integrity. The written checklist of evidence of distress (see Tab 2) should be completed and retained. The inspection should include indicators of potential problems at the dam, such as:

- slumping, sloughing, or slides on the dam or abutment
- cloudy or dirty seepage, seepage with an increase in flow
- cracks, settlement, misalignment, or sinkholes
- erosion
- animal burrows, especially those associated with beavers
- presence of tree and brush growth
- leakage into the intake
- undermining of the spillway

Besides the dam, the dam supervisor *(or other appropriate title)* should inspect the area downstream of the dam.

4.2. Emergency Evaluation

Upon determination of a potential emergency situation, the dam supervisor *(or other appropriate title)* should notify the *(Owner or Owner's Representative)* and the *AAA* County emergency manager. *(Owner)* should contact the *AAA* County sheriff. The **appropriate emergency personnel, consisting of the Dam Supervisor (or other appropriate title), (Owner), the AAA County emergency manager, and the AAA County sheriff**, must assess the severity and magnitude of any existing or potential emergency through information gathering and discussions to make the emergency classification.

5. Emergency Classification

Emergencies are classified according to their severity and urgency by the appropriate emergency personnel. The following classifications will be used for any emergency situations at *(Name)* Dam.

- **“Watch” condition.** A problem has been detected at the dam, which requires constant monitoring or immediate action to repair or correct. At this time, the distress condition is manageable by dam operations personnel. This condition should convey the impression that **some amount of time** is available for dam repair with further analysis. A “watch” condition will continue until the problem is corrected, or until an imminent or actual “dam failure” warning is issued.
- **Imminent or actual “dam failure” warning.** These conditions apply where a dam failure has occurred, is occurring, or is imminent. If a “watch” condition preceded this warning, repairs have failed and no additional actions can be implemented to secure the dam’s integrity. Whether the dam failure has occurred or is imminent, all EAP agencies should interpret this condition as conservatively as possible. No lag time is available prior to implementing notification and evacuation procedures. This condition should convey the impression that **time has run out**.

6. Implementation

A draft copy of this EAP has been supplied to the TCEQ for review and comments prior to final approval by (*Owner*), whose signature and title appear earlier in this EAP.

The dam supervisor (*or other appropriate title*) is responsible for distributing this EAP and any revisions to the appropriate parties including the appropriate emergency personnel. The dam supervisor (*or other appropriate title*) is the point of contact if any involved parties have questions about the plan.

The dam supervisor (*or other appropriate title*) should schedule training about the plan for those associated with it, including:

- how to use the EAP
- how to identify problems and their severity
- how to implement the notification procedures
- what resources are available
- the importance of each agency during emergencies
- the importance of updating downstream information

The dam supervisor (*or other appropriate title*) is responsible for revising this EAP, as required, and for conducting an annual review to determine if revisions are required. The checklist in Tab 7 may be used for this review. Documentation of the annual review should be maintained in this EAP in Tab 7. Revisions to the EAP must also be approved. The revision approval date, the signature, and title of the approving authority should be included in this EAP. [Note that, if revisions to the contact names and phone numbers on the Notification Flowchart are the only revisions required, the revisions do not require review and approval by the (*Owner*). However, the revised contact-information pages must be distributed to all appropriate parties.]

A tabletop exercise shall be conducted at least once every five years, involving a meeting of the dam owner with state and local emergency-management officials in a conference room. The exercise begins with a description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures, and to resolve concerns regarding coordination and responsibilities. Any problems identified during an exercise should be included in revisions to the EAP. Records of training and any exercises should be maintained in Tab 6.

TAB 1
VICINITY MAP

TAB 2

EVIDENCE OF DISTRESS

Condition	<input type="checkbox"/> Yes <input type="checkbox"/> No	Inspection Findings	Actions Required	Date Actions Taken
Are there any surface cracks?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe extent of cracking:		
Is there any slumping, sloughing, or slides on the dam or the abutments?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe extent of problem and location:		
Is there cloudy or dirty seepage; or seepage with increase in flow?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe seepage:		
Is there any misalignment or settlement in the dam?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe location and extent of misalignment or settling:		
Is there any erosion or riprap displacement?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe location and extent of erosion or riprap displacement:		
Are there any animal burrows visible, especially those associated with beavers?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe location and extent of animal burrows:		
Are there trees or brush that is overgrown?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe location and extent of overgrowth:		
Is there any undermining of the service spillway?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe extent of undermining:		
Is there any undermining of the emergency spillway?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, describe extent of undermining:		
<i>For annual inspections:</i> Inspect the downstream areas and contact residents.		List persons contacted and any revisions required for the contact list or map.		

Any areas with leaks, seepage, or other visible signs of an integrity breach should be reported immediately to the dam supervisor (or other appropriate title). If dam failure appears imminent, contact emergency-management personnel.

Name of Inspector: _____ Date of Inspection: _____ Inspection Type (circle one): annual emergency assessment

Signature of Dam Supervisor: _____ Date of Dam Supervisor's Review: _____

TAB 3
INUNDATION MAP

TAB 4

SAMPLE NOTIFICATION MESSAGES

Note: These notification messages will be coordinated through the *(Owner)*, *(title of dam emergency planner)*, the National Weather Service, the Department of Public Safety Regional Liaison office, and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties before they are disseminated to downstream organizations. Messages developed with the assistance of the National Weather Service may be used instead.

“Watch” Condition Message

This is an emergency message. *(Owner)* has declared a “watch” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however, the potential does exist. We request that you initiate appropriate emergency-management procedures. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison Office has been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Possible Dam Failure” Warning

This is an emergency message. *(Owner)* has declared a “possible failure” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is a possibility that the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. Emergency water releases to lower the lake *(are/are not)* being made. We request that you initiate appropriate emergency management procedures and prepare for evacuation of the threatened areas. If *(Name)* Dam does fail, flooding will occur along the *(Stream)*, the *(Stream)*, and the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison office and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Imminent Dam Failure” Warning

Urgent! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, is in imminent danger of failing. Attempts to save the dam will continue, but their success is unlikely. We request that you initiate appropriate emergency management procedures and begin evacuation of threatened areas. It is probable that the dam will fail in *hours*. If *(Name)* Dam fails, a flood wave will move down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison Office and Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures.

“Dam Failure” Message

Emergency! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, has failed. A flood wave is moving down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)* toward *(City)* and *(City)*. The flood waters have already reached *(Road)*, *(Road)*, and *(Road)* on *(Stream)*. The City of *(Name)* will begin flooding at *(time—give number of hours after PMF breach)*. FM *(###)* on the *(Name)* River will begin flooding at *(time—prior to a PMF breach, give number of minutes after a sunny-day breach)*. The flood wave will go up the *(Stream)* and flood areas along

the river. *(Road)* in *AAA* County will begin flooding at *(time—prior to a PMF breach and three hours after a sunny-day breach)*. SH *(##)* at *(landmark)* will begin flooding at *(time—give number of hours after a PMF breach)*. Evacuate threatened areas immediately. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison office and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition.

TAB 5

SAMPLE NEWS RELEASES

Note: Coordinate with the National Weather Service, the Department of Public Safety (*Location*) District Regional Liaison office, and the emergency management directors for *AAA*, *BBB*, and *CCC* counties prior to release. Messages developed with the assistance of the National Weather Service may be used instead.

Announcement for a Slowly Developing “Watch” Condition

(Owner) has declared a “Watch” condition for *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however the potential does exist. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)*

Announcement for a Possible Dam Failure

(Owner) has declared a possible dam failure at *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* It is possible the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)* Additional news will be made available as soon as it is received.

Announcement for an Imminent Dam Failure

Urgent! *(Owner)* has announced that *(Name)* Dam is in imminent danger of failing. *(Describe what actions are being taken to monitor and control the situation.)* It is possible that the dam will fail in *(##)* hours. Residents in low lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*, as well as the town of *(Name)*, should prepare for immediate evacuation. Additional news will be made available as soon as it is received.

Announcement of a Dam Failure

Emergency! *(Name)* Dam failed at *(time and date)*. Residents who have not yet done so should immediately evacuate the city of *(Name)* and low-lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*. The flood waters have already reached *(Highway)* and *(Road)*. Additional news will be made available as soon as it is received.

TAB 6

TRAINING RECORD

Use this form to record training sessions. File the completed form in Tab 7 of the EAP. Thorough review of 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: _____

DATE: _____ TIME: _____ INSTRUCTOR: _____

CLASS SIGN-IN

TAB 6 (continued)

SIMULATED-EMERGENCY EXERCISE

Date of Exercise:	
Participant Sign-In:	
Type of Simulation Conducted:	Circle Emergency Type: emergency water release watch condition imminent dam failure actual dam failure
Comments, Results of Exercise:	
Revisions Needed to EAP Based on Results of Exercise?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list revisions required:

TAB 6 (continued)

PLAN REVIEW AND UPDATE

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

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of tabletop exercise: _____

Participants:

TAB 7

ANNUAL EAP EVALUATION CHECKLIST

Was the annual dam inspection conducted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is the checklist signed and included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was brush clearing, animal-burrow removal, or other maintenance required?	<input 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:	
Does the Notification Flowchart require revision?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date revised Contact Information pages were distributed: (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 type="checkbox"/> Yes <input type="checkbox"/> No	Circle: training exercise Date conducted:	
Are inspection and training records included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Was the EAP reviewed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, review date:	
Were changes required to the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date of revised EAP approval:	

Signature of dam supervisor: _____ Date completed: _____

APPENDIX C

Example Emergency Action Plan for a Small Dam

(NAME) DAM
TXO####
EMERGENCY ACTION PLAN

Date

Prepared for

(Name)

Prepared by

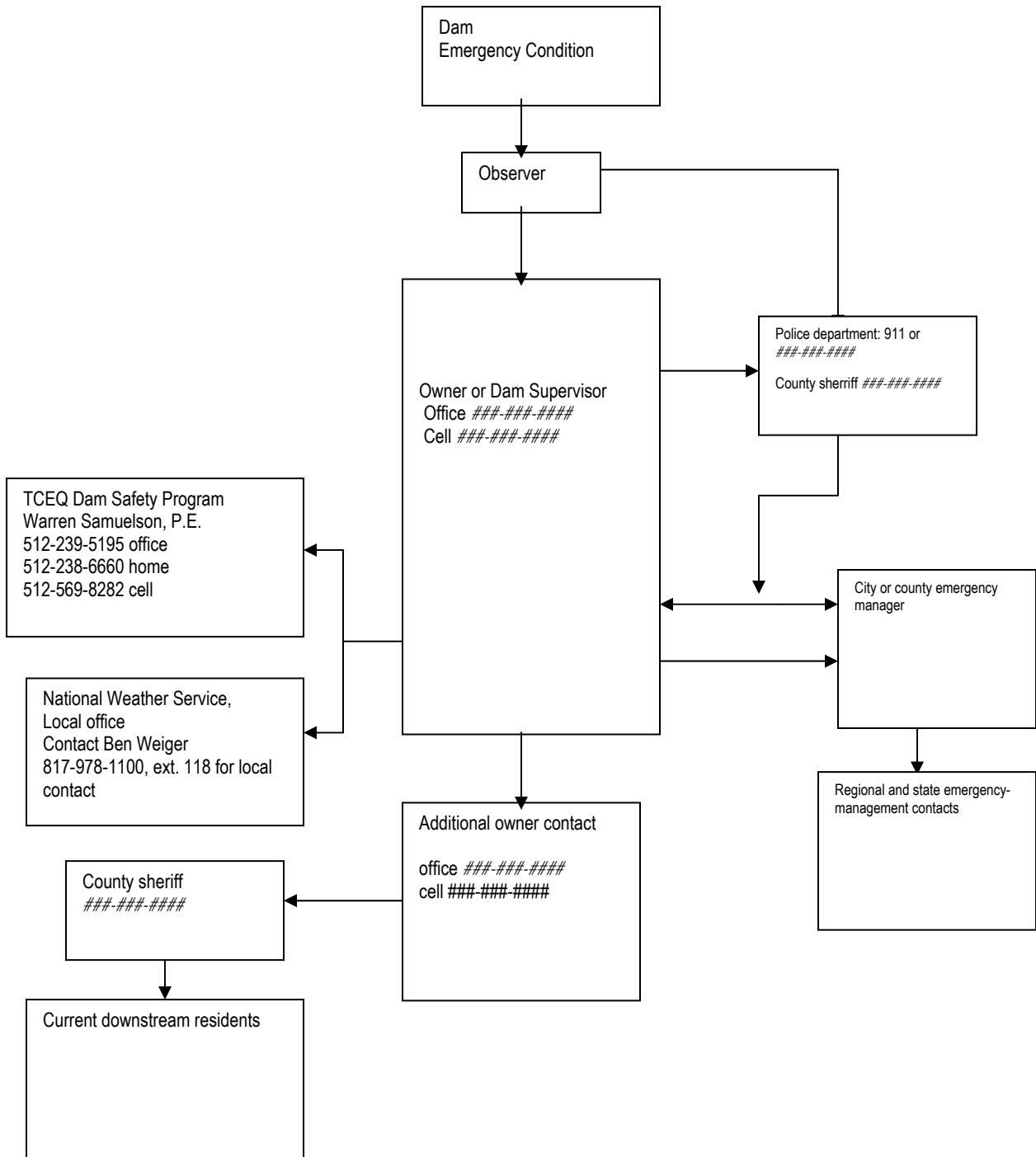
(Name)

Emergency Action Plan
(Name) Dam
(Owner), Inc.

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NOTIFICATION FLOWCHART



(NAME) DAM

LOG SHEET OF CHANGES

Date	Change Made	Signature

APPROVAL AND IMPLEMENTATION

EMERGENCY ACTION PLAN

(NAME) DAM

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

Name and Title of Emergency Planning Manager

Date

Name and Title of Appropriate Manager for Owner

Date

EMERGENCY ACTION PLAN

(NAME) DAM

1. Purpose

The purpose of this plan is to describe procedures to be followed in an actual or potential emergency associated with (Name) Dam caused by an unusually large flood, an earthquake, a structural malfunction, or malicious human activity such as sabotage, vandalism or terrorism, causing failure or compromise of the dam itself.

This Emergency Action Plan (EAP) defines protocols to identify unusual and unlikely conditions that may endanger the integrity of the dam and emergency protocols to warn downstream residents of its impending or actual failure.

2. Project Description

(The project can be described in this section or as shown in Tab 2.)

3. Responsibilities

3.1. Dam Owner's Responsibilities

The owner, (Name), is responsible for all dam operation and maintenance. The EAP will not designate a specific person for a specific responsibility but instead will designate the person's duties or job description.

The (title) is the first line of dam observers and is the person responsible to initiate implementation of the EAP. The (title) is responsible for conducting routine dam maintenance, such as annual brush control, conducting dam integrity inspections, and notifying (title) of any potential emergency situations. The (title) is responsible for contacting emergency personnel should a dam failure be imminent.

The (title) is also responsible for updating the EAP. An annual EAP review should be conducted to ensure that contact names and numbers are current on the Notification Flowchart.

The (title) is also responsible for directing specific, incident-appropriate actions during an emergency, such as opening or closing water intakes and remedial construction activities such as dirt moving, etc. Specific scenarios are not listed in this EAP.

3.2. Responsibilities for Notification

The (title) is responsible for inspecting the dam in a potential emergency such as potential the threat of high waters or a tornado. The (title) will contact the AAA County sheriff and emergency manager. Sample notifications and news releases appear in Tab 4 and Tab 5.

If warranted, the (title) will notify the TCEQ Dam Safety Program. The AAA County sheriff will notify downstream residents. The AAA County emergency manager will implement the notification flowchart for regional and state emergency-management contacts.

3.3. Responsibilities for Evacuation

The AAA County Sheriff's office is responsible for initiating evacuations.

3.4. Responsibilities for Duration, Security, Termination, and Follow-up

The *(title)* is responsible for monitoring of emergency situations at the dam and keeping authorities informed, based on the Notification Flowchart.

The *(title)* and the AAA County emergency-management coordinator are responsible for declaring that an emergency at the dam is terminated. Applicable authorities will be notified based on the Notification Flowchart.

4. Possible Emergency Conditions

Daily surveillance at the site and during an event will be the normal method of detecting potential emergency situations. Contact the TCEQ Dam Safety Office for determinations of dam conditions. Each event or situation will be placed in one of the following classifications:

- **Non-failure concern.** A problem is developing; however, the dam is not in danger of failing, but flooding is expected downstream. Contact the AAA County Sheriff's office.
- **Potential failure.** A situation is developing that could cause the dam to fail. Contact the AAA County Sheriff's office.
- **Imminent failure.** A dam failure is occurring that may result in flooding that threatens life and property. When the owner determines that there no time remains to implement measures to prevent failure, the AAA County Sheriff's Office will be notified for implementation of emergency procedures.

Events that can lead to the failure of the dam are discussed below:

If the reservoir level rises to within 1 foot of the top of the dam, *(Owner)* will contact the AAA County Sheriff's office.

Other determining factors that could cause the emergency action plan to be implemented are discharge rates of creeks or rivers high enough to affect a dam site, sloughing, rapid seepage, cracks, sliding, malicious human actions (sabotage, vandalism, or terrorism), etc.

Once there is no longer an emergency at the dam site, the applicable County's Emergency Management Agency will be notified; that office will then determine whether the emergency protocol should be terminated, and will notify appropriate parties.

5. Preventive Actions

Preparations are to be taken to prevent, or to help reduce the effects of, a dam failure and facilitate emergency response. The following are some steps that could prevent or delay failure after an emergency is first discovered. **These actions should only be performed under the direction of a qualified professional engineer or contractor. In all cases the personnel of the TCEQ Dam Safety Office must be notified.**

Due to the seriousness of the items discussed below, it is paramount that the AAA COUNTY SHERIFF'S OFFICE be notified should any of these situations occur.

If the Dam's Integrity Is Threatened

Overtopping by flood waters

- (a) Give erosion-resistant protection to the downstream slope by placing plastic sheets or other materials over eroding areas.
- (b) Divert floodwaters around the reservoir basin, if possible.

A slide on the upstream or downstream slope of the embankment

- (a) Lower the water level in the reservoir at a rate, and to an elevation, considered safe given the slide condition. If the outlet is damaged or blocked, pumping or siphoning may be required.
- (b) Stabilize any slide on the downstream slope by weighting the toe area below the slide with additional soil, rock, or gravel.

Erosional seepage or leakage (piping) through the embankment, foundation, or abutments

- (a) Plug the flow with whatever material is available (hay bales, bentonite, or plastic sheeting, if the entrance to the leak is in the reservoir).
- (b) Lower the water level in the reservoir until the flow decreases to a non-erosive velocity or until it stops.
- (c) Place an inverted filter (a protective sand-and-gravel filter) over the exit area to hold materials in place.
- (d) Continue lowering the water level until a safe elevation is reached; continue operating at a reduced level until repairs are made.

A failure of an appurtenant structure such as an inlet or outlet of the spillway

- (a) Implement temporary measures to protect the damaged structure, such as closing the inlet or putting in place temporary protection for a damaged spillway.
- (b) Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair.
- (c) Lower the water level in the reservoir to a safe elevation. If the inlet is inoperable, pumping or siphoning may be required.

A mass movement of the dam on its foundation (spreading or mass sliding failure)

- (a) Immediately lower the water level until excessive movement stops.
- (b) Continue lowering the water level until a safe level is reached; continue operation at a reduced level until repairs are made.

Auxiliary spillway erosion threatening reservoir evacuation

- (a) Provide temporary protection at the point of erosion by putting in place sandbags, riprap materials, or plastic sheets weighted with sandbags.
- (b) Consider pumps and siphons to help reduce the water level in the reservoir.
- (c) When inflow subsides, lower the water in the reservoir to a safe level; continue operating at a lower water level in order to minimize spillway flow.

Excessive settlement of the embankment

- (a) Lower the water level by releasing it through the outlet or by pumping or siphoning.
- (b) If necessary, restore freeboard, preferably using sandbags.
- (c) Lower the water in the reservoir to a safe level; continue operating at a reduced level until repairs can be made.

Malicious human activity (sabotage, vandalism, or terrorism)

- (a) If malicious human activity that could endanger public safety is suspected, contact law-enforcement personnel for their help in evaluating the situation.
- (b) If the principal spillway has been damaged or plugged, implement temporary measures to protect the damaged structure. Employ experienced, professional divers, if necessary, to assess the problem and possibly implement repair.
- (c) If the embankment or auxiliary spillway has been damaged or partially removed, provide temporary protection in the damaged area by putting in place sandbags, riprap materials, or plastic sheets weighted with sandbags. Use pumps and siphons to help reduce the water level in the reservoir.
- (d) If the water supply has been contaminated, immediately close all inlets to the water supply system and notify appropriate authorities.

6. Supplies and Resources

In an emergency, equipment, supplies, and other resources may be needed on short notice, such as sandbags, riprap, fill materials, and heavy equipment. Resources that may be helpful include:

- earth-moving equipment
- riprap
- sand and gravel
- sandbags
- pumps
- pipe
- laborers
- lighting equipment

(Also include a list of contractors.)

(Owner) will also be in direct consultation with the TCEQ Dam Safety Office, which is able to offer appropriate plans of action and advice.

In any EAP implementation, the Notification Flowchart will apply.

7. Inundation Map

A breach inundation study was not performed for this Emergency Action Plan due to the limited development downstream.

8. Implementation

8.1. Plan Maintenance

This plan shall be reviewed and updated annually by *(Owner)* and personnel from local emergency-management agencies in conjunction with *(Owner)*'s annual maintenance inspection of all dams. All signatories to this plan are encouraged to attend, to ensure that all names and contact information are current.

8.2. Training

All people involved in the EAP shall be trained to ensure that they are thoroughly familiar with its elements, the availability of equipment, and their responsibilities and duties under the plan. Personnel shall be trained in problem detection, evaluation, and appropriate corrective measures. This training is essential for proper evaluation of developing situations at all levels of responsibility.

A tabletop exercise shall be conducted at least once every five years. The tabletop exercise involves a meeting of (*Owner*) with state and local emergency-management officials in a conference room. The exercise begins with a description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures, and to resolve concerns regarding coordination and responsibilities. Any problems identified during an exercise should be included in revisions to the EAP. Records of training and exercises should be maintained in Tab 7.

8.3. Distribution

Copies of this Emergency Action Plan have been supplied to all of its signatories. Large-scale maps are on file with the local emergency-management agency in *AAA* County for evacuations.

TAB 1
VICINITY MAP

TAB 2

PROJECT DESCRIPTION

Official Dam Name:

Stream:

Location:

Dam Owner:

Address:

Phone Number:

Type of Dam: *compacted earthfill*

Year Constructed:

Dam Height: *### feet* Dam Length: *### feet*

Drainage Area: *#### square miles* Hazard Classification: *(identify) Hazard*

Principal Spillway:

Principal Spillway Capacity:

Auxiliary Spillway Type and Maximum Capacity:

Normal Storage Volume: *#### acre-feet*

Maximum Storage Volume: *#### acre-feet*

Elevations (Mean Sea Level) Principal Spillway Crest:
Auxiliary Spillway Crest:
Top of Dam:

TAB 3
DOWNSTREAM AREA MAP

TAB 4

SAMPLE NOTIFICATION MESSAGES

Note: These notification messages will be coordinated through the *(Owner)*, *(title of dam emergency planner)*, the National Weather Service, the Department of Public Safety Regional Liaison office, and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties before they are disseminated to downstream organizations. Messages developed with the assistance of the National Weather Service may be used instead.

“Watch” Condition Message

This is an emergency message. *(Owner)* has declared a “watch” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however, the potential does exist. We request that you initiate appropriate emergency-management procedures. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison Office has been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Possible Dam Failure” Warning

This is an emergency message. *(Owner)* has declared a “possible failure” condition for *(Name)* Dam, Texas ID TX0####. *(Briefly describe the problem or condition.)* There is a possibility that the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. Emergency water releases to lower the lake *(are/are not)* being made. We request that you initiate appropriate emergency management procedures and prepare for evacuation of the threatened areas. If *(Name)* Dam does fail, flooding will occur along the *(Stream)*, the *(Stream)*, and the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison office and the Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures. *(Owner)* will supply additional information regarding the status of the dam as it becomes available.

“Imminent Dam Failure” Warning

Urgent! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, is in imminent danger of failing. Attempts to save the dam will continue, but their success is unlikely. We request that you initiate appropriate emergency management procedures and begin evacuation of threatened areas. It is probable that the dam will fail in hours. If *(Name)* Dam fails, a flood wave will move down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)*. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for *(Name)* Dam. The Department of Public Safety *(Location)* District Regional Liaison Office and Emergency Management Coordinators for *AAA*, *BBB*, and *CCC* counties have been notified of this condition and may be contacted for information on emergency procedures.

“Dam Failure” Message

Emergency! This is an emergency message. *(Owner)* has declared that *(Name)* Dam, Texas ID TX0####, has failed. A flood wave is moving down the *(Stream)*, up the *(Stream)*, and upstream and downstream on the *(Stream)* toward *(City)* and *(City)*. The flood waters have already reached *(Road)*, *(Road)*, and *(Road)* on *(Stream)*. The City of *(Name)* will begin flooding at *(time—give number of hours after PMF breach)*. FM *(###)* on the *(Name)* River will begin flooding at *(time—prior to a PMF breach, give number of minutes after a sunny-day breach)*. The flood wave will go up the *(Stream)* and flood areas along

the river. (Road) in AAA County will begin flooding at (time—prior to a PMF breach and three hours after a sunny-day breach). SH (##) at (landmark) will begin flooding at (time—give number of hours after a PMF breach). Evacuate threatened areas immediately. For verification, call the phone numbers listed on the Notification Flowchart of the Emergency Action Plan for (Name) Dam. The Department of Public Safety (Location) District Regional Liaison office and the Emergency Management Coordinators for AAA, BBB, and CCC counties have been notified of this condition.

TAB 5

SAMPLE NEWS RELEASES

Note: Coordinate with the National Weather Service, the Department of Public Safety (*Location*) District Regional Liaison office, and the emergency management directors for *AAA*, *BBB*, and *CCC* counties prior to release. Messages developed with the assistance of the National Weather Service may be used instead.

Announcement for a Slowly Developing "Watch" Condition

(Owner) has declared a "Watch" condition for *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* There is no immediate danger of the dam failing; however the potential does exist. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)*

Announcement for a Possible Dam Failure

(Owner) has declared a possible dam failure at *(Name)* Dam as of *(time and date)*. *(Briefly describe the problem or condition.)* It is possible the dam could fail. Attempts to save the dam are under way, but their success cannot be determined as yet. *(Describe what actions are being taken to monitor and control the situation.)* *(State the quantity of any releases.)* Additional news will be made available as soon as it is received.

Announcement for an Imminent Dam Failure

Urgent! *(Owner)* has announced that *(Name)* Dam is in imminent danger of failing. *(Describe what actions are being taken to monitor and control the situation.)* It is possible that the dam will fail in *(##)* hours. Residents in low lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*, as well as the town of *(Name)*, should prepare for immediate evacuation. Additional news will be made available as soon as it is received.

Announcement of a Dam Failure

Emergency! *(Name)* Dam failed at *(time and date)*. Residents who have not yet done so should immediately evacuate the city of *(Name)* and low-lying areas along the *(Stream)*, the *(Stream)*, and the *(Stream)*. The flood waters have already reached *(Highway)* and *(Road)*. Additional news will be made available as soon as it is received.

TAB 6

DIRECTORY OF PERSONNEL WITH DAM-SAFETY EXPERTISE

The following list identifies other individuals with expertise in dam safety, design and construction that may be consulted about taking specific actions at the dam when there is an emergency situation:

NAME	TELEPHONE	RESPONSIBILITY

TAB 7

TRAINING RECORD

Use this form to record training sessions. File the completed form in Tab 7 of the EAP. Thorough review of 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: _____

DATE: _____ TIME: _____ INSTRUCTOR: _____

CLASS SIGN-IN

TAB 7 (continued)
SIMULATED-EMERGENCY EXERCISE

Date of Exercise:	
Participant Sign-In:	
Type of Simulation Conducted:	Circle Emergency Type: emergency water release watch condition imminent dam failure actual dam failure
Comments, Results of Exercise:	
Revisions Needed to EAP Based on Results of Exercise?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list revisions required:

TAB 7 (continued)

PLAN REVIEW AND UPDATE

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

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of review: _____

Participants:

Date of tabletop exercise: _____

Participants:

TAB 8

ANNUAL EAP EVALUATION CHECKLIST

Was the annual dam inspection conducted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is the checklist signed and included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Was brush clearing, animal-burrow removal, or other maintenance required?	<input 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:	
Does the Notification Flowchart require revision?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date revised Contact Information pages were distributed: (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 type="checkbox"/> Yes <input type="checkbox"/> No	Circle: training exercise Date conducted:	
Are inspection and training records included in the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Was the EAP reviewed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, review date:	
Were changes required to the EAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, date of revised EAP approval:	

Signature of dam supervisor: _____ Date completed: _____