

Dam Safety Training

Developing & Implementing Emergency Action Plans and Emergency Preparedness Plans

Presented by: **Robert VanLier, P.E.**

Commonwealth of Virginia,
Department of Conservation & Recreation

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EAP Required Sections

According to Section:

- 7 PARTS:
- Notification Chart
- Responsibilities
- Preparedness
- Inundation Maps
- Appendices
- Emergency Detection Process
- Certification

Definition of an Emergency Action Plan

A formal document that recognizes potential impounding structure emergency conditions and specifies preplanned actions to be followed to minimize loss of life and property damage. The EAP specifies actions the owner must take to minimize or alleviate emergency conditions at the impounding structure. It contains procedures and information to assist the owner in issuing early warning and notification messages to responsible emergency management authorities. It shall also contain dam break inundation maps as required to show authorities the critical areas for action.



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Required Sections

Notification Chart:

- **Contact information providing 24 hour coverage**
- **Dam owner**
- **Dam operator**
- **State Emergency Management**
- **Local Emergency Management**
- **Police/Sheriff's Departments**
- **Owner's Engineer**

The Chart will identify the process and by whom the downstream residents and property owners shall be notified.

Note: DCR Dam Safety personnel are to be notified, only.

Required Sections

Emergency Detection, Evaluation and Classification

- **Procedures for detection and classification**
- **Evaluation and classification of potential failure**
- **Each situation should have documented course of action.**
- **Prioritization of potential failure based on reaction timing**



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Required Sections

Responsibilities

- **Designation of the responsibility of each member shown on the flow chart shall be presented regarding decision making, including when the emergency conditions cease.**
- **Designation of the person responsible for communicating with downstream public.**

Required Sections

Preparedness

- **A description of preparedness actions should be listed with associated possible failure situations.**

i.e. Piping, overtopping, valve failure.

Required Sections

Inundation Maps

- **Sunny-day dam failure**
- **SDF with and without a dam failure**
- **PMF with a dam failure.**

In most cases:

- 1.) The SDF of a significant hazard dam will be the ½ PMF**
- 2.) The SDF of a high hazard dam will be the full PMF.**

Required Sections

Appendices

Documentation of:

- Training plans
- Tabletop projects
- Full scale exercises
- Flood history documentation

Required Sections

Certification

List:

- **Responsible parties (document each has a copy of EAP)**
- **Preparers name and contact information**
- **Preparers signature required**
- **Deficiencies noted by local EMS personnel.**

EAP must be developed in coordination with state and local emergency management groups.



It is the owner's responsibility to develop, maintain and, exercise, and implement the EAP.



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The EAP shall be submitted every 6 years or as is it is updated due to site specific changes.

Hazard Class reclassification.

Ownership change

Personnel change

Downstream changes, including residents, development, roads, etc.



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A drill shall be conducted annually for each high and significant hazard dam. This Drill shall include a face to face meeting with local EMS personnel.



A Tabletop exercise shall be conducted once every 6 years. The Drills and Exercises shall be documented in writing to DCR once it is completed. In addition this documentation shall be added to the Appendences.

The development of EAP shall be coordinated with all entities, jurisdictions, and agencies that would be affected by a dam failure and/or have responsibilities for warning, evacuation, and postflood actions. This includes both local and State agencies as required.



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All monitoring, sensing, and warning equipment in remote or unattended impounding structures shall be tested at least 2 times per year. Testing documentation should be added to the appendices each test cycle.



Format

Title page
Table of contents
Certification
Notification Chart
Statement of Purpose
Project Description
Emergency Detection, Evaluation, and Classification
Responsibilities
 A. Owner
 B. Notification Responsibility
 C. Evacuation Responsibility
 D. Termination/Follow Up Responsibility
 E. EAP Coordinator
Preparedness
Inundation Maps
Appendices



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Emergency Preparedness Plans

Low Hazard Dams, only

This form and other dam safety related forms can be found on DCR's web page at:

<http://www.dcr.virginia.gov>



EMERGENCY ACTION PLAN FOR CLASS I, CLASS II AND CLASS III IMPOUNDING STRUCTURES

Reference: Impounding Structure Regulations, 4VAC52-20-00 et seq., Virginia Soil and Water Conservation Board

1. Name of Impounding Structure: _____
Inventory Number: _____
Other Name (if any): _____
2. Hazard Potential Classification from Table I, Virginia Dam Safety Regulations:
Class I Class II Class III (Underline One)
3. Name of Owner: _____
Address: _____
Telephone: (Business)(____) _____ (Residential)(____) _____
4. Name of Dam Operator: _____
Address: _____
Telephone: (Business)(____) _____ (Residential)(____) _____

Name of Alternate Operator: _____
Telephone: (Business)(____) _____ (Residential)(____) _____
5. Name of Rainfall or Staff Gage Observer for Dam: _____
Address: _____
Telephone: (Business)(____) _____ (Residential)(____) _____

Name of Alternate Observer: _____
Telephone: (Business)(____) _____ (Residential)(____) _____

Components of an Emergency Preparedness Plan

1. Name of dam, inventory number, location.
2. Owner's name, address, telephone numbers (24 hour).
2. Operator's name, address, telephone numbers (24 hour).
4. Observer's name, address, telephone numbers (24 hour).
5. Alternant Operator and Observer information.
6. Dispatch center contact information.
7. Local EMS contact information.
8. Notification procedure identification.
9. Reliable detection, evaluation, action procedures.
10. Simple inundation maps (Law requires 4 zones by computer model)

Components of an Emergency Preparedness Plan

11. Identification of public roads downstream noting highway number. Include VDOT, or local engineer contact information.
12. Stage II and Stage III identification (inches rainfall in 6, 12, 24-hour).
13. Stage II and Stage III identification (flow rate in emergency spillway).
14. Staff gauge location and description, frequency of observation (12 and 13 above) and access route to dam under flood conditions.
15. Evacuation procedures, including notification, monitoring, evacuation, and reporting process and responsibility.
16. Documentation that all critical persons have copy of EPP.
17. Certification of the above by owner. (signature).

EAP/EPP Basics

The dam owner is responsible for development, maintenance, and exercise of the EAP or EPP.

EAP/EPP must be developed in coordination with state and local emergency management groups.

EAP/EPP must comply with state dam safety program requirements.

EAP must contain all components previously listed, be in writing, & coordinated by all responsible parties.

■ The development of EAP requires the cooperative effort between:

1) The dam owner, 2) the dam owner's engineer, 3) emergency action agency personnel, 4) members of the community, and 5) downstream residents and land owners.



Implementing the EAP/EEP

Step 1 – Event Detection

Step 2 - Emergency Level Determination

Stage 1

Stage 2

Stage 3

Step 3 – Notification & Communication

Step 4 – Expected Actions

Step 5 - Termination

Implementation

Step 1 – Event Detection

This step describes the detection of an unusual or emergency event and provides information to assist the dam owner in determining the appropriate emergency level for the event.

The Owner should ask themselves is there something I can do now to mitigate the conditions about to occur.



Step 1 - Event Detection (cont'd)

- Forewarning of conditions, which may cause an unusual event or emergency event at the dam. For example, a severe weather or flash flood forecast, hurricane warning. <http://nhc.noaa.gov/>
- Observations at or near the dam.
- Evaluation of instrumentation data.
- Earthquakes felt or reported in the vicinity of the dam.

Step 2 - Emergency Level Determination

Stage 1; Non-emergency, unusual event, slowly developing

- Declaration of Flood Watch or Warning
- New seepage areas in or near the dam
- New sinkhole in reservoir area or on embankment
- Measurable earthquake felt or reported within 50 miles of dam



Step 2 - Emergency Level Determination

Stage 2; Potential dam failure situation, rapidly developing

- Emergency Spillway flowing with some erosion occurring
- Rapidly enlarging sinkhole
- Cracks in the embankment with cloudy seepage
- Earthquake resulting in visible damage to the dam or appurtenances



Step 2 - Emergency Level Determination

Stage 3; Urgent - Dam failure is imminent or in process

- Water level rise is within evacuation threshold
- Damage to the dam or appurtenant structures will soon cause an uncontrolled release
- Earthquake resulting in potential uncontrolled release



Step 3 – Notification & Communication

After the emergency level has been determined, the people on the notification flow chart for the appropriate emergency level shall be notified immediately.



Step 3 – Notification & Communication

Stage I–Non-emergency, Unusual event; Slowly developing

The designated person should call the county/city emergency services coordinator saying we are responding to the dam to see what is going on.

If technical questions are needed then the owner should contact their consulting engineer.

Step 3 – Notification & Communication

Stage II – Potential Dam Failure; Rapidly Developing

Contact emergency services coordinator and/or 24 hour dispatch center – say that the water level in the spillway has reached the Stage II depth. This will allow them time to mobilize their evacuation team.



Step 3 – Notification & Communication

Stage III – Urgent; Dam Failure is Imminent or in Progress

Contact the emergency services coordinator or 24 hour dispatch center and say the water level has reached the stage III level and they should start the evacuation. Remind them also to contact VDOT to close the roads where the flood water will cross.



Step 3 – Notification & Communication

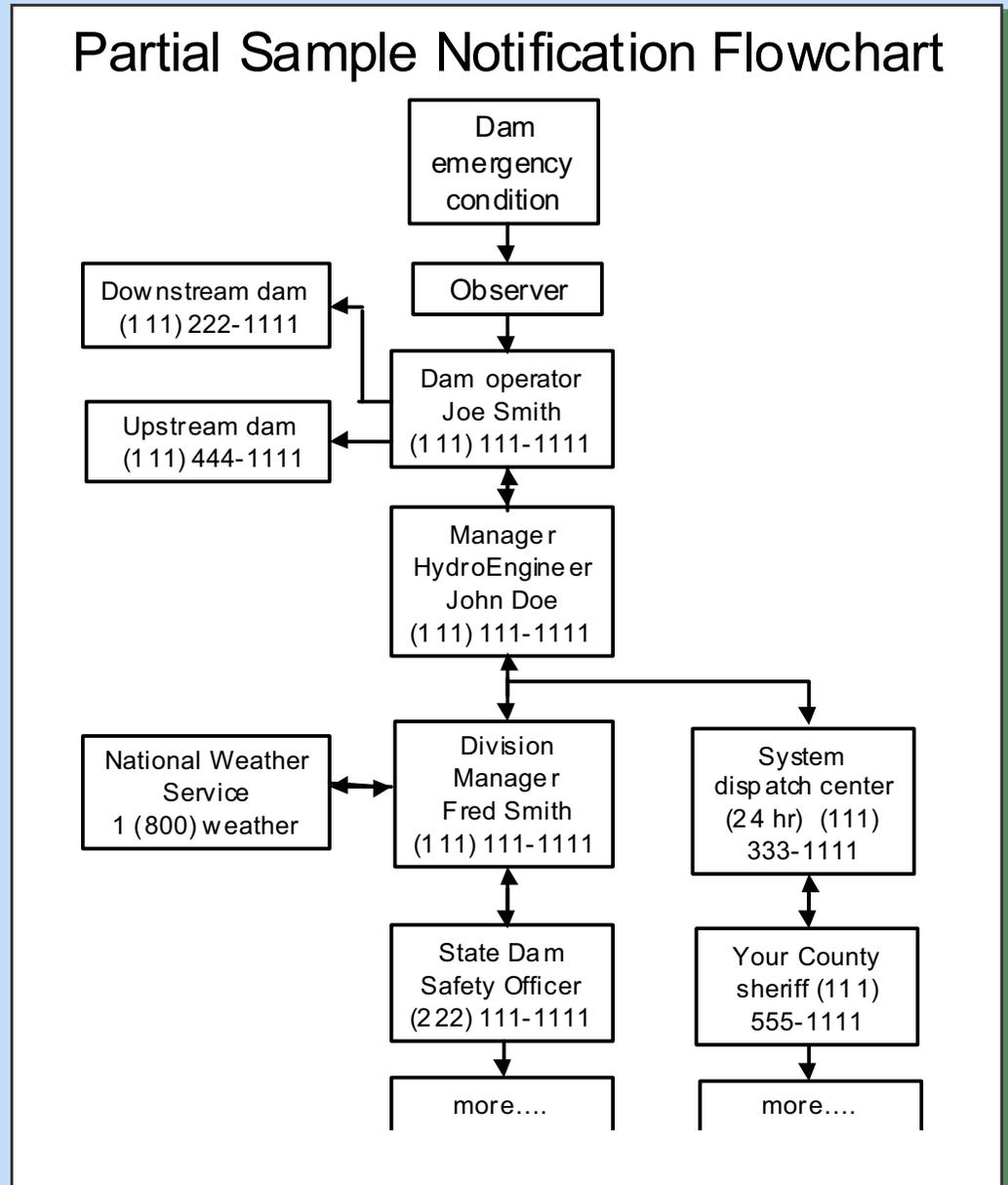
At Stage II & Stage III Problems can Occur

Issues to Consider:

1. Telephone service & electrical power are usually the first to go during large storms
2. Travel by car is almost always cutoff by high water during these events.



Sample Flow Chart



Emergency Notification Flowchart Contents

- Individual(s) responsible for notification of local emergency management officials, state dam safety officials and other people involved.
- Specific individual(s) that must be notified of emergency condition should be in the EAP document or on the break inundation map



Flowchart Contents (Cont.)

- Prioritized listing of individuals and agencies to be notified
- Correct phone numbers and addresses of all individuals, officials, and agencies that must be notified

Step 4 – Expected Actions

- After an emergency level has been determined and the notifications made, the EAP should contain actions to be taken for each emergency level by each person or group involved.
- Possible remedial actions should be included for situations that can be foreseen, if time permits. The intent of these remedial actions is to delay, moderate, or prevent the failure of the dam.

Step 4 – Expected Actions

- Should include descriptions of the following:
 - Schedule of preventative actions to provide timely response in critical emergency situations
 - Equipment and materials that must be on-site or readily available for use in prevention of a dam failure incident or to reduce the impact of a dam failure incident
 - Identification of equipment operators qualified to institute preventative actions and measures

Step 5 - Termination

- Whenever the EAP has been activated and the emergency is over, the event must be terminated.

The EAP should specify who issues the termination order and how it is handled. Emergency Services Coordinator recommended.

- The staff gauge observer should remain on site until the water level in the emergency spillway starts to recede or the dam breaks.

EAP Exercise Programs

- Purpose
 - Promote coordination of emergency preparedness
 - Demonstrate workability of the EAP
 - Results in improved, more effective EAP

Definition of EAP Exercise

- An activity designed to promote emergency preparedness; test or evaluate emergency operations, policies, plans, procedures or facilities; train personnel in emergency management duties; and demonstrate operational capability.

Objectives of EAP Exercises

- Reveal strength and weaknesses in EAP
- Reveal capabilities and deficiencies in resources and information
- Improve coordination
- Clarify roles and responsibilities
- Improve individual performance
- Increase public recognition of EAP

Types of EAP Exercises

- Orientation seminar
- Drill
- Tabletop exercise
- Functional exercise
- Full scale exercise



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Orientation Seminar

- Familiarize participants with:
 - EAP
 - Roles and responsibilities
 - Standard procedures
 - Plans for exercise
- Can involve all stakeholders
- Uses meeting format
- Not an actual test



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EAP Drill

- Lowest level exercise that involves an actual test (face to face, owner and local EMS)
- Tests, develops or maintains skill in a single response procedure
- Usually an in-house test
- Part of on going training

Tabletop Exercise

- Higher level exercise than drill
- Involves various levels of personnel
- Informal conference room environment
- Low stress, no time constraints
- Action taken and discussion based on a described emergency situation plus a series of messages to players



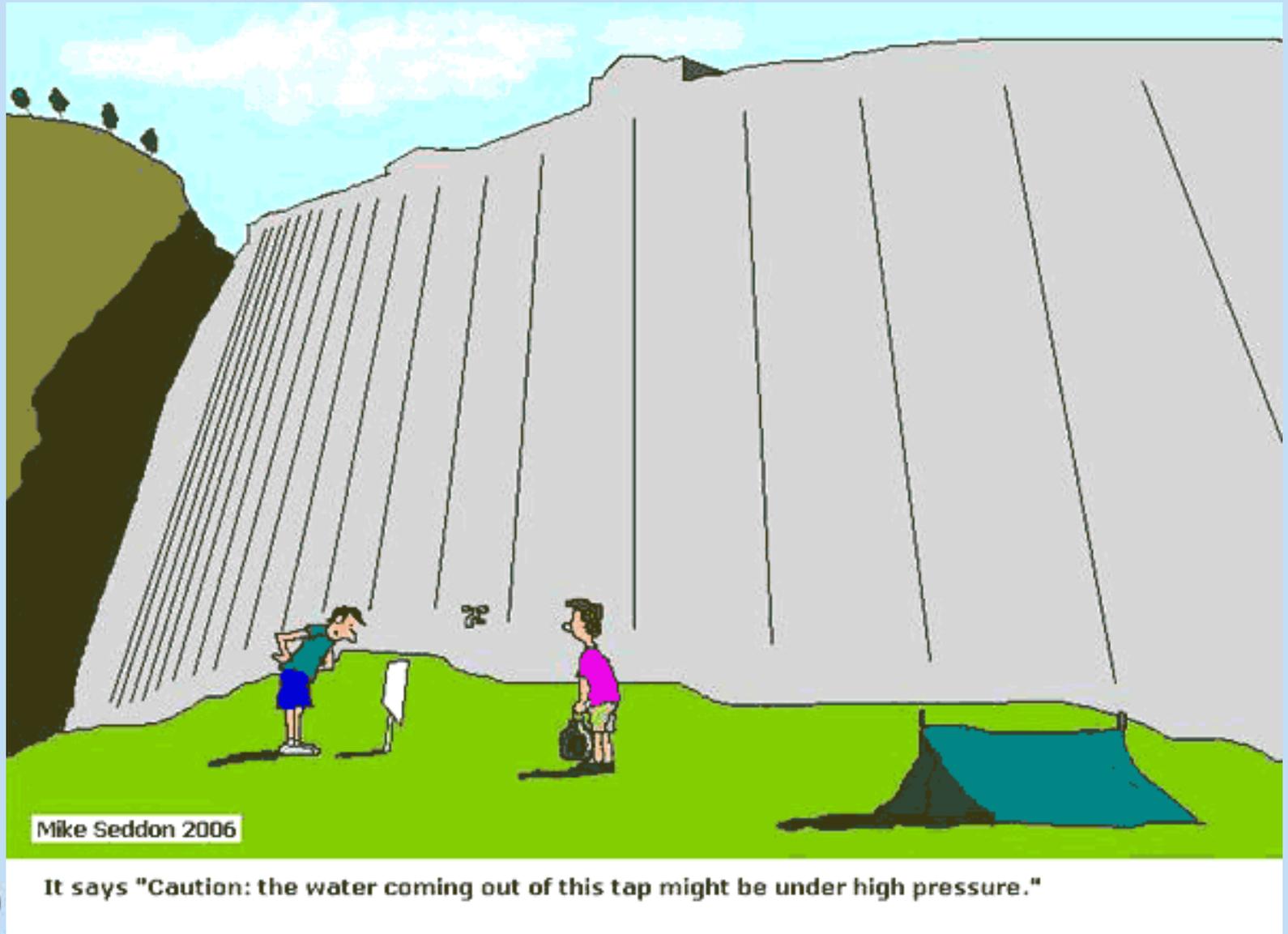
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Tabletop Exercise

- Opportunity to discuss EAP and response procedures, and resolve questions throughout exercise
 - Ongoing discussion and evaluation of appropriateness of actions taken and decisions made
 - Permits liberal breaks before new messages are delivered to discuss proper response
- Practice problem-solving for emergency situations
- Practice a coordinated, effective response

Questions?



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The End