

## Session 5: Developing and Implementing Emergency Action Plans



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### What Will Be Covered in Session 5

- Definition of Emergency Action Plan (EAP)
- Components of an EAP
- Development of an EAP
- Example and Experience with EAP Tabletop Exercise

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## Session 5 Learning Objectives

- Define Emergency Action Plan (EAP)
- Identify main components of an EAP
- Identify steps required to develop an EAP
- Identify steps required to implement an EAP
- Take correct emergency preparedness and preventative actions

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## ***Vermont DEC EAP Requirements***

- Currently, there is no statutory requirement for EAPs for non-power, non-federal dams under Chapter 43.
- EAPs are available for 40 of 41 HIGH hazard dams.
- EAPs either done by owners voluntarily or by State using FEMA funding.
- Upcoming Dam Safety Rules:
  - HIGH hazard dams to have a comprehensive current/up-to-date EAP with Flood Inundation Maps
  - SIGNIFICANT hazard dams to have to have a simplified current/up-to-date EAP with Flood Inundation Map

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## **Vermont DEC EAP Requirements**

### Federal Definitions – Hazard \*

- **Hazard.** A situation that creates the potential for adverse consequences such as loss of life, property damage, or other adverse impacts.
- **Hazard potential.** The possible adverse incremental consequences that result from the release of water or stored contents due to failure of the dam or misoperation of the dam or appurtenances. Impacts may be for a defined area downstream of a dam from flood waters released through spillways and outlet works of the dam or waters released by partial or complete failure of the dam. There may also be impacts for an area upstream of the dam from effects of backwater flooding or landslides around the reservoir perimeter.

\* Federal Guidelines for Dam Safety – USDHS-FEMA 2003

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## **Vermont DEC EAP Requirements**

### Federal Definitions – Hazard \*

- **Hazard.** A situation that creates the potential for adverse consequences such as loss of life, property damage, or other adverse impacts.
- **Hazard potential classification.** A system that categorizes dams according to the degree of adverse incremental consequences of a failure or misoperation of a dam. The hazard potential classification does not reflect in any way on the current condition of the dam (i.e., safety, structural integrity, flood routing capacity).

\* Federal Guidelines for Dam Safety – USDHS-FEMA 2003

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## State Specific EAP Requirements

### State Definitions

Classification	Proposed General Definition	Existing Definition
HIGH	Dams where failure or mis-operation will probably cause loss of human life. <b>Probably/probable: means more likely than not to occur; expected; realistic.</b>	Dams where failure is expected to cause <b>loss of more than a few lives</b> and excessive damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads. <b>Few: Two inhabited structures, 6 lives</b>
SIGNIFICANT	Dams where failure or mis-operation results in <b>no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities</b> , or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.	Dams where failure is expected to cause <b>loss of a few lives and appreciable damage</b> to homes, industrial or commercial facilities, secondary highways or railroads.
LOW	Dams where failure or mis-operation results in <b>no probable loss of human life and low economic and/or environmental losses.</b>	Dams where failure is <b>not expected to cause loss of life and only minimal property damage.</b>
MINIMAL	A dam that meets the LOW hazard definition, above, but impounds less than 500,000 cubic feet.	Not currently used

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## Definition of an Emergency Action Plan

- A formal document that identifies potential emergency conditions at a dam and specifies pre-planned actions to be followed to minimize property damage or loss of life as a result of failure or operations of a dam

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## Need For Emergency Action Plan

- Regardless of the requirement for a recorded or documented EAP by the State Dam Safety Program, every dam owner is strongly encouraged to develop some type of EAP that can be used to implement an emergency action response in the event of an incident at their dam

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## Components of an Emergency Action Plan

1. Basic Dam Characteristics
2. EAP Plan Overview
3. Roles & Responsibilities
4. Event Detection
5. Emergency Level Determination
6. Notification & Communication
7. Expected Actions
8. Termination
9. EAP Maintenance (Review & Update)
10. Appendices

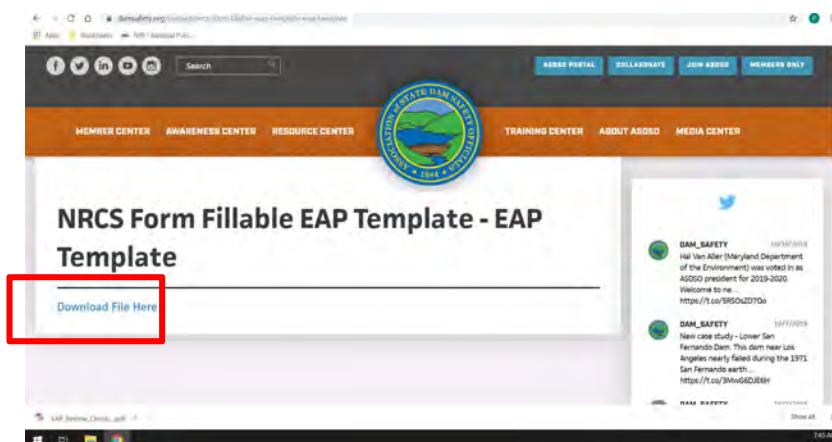
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## Reference Documents



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## EAP Checklist Example (CT)

Connecticut Department of Energy & Environmental Protection  
Water Planning and Management Division  
Dam Safety Program

**EMERGENCY ACTION PLAN COMPLETENESS REVIEW CHECKLIST**

Dam Name: \_\_\_\_\_ CT Dam ID #: \_\_\_\_\_  
Town(s): \_\_\_\_\_ Date of EAP Submission: \_\_\_\_\_  
Date of EAP: \_\_\_\_\_  
New or Updated EAP: \_\_\_\_\_ If Updated, Date of Last Submission: \_\_\_\_\_

**EAP Requirements**

- 1. Title Page**
  - a. \_\_\_\_\_ Includes date the EAP was submitted
  - b. \_\_\_\_\_ Identifies the document as an EAP and specifies the dam for which it was developed
  - c. \_\_\_\_\_ Includes dam names, CT Dam ID number, reservoir names, hazard class, and town(s) in which the dam is located
- 2. Executive Summary**

Includes description of:

  - a. \_\_\_\_\_ Physical components of the dam
  - b. \_\_\_\_\_ Pertinent history
  - c. \_\_\_\_\_ Riverine system upstream and downstream of the dam
- 3. Location of Emergency Operations Center**
  - a. \_\_\_\_\_ Identifies location of an EOC - where responsible officials will gather during an emergency to direct and coordinate emergency operation (provide address and phone number)
- 4. Dam Monitoring Procedure**

Outlines procedures for monitoring the dam during periods of heavy rainfall and runoff, or when other conditions develop that warrant close monitoring of the dam

  - a. \_\_\_\_\_ Identifies person and their alternate(s) responsible for conducting monitoring of the dam
  - b. \_\_\_\_\_ Requires initiation of the Dam Monitoring Procedure when the NWS announces a Flood Warning for the area where the dam is located, or when other conditions develop that warrant close monitoring

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## EAP Checklist Example (CT)

- c. \_\_\_\_\_ Is conducted at an interval that has been calculated by a professional engineer retained by the owner, to correspond with the particular hydrologic, hydraulic and structural components of the dam
- d. \_\_\_\_\_ Includes viewing the dam and, if possible, walking the dam crest at regular intervals to determine if any sloughing of the embankment, cracking, settlement, or movement of the dam has occurred. Also includes inspection of the toe of the dam and the abutment contacts to detect any signs of deterioration of the dam or its components, and inspection of the spillway(s) and outlet structure(s) for accumulation of debris
- e. \_\_\_\_\_ Requires notification to the local authority upon initiation of monitoring
- f. \_\_\_\_\_ Requires written record of all monitoring activity (record form may be included in an appendix). Written record must include:
  - i. \_\_\_\_\_ date and time of each inspection interval
  - ii. \_\_\_\_\_ rainfall data
  - iii. \_\_\_\_\_ reservoir level
  - iv. \_\_\_\_\_ observation of any changes in the dam including sloughing of the embankments, cracking, settlement, movement, erosion, seepage, deterioration of abutment contacts, debris obstructing spillways or outlet structures, or any other sign the dam is deteriorating
  - v. \_\_\_\_\_ If seepage is observed, comment on location, amount of flow, and whether seepage is clear, cloudy or muddy
  - vi. \_\_\_\_\_ If movement, sloughing or erosion is observed, comment on the depth and location of conditions
- g. \_\_\_\_\_ Includes steps taken to provide adequate lighting to view the dam at night
- h. \_\_\_\_\_ Includes an inventory of emergency equipment and supplies and their location, and personnel which could be utilized to respond to emergencies at the dam
- i. \_\_\_\_\_ Lists personnel and their alternates that would be utilized by the dam owner or operator responsible for decision making and implementing emergency repairs, in the event the owner is absent

**5. Notification Flow Chart**

- a. \_\_\_\_\_ Flow chart shows titles or associated contact names with phone numbers of local, state, federal, tribal agencies, and any public service company responsible for providing emergency services
- b. \_\_\_\_\_ Contacts on flow chart shall be called when the Dam Monitoring Procedure is initiated in response to a NWS Flood Warning, when an Early Warning Notification is recommended by the owner/operator, and when a Final Warning Notification is recommended
- c. \_\_\_\_\_ Flow chart clearly depicts the order and circumstance under which named contacts will be notified

**6. Warning Notification Procedure**

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## EAP Checklist Example (CT)

Provides a formal warning notification process to alert the local authority who is responsible for acting on the warning and/or determining whether to evacuate residents or others within the inundation zone in the event of an emergency	
a.	Includes a warning notification list with addresses for residences, businesses, and highways located in the inundation zone, to be used to warn inhabitants downstream that the dam may fail, or is in imminent danger of failing
b.	Provides an Early Warning Notification to the local authority responsible for providing emergency services when any of the following conditions are observed:
i.	A marked increase in seepage through an embankment, particularly if evidence of a boil is observed
ii.	An increase in the rate of rise of the impoundment such that the non-overflow section(s) of the dam may be overtopped
iii.	Conditions are developing at the dam that could lead to a potential failure
c.	Early Warning Notification includes:
i.	Name of dam owner and operator
ii.	Name and location of dam
iii.	Conditions that indicated the dam may be compromised
iv.	A notice to the emergency management authority to warn residents
d.	Provides a Final Warning Notification to alert the local authority who is responsible for acting on the final warning and evacuating residents when any of the following conditions have been observed:
i.	A dramatic increase in seepage flow (or pre-existing boil), particularly if piping is occurring
ii.	Cracking, settlement, or movement of masonry or concrete spillways, training walls or other structures
iii.	The rise of impoundment is such that the non-overflow section(s) of the dam will overtop or is overtopping and the dam is failing or is in imminent danger of failing
iv.	Substantial erosion or sloughing of dam embankments
v.	Any other condition which would likely result in a failure of the dam
e.	Final Warning Notification includes:
i.	Name of dam owner and operator
ii.	Name and location of dam
iii.	Conditions at the dam indicated the dam is in imminent danger of failing
iv.	This is a final warning
v.	A notice to the emergency management authority to warn residents that evacuation is necessary
7. Termination of Emergency	
a.	Description of procedure for determining when the emergency can be terminated

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## EAP Checklist Example (CT)

b.	Identifies parties responsible for determining when the emergency can be terminated
8. Inundation Map	
a.	Prepared by a Professional Engineer
b.	Map is sufficient in graphic detail and of a scale that clearly shows the downstream inhabited areas and the inundation zones
c.	All elevations are based on a reference to Geodetic North American Vertical Datum (NAVD88)
The inundation map must show at a minimum the following features:	
d.	Name and address or location of the dam
e.	Local names for all pertinent downstream features (buildings, homes, railroads, bridges, schools, hospitals, camp grounds, other dams, and any other significant facilities)
f.	Inundation zone for wet weather, with arrows indicating direction of the flood wave
g.	A north arrow and bar scale
h.	Pertinent downstream cross sections, such as roads (include road names)
Related information must be included with the Inundation Map:	
i.	Estimated timeline that shows arrival times of peak floodwaters expressed in hours and minutes and incremental increase in water depth above the baseline elevation at critical intersections, structures, or inhabited structures
j.	List of all streets, roads, and highways, including the address of the residences and businesses subject to flooding
k.	A location map sufficient in scale to clearly show the exact location of the impoundment in relation to the surrounding area, other dams in the area, and the delineation of the drainage area. Map should include a north arrow, a bar scale, and the size of the drainage area in square miles
l.	A description of the method or computer model used to prepare the inundation map
9. Description of Drill	
a.	Description of an exercise, or test to be conducted at a minimum of every two years
b.	Drill includes participation of all appropriate personnel identified in the EAP that are responsible for providing emergency services in the event the EAP is initiated
10. Distribution List of Affected Agencies – Include in an appendix	
a.	List of all local, state, federal, and federal tribal affected agencies that will receive a copy of the EAP

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## EAP Checklist Example (CT)

<b>Completeness Recommendation:</b>	
Sections 1 – 10 (except Section 7) ____ Complete      ____ Incomplete	
Comments: _____ _____ _____	
Staff Reviewer: _____ Date: _____	
<b>Section 7 Inundation Map and Related Information</b> ____ Complete      ____ Incomplete	
Comments: _____ _____ _____	
Staff Reviewer: _____ Date: _____	
<b>Revision Review</b>	
Sections: _____ Date of Revision: _____	
____ Complete      ____ Incomplete	
Comments: _____ _____ _____	
Staff Reviewer: _____ Date: _____	

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## Inundation Mapping

- Key component of the EAP - shows areas that may have to be evacuated in a dam emergency
- Maps facilitate notifications by displaying flood areas and estimated travel times for the dam failure flood wave to arrive
- Mapping can be simple or complex, but effectiveness is only as good as the work that goes into it

Typical features:

- Feature description / road name / building use
- Flood wave travel time from time of breach
- Depth of flow or inundation

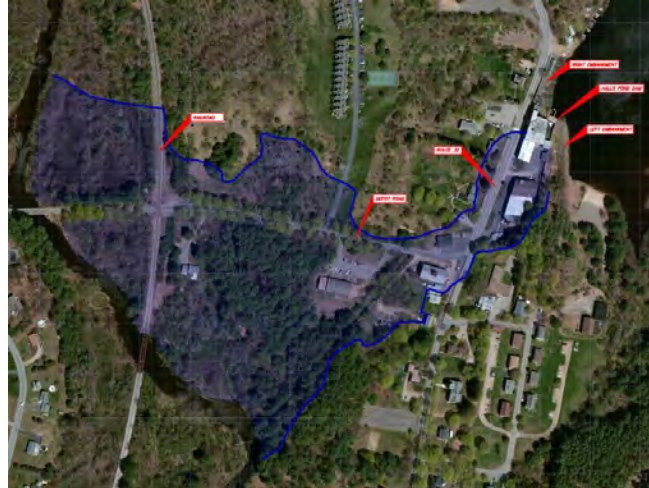
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## Downstream flood routing/inundation map



Privately owned dam, CT

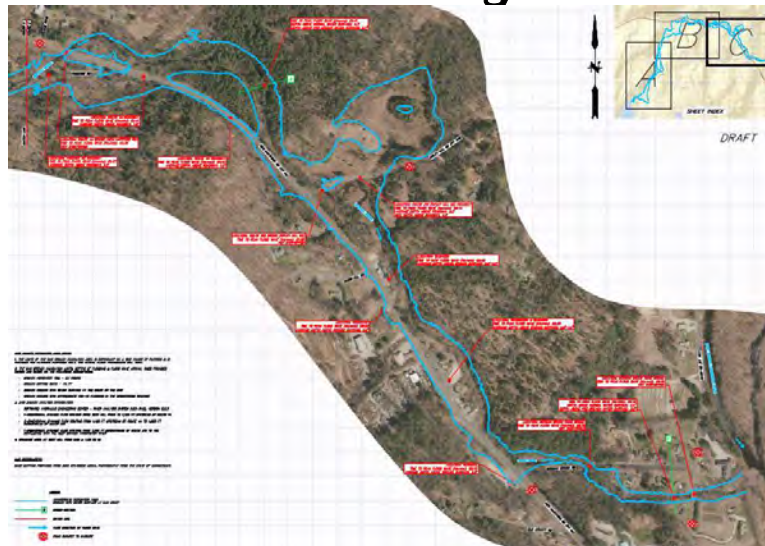
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## Downstream flood routing/inundation map



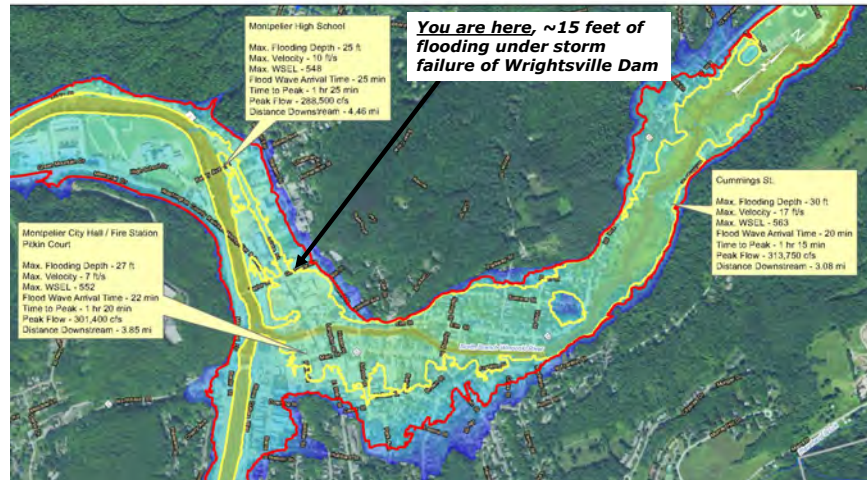
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## Downstream flood routing/inundation map



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**City of Montpelier,  
Wrightsville Dam Flood Inundation Map**

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## Inundation Mapping

Tools – best executed by an engineering consultant:

Dam break analysis: HEC-RAS, HEC-HMS, NWS models.  
Relatively complex input required

DSS-Wise Lite\*

- 2D dam break flood and inundation model. Simple to set up and run. Provides inundation boundaries, flood hydrographs, flood depths, flood wave arrival time

AutoCAD and GIS mapping tools

Separate analysis / determination of dam breach parameters required (depth, width, time of breach formation)

\* University of Mississippi, supported by FEMA

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## Dam Owner EAP Responsibilities

- The dam owner is responsible for development, maintenance, and exercise of the EAP.
- Technical sections (such as downstream flood routing and inundation mapping) may require the services of a professional registered engineer. In many states a PE is required to certify EAP documents.

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## Owner Responsibilities (Cont.)

- The dam owner might also elect to have the same consultant assist in preparation of other sections of the EAP such as:
  - Emergency Detection
  - Evaluation
  - Classification of Potential Dam Failure Incidents
  - Preparedness and Preventive Actions

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## Owner Responsibilities (Cont.)

- EAP must contain all of the above components
- EAP must be developed in coordination with state and local emergency management agencies
- EAP must comply with state dam safety program requirements

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## 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

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## Step 1 - Event Detection

- Observations at or near the dam.
- Evaluation of instrumentation data.
- Earthquakes felt or reported in the vicinity of the dam.
- Forewarning of conditions, which may cause an unusual event or emergency event at the dam. For example, a severe weather or flash flood forecast.

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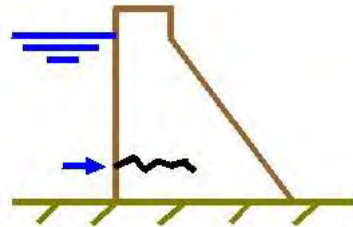
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## Step 2 – Emergency Level Determination

### *Emergency Level 1; Non-emergency, unusual event, slowly developing*

- New seepage areas in or near the dam
- New sinkhole in reservoir area or on embankment
- Visual movement/slippage of the embankment slope
- Measurable earthquake felt or reported on or within 50 miles of the dam



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## Step 2 – Emergency Level Determination

### ***Emergency Level 2; Potential dam failure situation, rapidly developing***

- Spillway flowing with active gully erosion
- Rapidly enlarging sinkhole
- Cracks in the embankment with seepage
- Earthquake resulting in visible damage to the dam or appurtenances



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## Step 2 – Emergency Level Determination

### ***Emergency Level 3; Urgent - Dam failure is imminent or in progress***

- Major overtopping flow eroding the embankment slope
- Damage to dam or appurtenances that has resulted in uncontrolled water release
- Earthquake resulting in uncontrolled release of water from the dam



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## Step 3 – Notification & Communication

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



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## Step 3 – Notification & Communication

### ***Emergency Level 1: Non-emergency, Unusual Event; Slowly Developing***

- *The owner should contact the State Dam Safety Official. Describe the situation and request technical assistance on next steps that should be taken.*



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## Step 3 – Notification & Communication

### **Emergency Level 2: Potential Dam Failure Situation; Rapidly Developing**

- *Contact sheriff/law enforcement or emergency management personnel*



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## Step 3 – Notification & Communication

### **Emergency Level 3: Urgent; Dam Failure is Imminent or in Progress**

- *The Sheriff should be contacted immediately and the potential area flooded if the dam should fail must be evacuated:*
  1. Call law enforcement and notify anybody immediately downstream who may be affected. Law enforcement will call other authorities and the media and begin the evacuation.

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## Step 3 – Notification & Communication

### ***Emergency Level 3: Urgent; Dam Failure is Imminent or in Progress***

2. Keep in frequent contact with the Sheriff and Emergency Services to keep them up-to-date on the condition of the dam.



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## Step 3 – Notification & Communication

### ***Emergency Level 3: Urgent; Dam Failure is Imminent or in Progress***

If all means of communication are lost:

- A. try to find out why,
- B. try to get to another radio or telephone that works, or
- C. get someone else to try to reestablish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with the Sheriff and Emergency Services.

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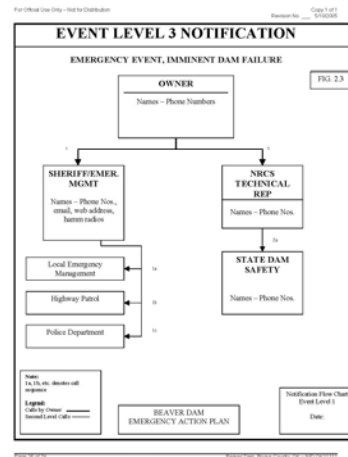
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## Step 3 – Notification & Communication

See example event level notification contact flowcharts in EAP Sample



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## Emergency Notification Flowchart Contents

- Individual(s) responsible for notification of emergency management officials and state dam safety officials
- Specific individual(s) that must be notified of emergency condition
- Prioritized listing of individuals and agencies to be notified
- Correct phone numbers and addresses of all individuals, officials, and agencies that must be notified

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## Guidelines – Emergency Level Determination

For Official Use Only – Not for Distribution

### Guidance for Determining the Emergency Level

Event	Situation	Emergency level*
Earth spillway flow	Reservoir water surface elevation at auxiliary spillway crest or spillway is flowing with no active erosion	1
	Spillway flowing with active gully erosion	2
	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise	2
	Spillway flowing with an advancing headcut that is threatening the control section	3
Embankment overtopping	Spillway flow that is flooding people downstream	3
	Reservoir level is 1 foot below the top of the dam	2
Seepage	Water from the reservoir is flowing over the top of the dam	3
	New seepage areas in or near the dam	1
	New seepage areas with cloudy discharge or increasing flow rate	2
Sinkholes	Seepage with discharge greater than 10 gallons per minute	3
	Observation of new sinkhole in reservoir area or on embankment	2
	Rapidly enlarging sinkhole	3
Embankment cracking	New cracks in the embankment greater than 1/4-inch wide without seepage	1
	Cracks in the embankment with seepage	2
Embankment movement	Visual movement/slippage of the embankment slope	1
	Sudden or rapidly proceeding slides of the embankment slopes	3
	Instrumentation readings beyond predetermined values	1
Earthquake	Measurable earthquake felt or reported on or within 50 miles of the dam	1
	Earthquake resulting in visible damage to the dam or appurtenances	2
	Earthquake resulting in uncontrolled release of water from the dam	3
Security threat	Verified bomb threat that, if carried out, could result in damage to the dam	2
	Detonated bomb that has resulted in damage to the dam or appurtenances	3
Sabotage/vandalism	Damage to dam or appurtenance with no impacts to the functioning of the dam	1
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	1
	Damage to dam or appurtenances that has resulted in seepage flow	2
	Damage to dam or appurtenances that has resulted in uncontrolled water release	3

From NRCS Template

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\* Emergency Level 1: Nonemergency unusual event, slowly developing  
\* Emergency Level 2: Potential dam failure situation, rapidly developing  
\* Emergency Level 3: Urgent; dam failure appears imminent or is in progress

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## Step 4 – Expected Actions

- After an emergency level has been determined and the notifications have been made, the EAP should contain actions to be taken for each emergency level.
- Possible remedial actions should be included for several situations involved with emergency level 2, if time permits. Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam.

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## Step 5 – Termination

- Whenever the EAP has been activated and the emergency is over, the event must be terminated and follow-up procedures completed.
- The Incident Commander in consultation with Local and State Emergency Officials and State Dam Safety Officials are responsible for terminating the operations and relaying the decision to the dam owner.
- All persons notified during the activation of the EAP must again be contacted to inform them that the event is over.
- The “Dam Safety Emergency Situation Report” shall be completed to document the emergency event and the actions that were taken.

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## EAP Maintenance

- Review Annually
- Revise as Needed
- Periodically Test
- Maintain records of revision dates and distribution list



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## EAP Appendices

Include the following:

- Contact Checklist
- “Unusual or Emergency Event Log” form
- “Dam Emergency Situation Report” form
- Glossary of Terms
- Resources Available
- Location and Vicinity Map
- Watershed Project Map
- Evacuation Map
- Residents/Businesses/Highways At Risk
- Plan View of Dam
- Profile of Principal Spillway
- Reservoir Elevation-Area-Volume and Spillway Capacity



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## EAP Checklist Example (CT)

Reference

[https://www.ct.gov/deep/lib/deep/water\\_inland/dams/EAP\\_Review\\_Checklist\\_2016-12-02\\_Final.pdf](https://www.ct.gov/deep/lib/deep/water_inland/dams/EAP_Review_Checklist_2016-12-02_Final.pdf)

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# Dam Emergency Tabletop Exercise



Connecticut Department of  
**ENERGY &  
ENVIRONMENTAL  
PROTECTION**

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## Tabletop Goals

***Familiarize Personnel with  
The Emergency Operations  
Plan***

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## Tabletop Goals

***Evaluate Procedures Established  
By the Current Plan Already  
in Place***

*"Test the Plan"*

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## Tabletop Goals

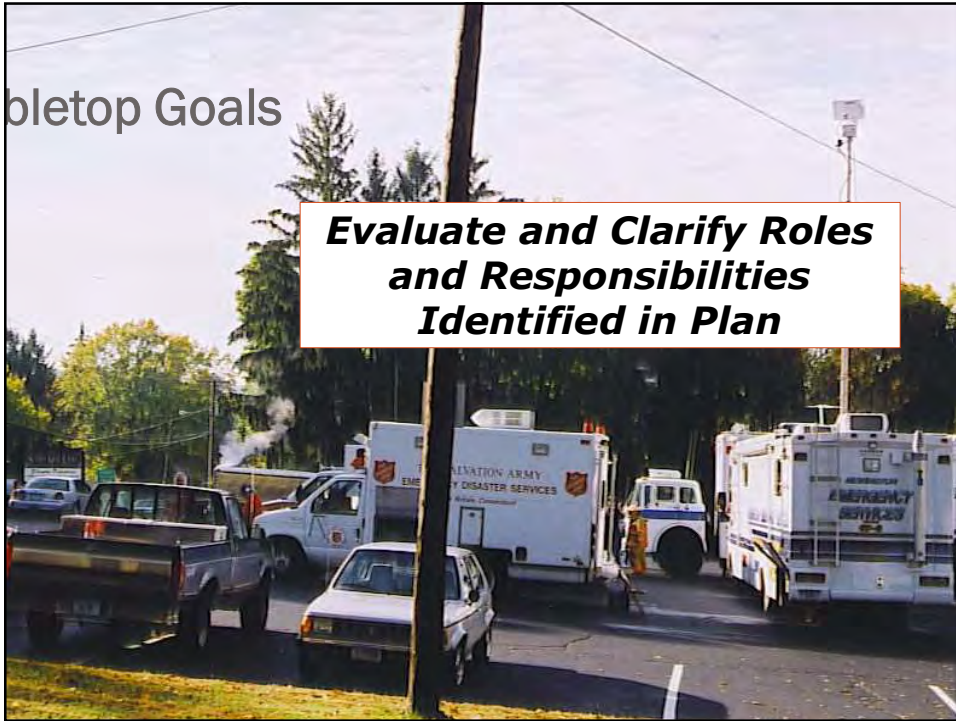
***Familiarize Personnel with  
The Emergency Operations  
Plan***

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## Tabletop Goals

***Evaluate and Clarify Roles  
and Responsibilities  
Identified in Plan***



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## Tabletop Goals

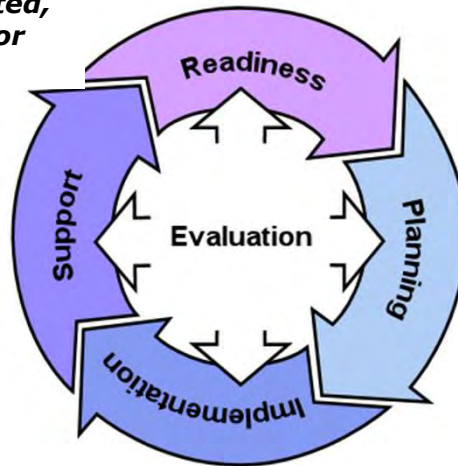
***Familiarize Personnel with  
The Emergency Operations  
Plan***

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## Tabletop Goals

**Identify Plan Characteristics  
That Need to Be Updated,  
Modified, Adjusted, or  
Further Developed**



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## Tabletop Goals

**Support Future Exercises  
and Dam EAPs for  
Other  
Communities**



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## Program Schedule

- Introductions
  - Who you are what you do
  - Knowledge and awareness of current plan
  - Experience with Table-Top Exercises
  - Explain your role in this plan
  
- *Scheduled from 8:30 – 1:00pm*

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## *“Rules of Engagement”*

1. Introduce a scenario
2. Response(s) will be based on current department and community procedures and/or guidelines
3. Transition between individual and group discussion
4. Use “reasonable” time estimates and manpower to work through each scenario
5. Interjections will be added to aid in scenario development.

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55



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## Scenario

Fire department is dispatched to  
“Water in a basement” at 48 Tanglewood Drive.

1. *What is the FD response to this location?*
2. *Mutual Aid?*



57

## **48 Tanglewood & Bogdanski Drive**



58





## 48 Tanglewood Drive

1. *What type(s) of services does FD provide?*
2. *Are there any other notifications?*
  - *Support from other agencies?*
    - *Police Department*
    - *Gas Co.*
    - *CL&P*

59



***Who's In  
Charge (IC)***



60



## Scenario

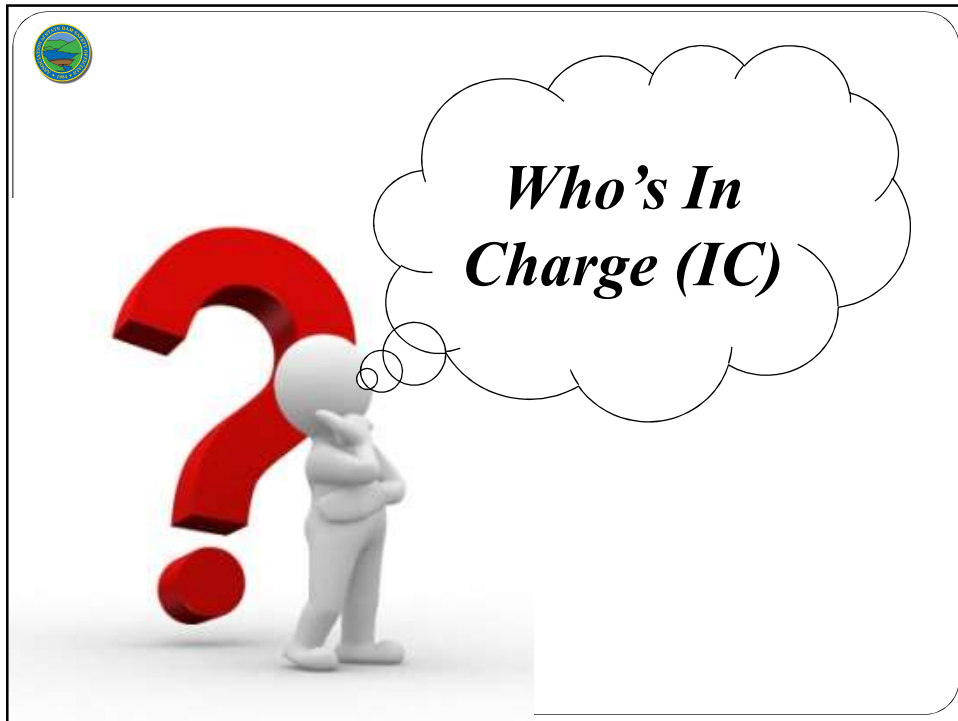
Fire department is dispatched to a second call for “water in a basement” - 42 Case Street.

1. *What is the normal FD response?*
2. *What type(s) of services does FD provide?*
3. *Other notifications?*
4. *Support from other agencies?*
5. *Are there sufficient resources?*


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62




63



## Interjection #1

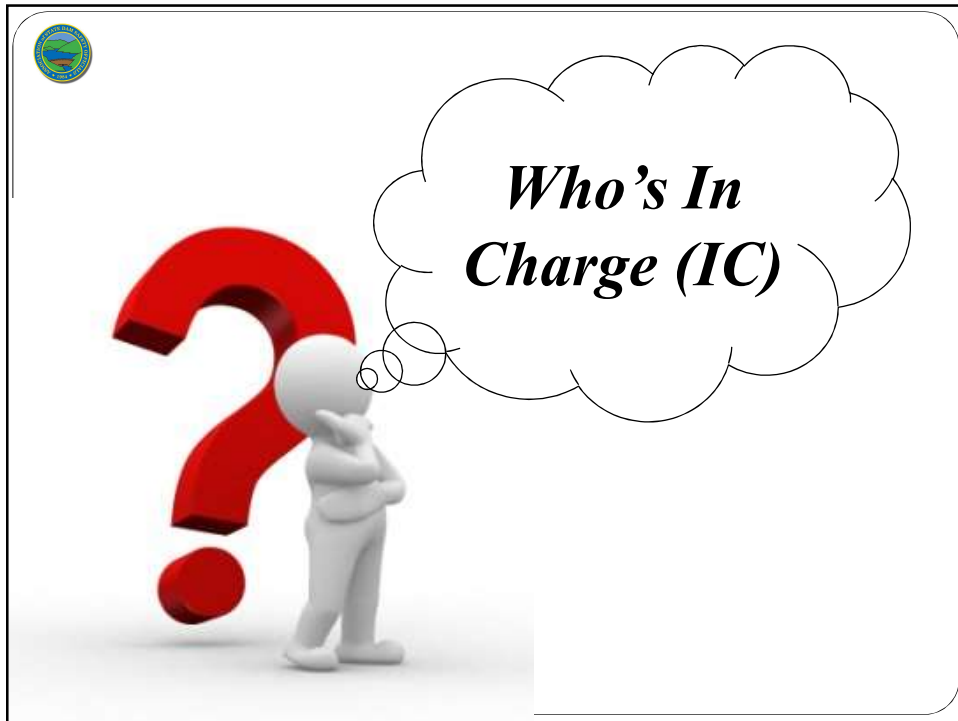
Fire department is notified by dispatch that CSP received a 911 call from a hunter that the dam Bog Meadow pond was leaking a lot of water.

1. *Does the FD respond to this location?*
2. *What are you going to do?*
3. *Additional thoughts on this situation?*




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## Interjection #2

Fire department is notified by dispatch that Connecticut State Police are reporting water across I-395, south of Scotland Road Overpass. DOT has also been notified.

1. *Does the FD respond to this location?*
2. *Who is in charge?*
3. *Additional thoughts on this situation?*

66



67

## Traffic Management

- Traffic Routing Plans?
- What equipment and resources can DOT pull into this scenario?
  - Crushed Rock/Rip Rap – How Much?
  - Equipment to clear material blockages
  - Timeframe for equipment deployment
- Any other Roads of Concern?

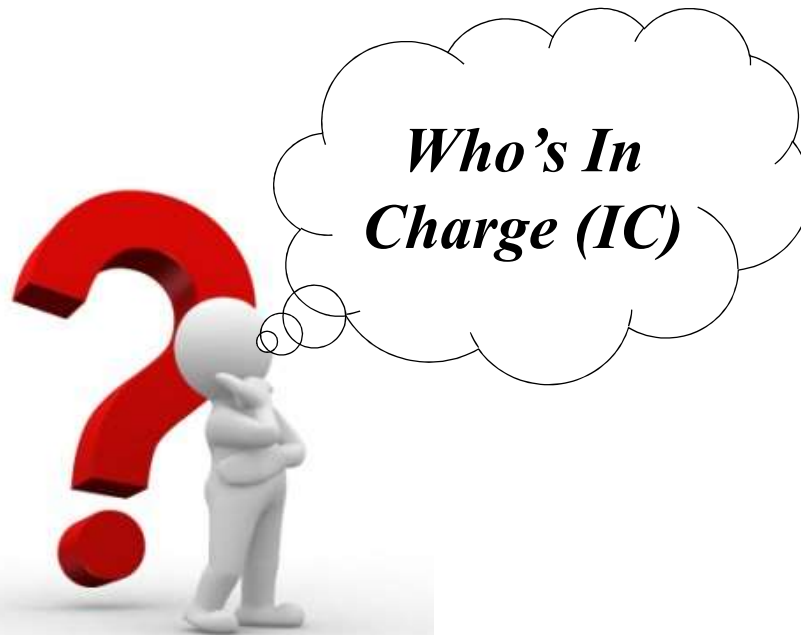
68



## Flood Control Management

- Communication procedures
- What equipment can the Utility pull into this scenario?
  - Crushed Rock/Rip Rap – How Much?
  - Equipment to clear material blockages
  - Timeframe for equipment deployment
- Any other Areas/Roads of Concern?
- What Else?

69

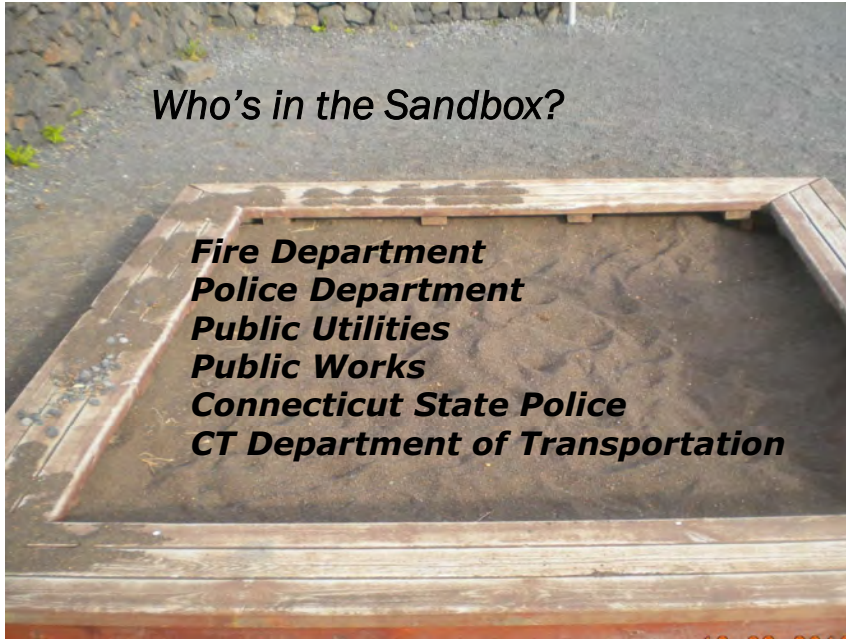


70



*Who's in the Sandbox?*

***Fire Department  
Police Department  
Public Utilities  
Public Works  
Connecticut State Police  
CT Department of Transportation***



71



***At What Point  
Will you  
Assess the  
Condition of  
the Dam?***



72



### **Weather-related Operations -**

*If forecasts indicate the possibility of a major weather system within 24-48 hours (>6-inches in 24-hours), the operator shall fully open the mid and low-level outlets.*

*CT DEP and Utility notification . . .*

*Continual surveillance . . .*

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### **Interjection #3**

Utility Worker sent to Bog Meadow Reservoir to assess the situation.

*How long will/should this take?*

*Can anyone else assess the dam condition?*

*Do they know how to get to the dam?*

*Do they know what they're looking for or at?*

*What information are you looking for?*

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### **Initial Field Report from the Dam - -**

*A really big beaver dam and downed trees and it looks like the debris has stopped water flow. The water level also appears to be at the top of the dam.*

75



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### Follow-up Report from the Dam - -

*The far side of the dam is washing out and a lot of water and debris are flowing into the woods towards 395.*

77



### Visual of Water Flow at Dam



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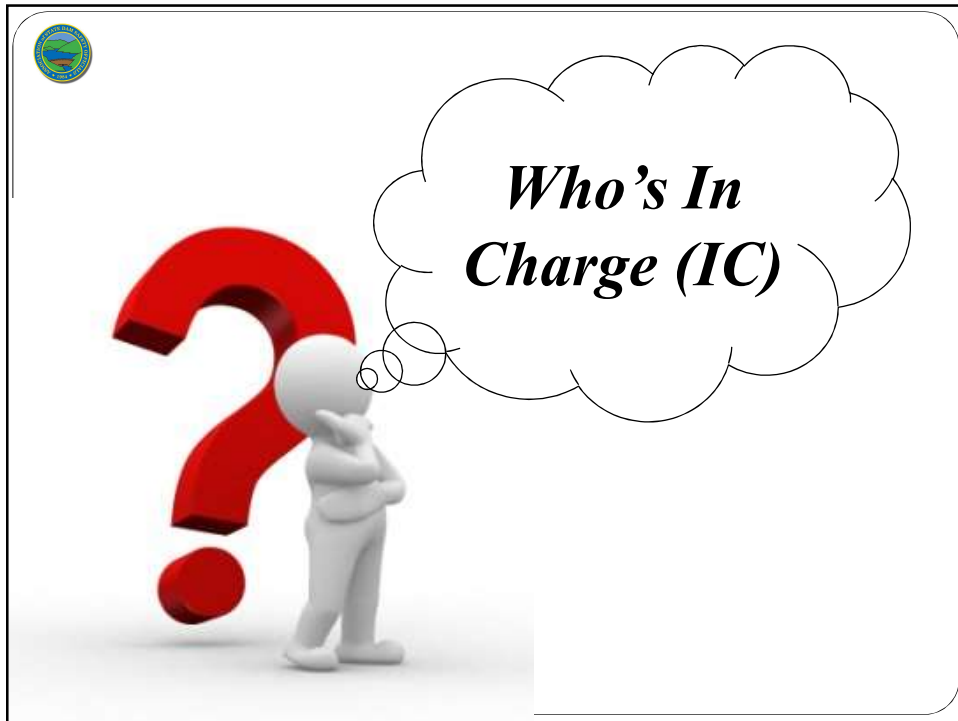


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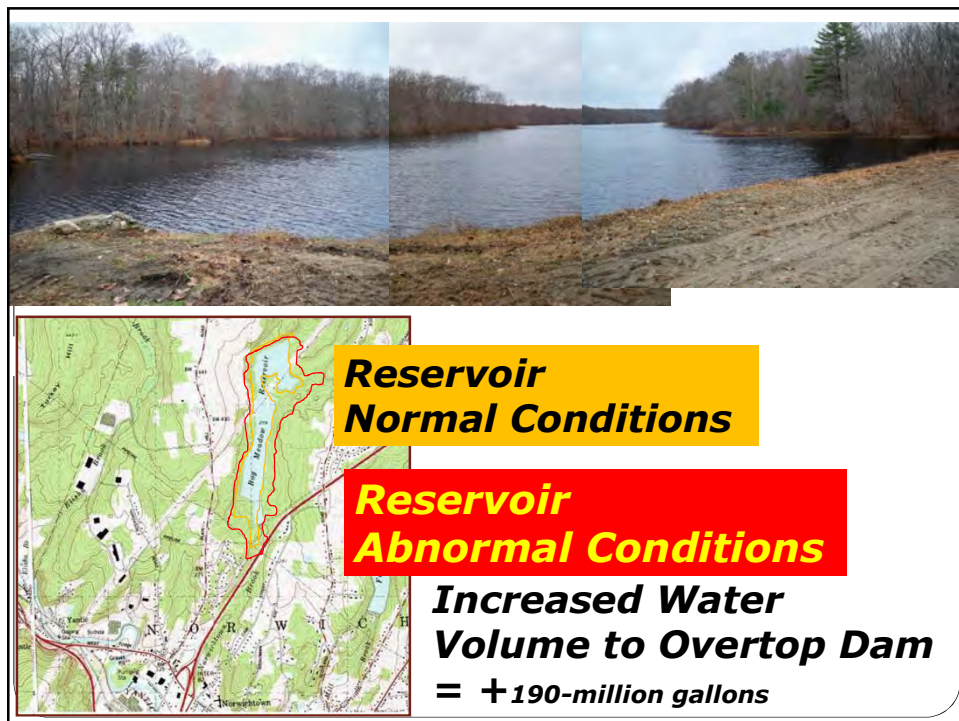
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84



## CT-DEEP



***What Are The Expectations  
Of Their Support to This Event***

85

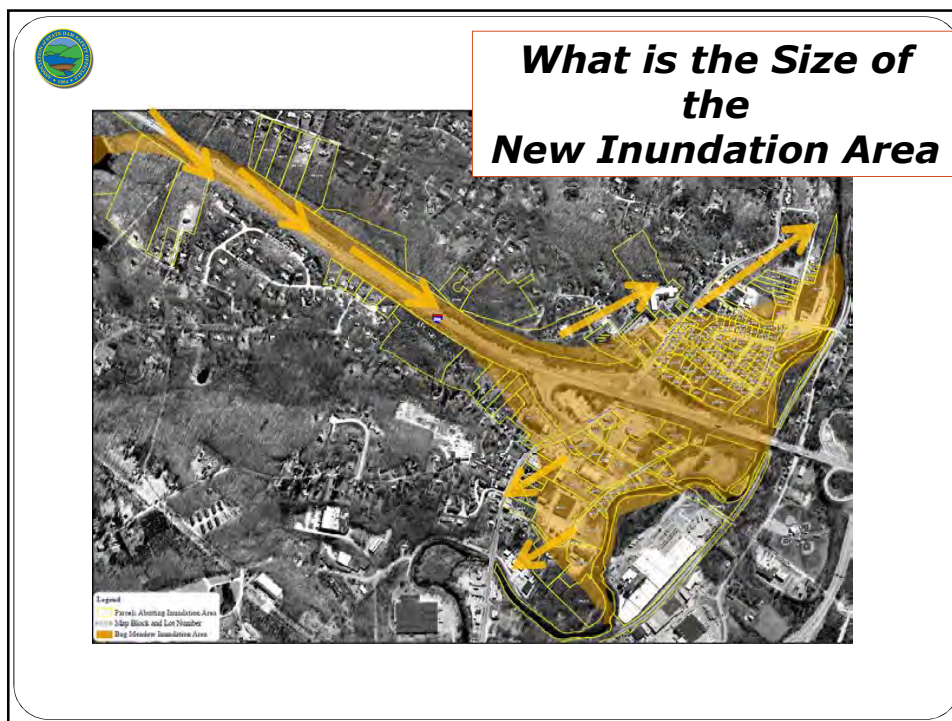


## ***Inundation Area***

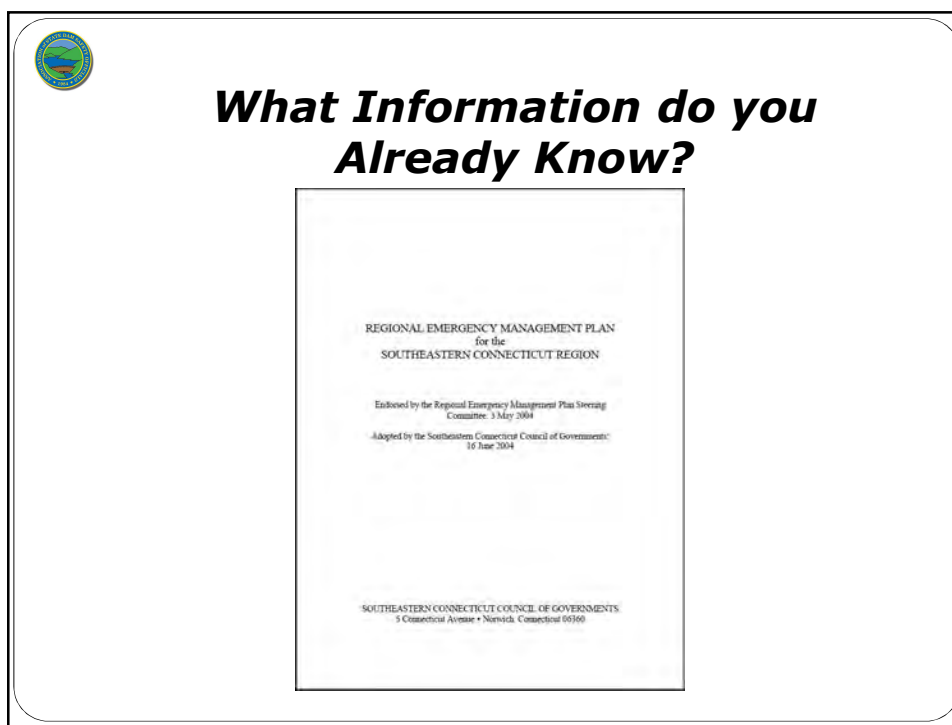


86





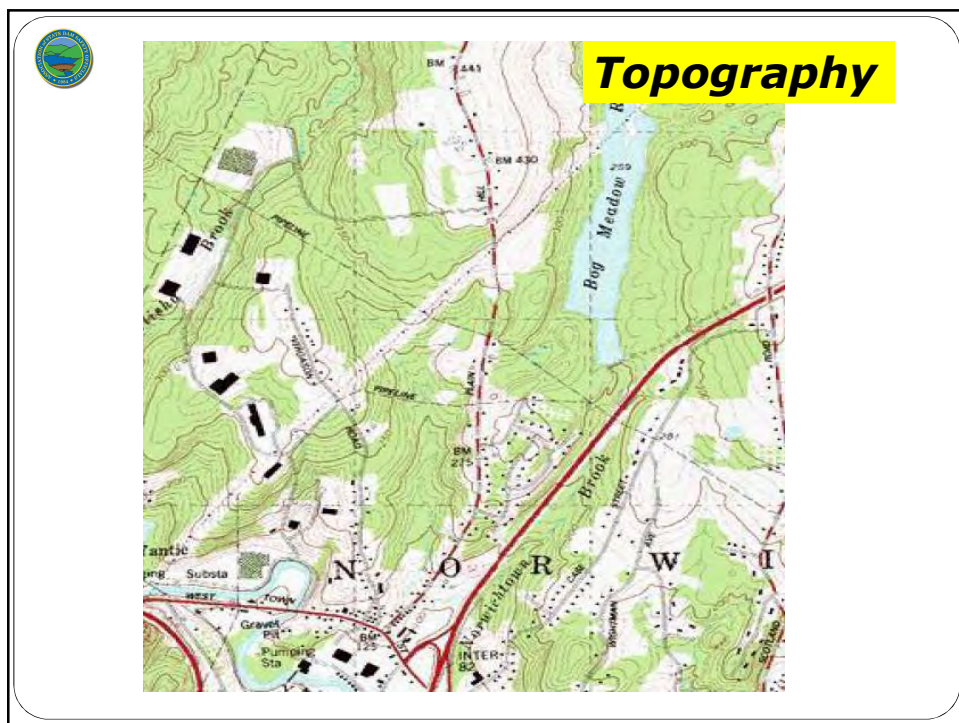
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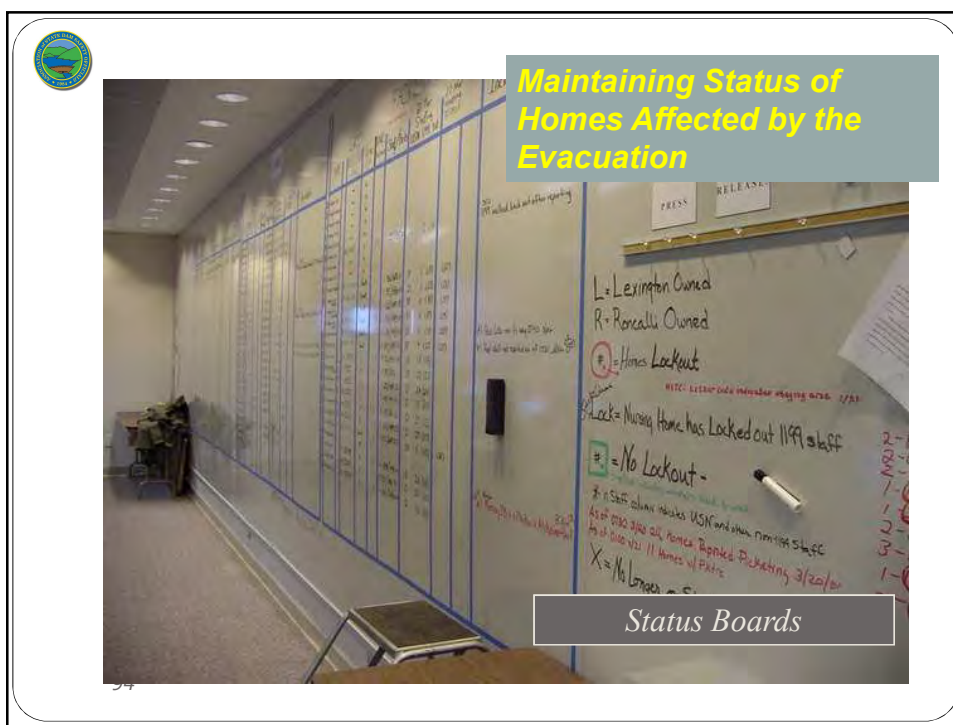
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94





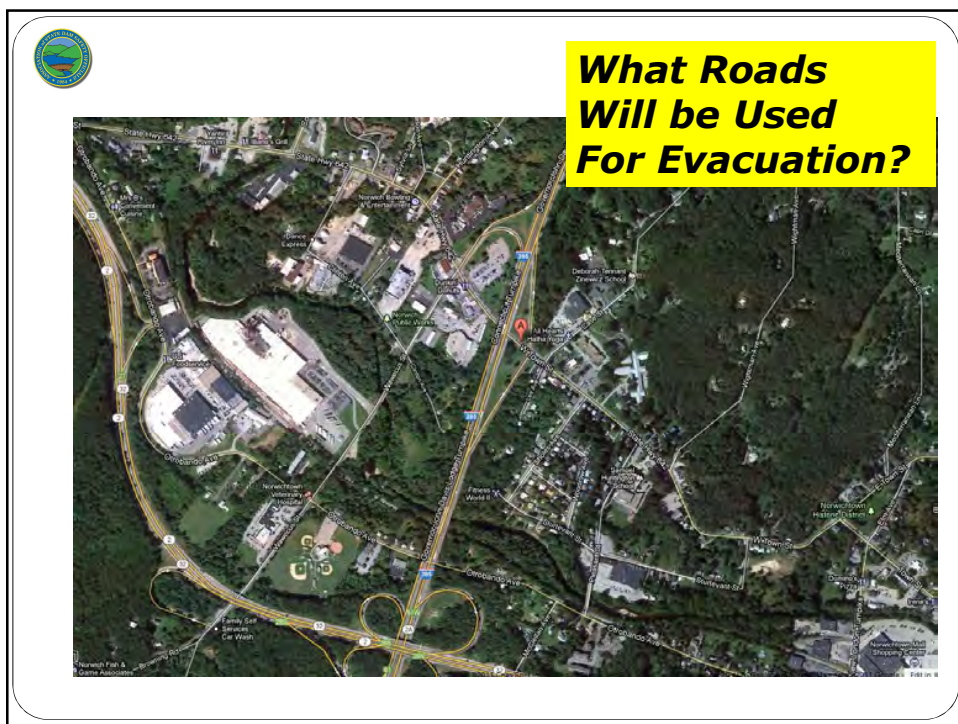
***How Long Will it Take  
To Evacuate  
The Inundation Area***

95

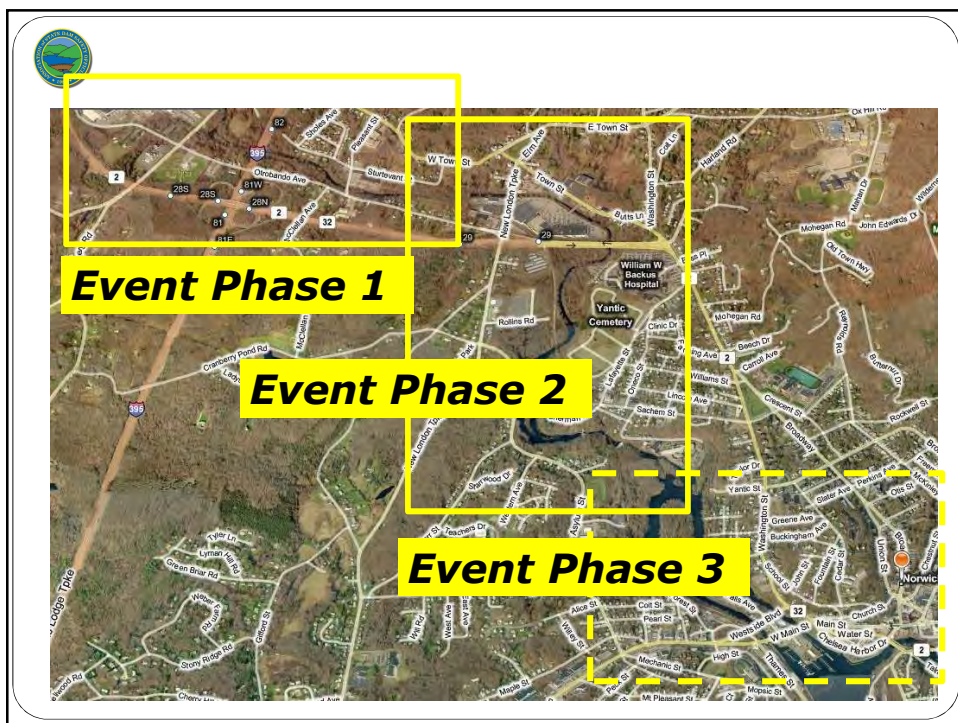


***Addition of Emergency  
Vehicles Into An  
Area That is Flooding  
And Being Evacuated***

96



97



98



## Post-Flood Inspection

- What are the DEEP Post-Flood Inspection procedures?
- Dam improvement/modification guidance
- Expectations for the City of Norwich
- Special Considerations

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## Post-Flood Inspection

- What are the DOT Post-Flood Inspection procedures?
- Who conducts inspection(s)
  - I-395 Culvert
  - Roadway condition
- Timeframe to obtain qualified inspector(s)
- Special Considerations
  - Resources to Divert Water from I-395

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# ***Plan Detail and Inspection Conditions A Review***

101



***Reservoir –  
November 2012  
Conditions***

102






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**Bog Meadow Reservoir – EAP Actions**

**2-feet within embankment crest**


**Emergency, Rapidly Developing Dam Failure**

**Alert the Following Personnel of Potential Emergency:**

- 1) Emergency Services 911
- 2) Police Dispatcher (860) 886-5561
- 3) Utility Dispatch
- 4) CT DEEP Dam Safety Unit (860) 424-3706

- 1) State Office of Emergency Management (860) 566-3180
- 2) Civil Preparedness (860) 887-1018
- 3) Public Works Director
- 4) Fire Department
- 5) Emergency Management Director

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**Reservoir – EAP Actions**

**1-foot within embankment crest or if there is evidence of impending failure**

**Police Department should initiate the Full Evacuation Plan and serve and Evacuation Notice**

**Emergency Condition, Impending Dam Failure, Urgent Failure Appears Imminent**  
**Begin Recording Water Level Readings at the gatehouse every 2-Hours**

106

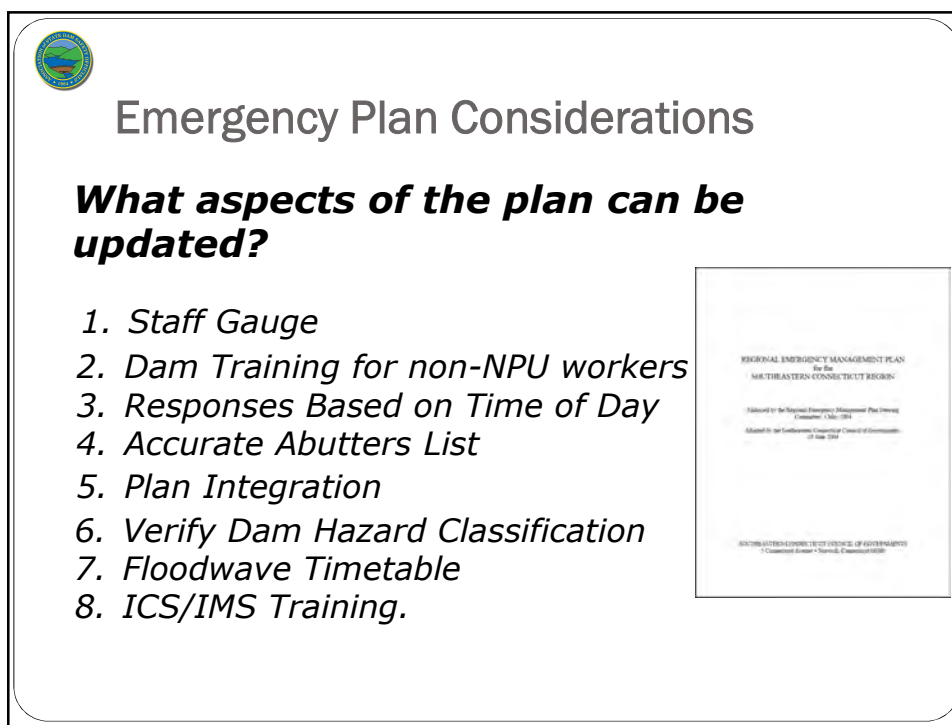


**Reservoir – EAP Actions**

**Police Department should initiate the Full Evacuation Plan and serve an Evacuation Notice**

- **Increased Seepage**
- **New or Worsening Sinkholes**
- **Embankment Movement**
- **Embankment Cracking**


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**Emergency Plan Considerations**

***What aspects of the plan can be updated?***

1. Staff Gauge
2. Dam Training for non-NPU workers
3. Responses Based on Time of Day
4. Accurate Abutters List
5. Plan Integration
6. Verify Dam Hazard Classification
7. Floodwave Timetable
8. ICS/IMS Training.




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## Flood Forecast Internet Resources

**U.S. Geological Survey Water Watch - Current water resources conditions**

- Map of flood and high flow condition (United States)  
[http://waterwatch.usgs.gov/?state=us&map\\_type=flood&web\\_type=map](http://waterwatch.usgs.gov/?state=us&map_type=flood&web_type=map)

**National and Oceanic and Atmospheric Administration's National Weather Service**

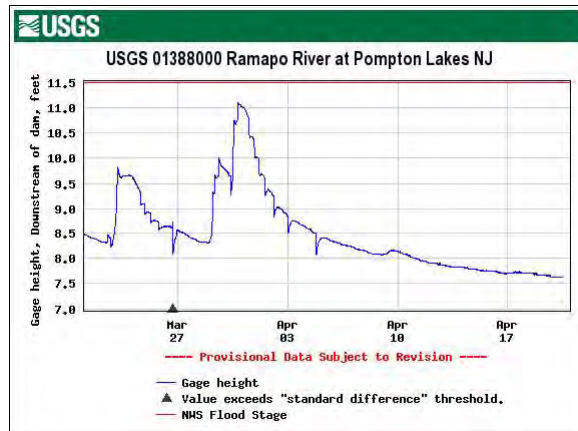
- Flood Warnings and Forecasts by State - <http://www.weather.gov/>
- Advanced Hydrologic Prediction Service (AHPS) - <http://water.weather.gov/ahps/>


[www.damsafety.org](http://www.damsafety.org)

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## Flood Forecast Internet Resource



U.S. Geological Survey Gage

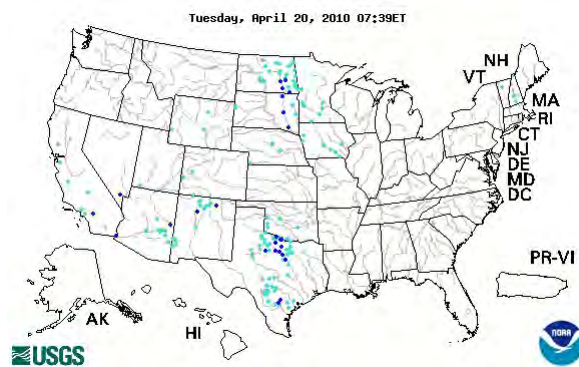
3-111

[www.damsafety.org](http://www.damsafety.org)

111



## Flood Forecast Internet Resource



Flood Warnings and Forecasts by State

3-112

[www.damsafety.org](http://www.damsafety.org)

112



[www.damsafety.org](http://www.damsafety.org)