EBC Connecticut Dam Management Program: Emergency Action Planning
Welcome

Dana Huff

Chair, EBC Connecticut Chapter

Vice President, Tighe & Bond
Welcome to Eversource Energy

Gary Iadarola

Manager, Environmental Remediation
Eversource Energy
Program Purpose – What You Will Learn

Matthew Taylor

Program Chair

Principal & Senior Vice President
GZA GeoEnvironmental, Inc.
The Anatomy of an Emergency Action Plan

J. Matthew Bellisle

Senior Vice President
Pare Corporation

Environmental Business Council of New England
Energy Environment Economy
Anatomy of an Emergency Action Plan

An Emergency Action Plan Workshop

Presented by

PARE CORPORATION

J. Matthew Bellisle, P.E. Senior Vice President

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Failing to Plan is Planning to Fail.

Denis Binder 2002
Hazard classification is based upon the potential for damage in the event of a failure, not the likelihood of failure itself.
RECOMMENDED COMPONENTS OF AN EAP

1. Planning
   a. Identification of hazards
   b. Inundation mapping

2. Preparedness
   a. Evacuation

3. Response
   a. Who, Where, When
   b. How long will it last

4. Recovery

5. Plan Distribution List

6. Executive Summary

7. Plan Maintenance

8. Glossary, References and Appendices
WHY?
Johnstown
Pennsylvania
May 31, 1889

Failure of the South Fork Dam caused an estimated $17 million in damages.

Fatalities: 2,209

Photo courtesy of ASDSO
Teton
Idaho - June 5, 1976
Damages: Unprecedented ($400M-$2B)
Fatalities: 11

- U.S. Bureau of Reclamation

Photo courtesy of ASDSO
Alton Dam, New Hampshire
California Jim’s Pond Dam
South Kingstown, RI
Whittenton Mill
Pond Dam
TAUNTON, MA

OCTOBER 2005
Spaulding Pond Dam - 1963
Norwich, CT
NUMEROUS OTHER RECENT DAM FAILURES AND OVERTOPPINGS SINCE 2010:

Hathaway Dam: Rochester, MA
Pratt Farm Pond Dam: Middleboro, MA
Hobbs Pond Dam: Weston, MA
Blue Pond Dam: Rockville, RI
Parker River Dam South: Newbury, MA
North Bellingham Dam: Bellingham, MA
Ka Loko Reservoir Dam: Kilauea Hawaii
Oroville Spillway Incident: Oroville, CA
Etc……..
DEFINITIONS:

“Dam” means any barrier made by humans, including appurtenant works that impounds or diverts water.

“Embankment” means the fill material, including but not limited to rock or earth, placed to provide a permanent barrier that impounds water.

“Appurtenant works” means any ancillary feature of a dam including such structures as dikes, training walls, spillways, either in the dam or separate there from, low level outlet works, and water conduits such as tunnels, channels, pipelines or penstocks, either through the dam or its abutments.
COMMON TERMS

**Capacity:** The amount of water that can be retained and/or discharged by the dam and through the discharge structures.

**Spillway Design Flood (SDF):** The flood used in the design of the dam and its appurtenant works particularly for designing the spillway and outlet works, and for determining the maximum temporary storage and height of dam requirements. This storm size is selected based upon the size and hazard classification of the dam.

100-year Storm: A storm with a 1% chance of occurrence each year.

500-year Storm: A storm with a 0.2% chance of occurrence each year.

Probable Maximum Flood (PMF): A theoretical storm event with no return cycle that represents the maximum precipitation that the atmosphere can generate in a given area over a given period of time.
OTHER TERMS

**Dam Break Analysis:** A computer simulation of a dam failure and determination of the flooding limits in the downstream area.

**Inundation Map:** A map that indicates the theoretical area that would be impacted during a dam failure event.

**Emergency Action Plan (EAP):** A predetermined plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam break.

**Operation and Maintenance (O&M) Manual:** A document that describes the operational and maintenance requirement specific to a particular dam site including scheduled maintenance, inspections, and training procedures along with logs for recording dam operations and maintenance.
OWNER REQUIREMENTS

• Registration of their dam
• Maintenance of their dam
• Inspection of their dams
• Repair of their dams
• Maintenance of an emergency action plan for high and significant hazard potential dams
• Notification of transfer of deed
Compliance with dam safety regulations

1. Owners shall keep their dams and appurtenant works in a safe condition.

2. Owners are liable for any damage or injury arising out of the operation or misoperation of their dam.

3. Nothing in the regulations shall prohibit the dam owner from seeking assistance or for municipalities in assisting a dam owner in the operation and maintenance of their dam.
Dam inspections are probably the single most important thing an owner can do.

Inspect a Dam:

- Formal Inspections as per dam safety regulations
- After a major storm event (wind, rain, snow)
- After an earthquake
- During draining and filling of the impoundment
- Informal inspections each change in season, and whenever you think of it…..
DAM FAILURE MECHANISMS
PROBABLE FAILURE MODE

- Overtopping
- Seepage/leakage
- Blocked spillways and outlets
- Malfunctioning gate (won’t close)
- Structural failure (gate failure, culvert collapse, etc.)
- Slope stability failure
- Beaver activity
- Earthquake
- Vandalism/terrorism
- Etc.
Those were obvious problems....

Not all deficiencies are that obvious.

Many are subtle and may be detected by:

• Healthier grass in an area of the embankment
• A leaning telephone pole
• The sound of running water
• A dry spillway channel when water is passing over the weir
• General lack of maintenance
Emergency Action Plan (EAP): A predetermined plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam break.

Each plan identifies threats and impacts and establishes activation thresholds and appropriate official(s) to contact in case of a dam failure.
EVALUATING A GOOD EAP

- Simple and well organized
- User friendly
- Flexible
- Integrated document
- Available
- Familiar / Consistent
- Complete
Each dam emergency is a unique situation that will require a site specific action plan to address the particular emergency situation that is developing.

Emergency responders should be prepared to adjust operation to respond to rapidly changing and developing conditions.
EAPs

“A predetermined plan of action to be taken to reduce the potential for property damage and loss of lives in an area affected by a dam” Blue Book, 1985

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“An emergency action plan can provide a systematic means to identify emergency conditions..., expedite effective response actions to prevent failures and reduce resulting losses” FEMA, 1987

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“An emergency action plan is a formal, but simple, plan that identifies potential emergency conditions which could occur at a dam, and prescribes procedures to be followed to minimize loss of life and the potential for property loss.”
PRECAUTIONS

• “Emergency action plans should not be viewed as a substitute for failure to exercise reasonable care to prevent the accident in the first instance” Denis Binder, 2002

• “The real effectiveness of a downstream warning system may be questionable and reliance on such systems may give a false sense of security to design engineers, dam owners, and residents below a dam” Blue Book, 1985

• “Emergency action plans are not designed to prevent an accident… these plans are designed to minimize or mitigate the impacts… reduce reaction time, and facilitate recovery” Denis Binder 2002
EMERGENCY RESPONSE

Who is responsible for starting the response?
• The Dam Owner

When will the dam fail?
• Unknown, but probably when you least expect it.

How will you be notified?
• Through the notification flow chart.
GENERAL PERSONNEL RESPONSIBILITIES

• Everyone has their own responsibilities during a response

• In order for the response to be effective the responders need to know what their responsibilities include

• Training and coordination is critical
Superintendent/Caretaker

- Acts as primary point of contact for dam reports
- Receives reports from observers at the dam
- Forwards information to response personnel
- Requests appropriate equipment
- Coordinates with the Dam Consultant
- Reviews plan yearly
- Instructs park staff of plan requirements
Owner’s Staff

- Site Responders
- Provide reports to the Superintendent
- Assess ability to repair structure
- Assist in securing the site and coordinating site activities
Dam Safety Program

• Assists in evaluating response and options/approaches
Local Emergency Management Director

- Responsible for contacting the state Emergency Management Agency, and local fire and police departments.
- Once mobilization has begun, EMD is the contact point for updates and status reports.
- If evacuation becomes required, EMD will be responsible for coordinating and implementing evacuation.
Local Fire Department

- If evacuation becomes necessary:
  - Assists in evacuation procedures
  - Assists at shelters
  - Assist in evacuating special needs citizens

- Fire department should be notified of potential emergency and put on alert.

- Fire department needs to be released from alert status upon resolution of concern.
Local Police Department

- Police department should be notified of potential emergency and put on alert early
- If evacuation becomes necessary:
  - Assist in securing the site
  - Establish barricades, direct traffic flow out of inundation zone
  - Assist in door to door notification
- Police also need to be released from Alert
State Emergency Management

- Assists in mobilizing response vehicles
- Assists in coordinating broadcast information
- Should be contacted early on so that they are on alert when they are needed.
- Once the emergency has been lifted, needs to be taken off of alert status
State Police

- Must be notified of potential problem
- Should be updated as situation develops
- Assist local police departments in traffic flow and evacuation
- Control incoming and outgoing traffic along state roads
- Must be notified when emergency is lifted
National Guard

- Can provide some specialized equipment (i.e., high wheel vehicles, troop transports, heavy equipment)
- Need time to respond
- Generally activated by Governor or EMA
National Weather Service

- **General Broadcast of Emergency Condition**
- Notifies Emergency Alert Service (EAS)
- NOAA WX Radio and TV
- Verifies conditions with fire department prior to making announcements
Governor

The Governor needs to know what is going on……

If required the Governor will mobilize the National Guard, declare disasters, and assist with recovery efforts.

The Governor will provide announcements and briefings as necessary.
The engineer should be notified early and provided with a full briefing.

Once notified, the engineer will assist in evaluating the situation and reviewing potential solutions.
Also joining the party....

- Local DPW
- School Department
- Local water, sewer, gas, electric, cable utilities
- Compassionate Aid
- State DOT
- Upstream and downstream dam owners
- Local contractors*
**Downstream Residents and Communities**

- Need to be notified once situation has been evaluated and seriousness is determined
- Closest to dam should be notified first
- Hospitals, nursing homes, schools, day cares etc. should be notified early to provide response time
- Evacuation routes should be clearly marked
- Need to be notified when the emergency has passed
IMPORTANT ITEMS

• Establish Incident Commander – usually Town Fire or Police Chief
  • Unified Command Structures within the Town then helps for longer duration responses and coordination between departments

• Establish Communication Protocols
  • Regularly scheduled briefings
  • Who is authorized to speak to the press

• Establish Command Center (and backup location)
Inundation maps are generated based upon computer modeling of specific storm events under certain conditions.

..... Actually conditions are very likely to be different.

Inundation maps should be utilized as a guide, augmented with judgment and local observations.

Inundation maps and evacuation maps are not exactly the same thing...

Inundation maps are valuable tools if their limitations are recognized.
How is an inundation map developed

• Based upon a numerical model that assumes a mode of failure, a point of failure, and a rate of failure.

• The resulting flood wave is modeled as it flows downstream. The progression downstream is dependent upon the topography, the number of bridges and culverts, and the elevation changes.
Introduction to Inundation Maps

What is shown on an inundation map?

• The area being flooded
• The location of roads and structures
• The anticipated limits of flooding
• The time of arrival at different points (if available)
• The peak depth at different points (if available)
READING AN INUNDATION MAP
Limitations of Inundation Maps

- Edges of flooding are based upon the best available mapping.
- Limits of inundation and arrival times are based upon assumed breach formation parameters.
- Variations in the downstream area can significantly change the flow path (i.e., blocked culverts).
NOTIFICATION PROCEDURES

- Should be standardized
- Should not overwhelm
- Need to be maintained to provide updates
- Central coordinator is key (i.e., EMD)
- Should be reviewed and updated yearly
NOTIFICATION

• Notifying the proper response personnel, emergency responders, and downstream public, is crucial in a dam response.

• Notification does not just happen, and should not be left to figuring out at the moment.

• Proper planning and new technology can make this task easier.
Developing a Notification Flow Chart

- Consider city, and regional personnel, equipment, and capabilities
- Review limits of inundation area
- Utilize existing system (i.e., city’s civil defense or emergency management procedures)
- UPDATE
Observer

Under the non-emergency event the call could be received by several entities along this notification chart. If received partially through the chart, calls up the chain occur up to and including the Water Superintendent.
For a developing failure or potential failure the initial call will likely reach an emergency services entity. If received partially through the chart, calls up the chain occur up to and including the Water Superintendent.
For a failure is occurring the call will likely reach an emergency services entity. If received partially through the chart, calls up the chain occur up to and including the Water Superintendent.
Level 2

Failure is not imminent
• This can be divided into 2 notifications
  • Internal – allows for investigation and assessment
  • Full – places responders on alert and begins formal assessment and preparation for second phase

Scenarios
• Blocked spillway*
• Cloudy Seepage/Sinkhole
• Waves breaking on dam crest
• Structural deterioration
• Threats
Level 3

- Failure is imminent or has occurred (i.e., Dam is a lost cause!)
- Full notification and response
- Efforts are expended on evacuation and traffic diversion
- Scenarios
  - Blocked Spillway*
  - Breach forming
  - Water within ½ foot of dam crest*
  - Dam overtopping
Care should be taken so that mitigation measures do not worsen conditions
TERMINATION / RECOVERY

Need to have an Exit Plan

- Site stabilized
- Structures inspected during water recession
- Warning lifted
- Evacuees allowed to return
- Streets/downstream area cleared
- Dam repaired or removed
RECOVERY
MITIGATION ACTIVITIES

- Surveillance
- Operations & Maintenance manuals
- EAP training and testing
- Updating and posting
- Onsite activities
Surveillance

• The most important part of an EAP is the identification of the problem

• The problem has to be identified in order for the plan to be executed

• Regular monitoring of the dam by knowledgeable personnel will help to identify problems before they become actionable concerns

• Monitoring before, during, and after rainfall and snow melt events is critical

• Contact information for non-city personnel (e.g. joggers) will help to direct calls for unforeseen emergencies
Operations and Maintenance (O&M) Manuals

- O&M manuals generally provide information specific to each dam regarding problems areas and maintenance requirements
- O&M manuals provide detailed procedures for dam operation under differing conditions
- Proper operation of a dam, during normal and storm conditions, will help reduce the risk of dam failures (i.e., seasonal drawdowns)
EAP Training and Testing

- Training seminars should be held for all plan participants.
- Having a plan is important, knowing how to implement it is critical.
- Once the responders know the plan, public meetings with the downstream residents should be conducted.
- EAP should be tested yearly, and refresher seminars conducted periodically.
Updating and Posting

• All parts of the EAP should be reviewed and updated once a year
• Changes in the condition of the dam and the downstream area should be noted during the review
• Review all phone numbers
• Distribute any and all revisions to all plan participants and plan holders immediately
• EAP should be in an accessible location
• Notification Charts should be posted in prominent locations in the office of personnel responsible for the EAP
Preparedness

• Ingress/Egress
  • How can the dam be accessed? From the toe; from the crest?

• What happens when the phones go down?
  • Cell phones/radios/secondary systems?

• Where can you get needed supplies?
  • Local contractors/borrow areas?
Response

Emergency Operations Centers
- Is it located in the inundation zone?

Downstream resident contact lists

Flow management procedures
- Who has the key to the gatehouse?

What do you need to respond to the problems
- Sandbags
- Backhoes
- Chainsaw
- High-wheel trucks
- Shovels
- Riprap
- Gravel/backfill
- Buses

Where are the charts, maps, and lists?
For more information contact:

J. Matthew Bellisle, P.E.
Senior Vice President
Pare Corporation

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Foxboro, MA 02035
8 Blackstone Valley Place
Lincoln, Rhode Island 02865
508.543.1755
mbellisle@parecorp.com
www.parecorp.com
Dam Breaking Analysis and Mapping

Christine Suhonen

Water Resources Engineer
GZA GeoEnvironmental, Inc.
Dam Break Analysis and Mapping

Presentation By:
Christine Suhonen, P.E.
May 16, 2019
Why?

Sudden, uncontrolled release of water.

Flood wave (from failure of Teton Dam) crossing a farmland - 1976
Why?

Hazard Classification

Emergency Preparedness
## Hazard Classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Results In Any of These</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Hazard</td>
<td>Probable Loss of Life&lt;br&gt;Major Damage to Structures&lt;br&gt;Damage to Major Utilities&lt;br&gt;Damage to Arterial Roads&lt;br&gt;Great Economic Loss</td>
</tr>
<tr>
<td>Significant Hazard</td>
<td>Possible Loss of Life&lt;br&gt;Minor Damage to Structures&lt;br&gt;Damage to Local Utilities&lt;br&gt;Damage to Collector Road and Railroads&lt;br&gt;Significant Economic Loss</td>
</tr>
<tr>
<td>Moderate Hazard</td>
<td>Damage to Unoccupied Storage Structures&lt;br&gt;Damage to Paved Local Roads&lt;br&gt;Moderate Economic Loss</td>
</tr>
<tr>
<td>Low Hazard</td>
<td>Damage to Agricultural Land&lt;br&gt;Damage to Unpaved Local Roads&lt;br&gt;Minimal Economic Loss</td>
</tr>
</tbody>
</table>
How many?
Dam Break Modeling

- Where will the water go?
- How deep will it be?
- How fast will it be moving?
- How long will the flooding last?
Dam Break Modeling

Rule of Thumb:

Depth of Flood Wave at Downstream Side of Dam = ½ x Depth of Water Behind Dam
Software
Input: Terrain
Input: Land Use
Input: Downstream Bridges/Dams
Input: Reservoir Volume
Input: Baseflow
Input: Breach Opening

Modeled breach opening size is based on historic breaches.
Inputs: HEC-RAS 1D
Inputs: HEC-RAS 2D
Input: DSS-WISE

Built into software:
- Terrain
- Land Use
- Some Downstream Bridges
- Some Downstream Dams
Mapping
### Upstream Side of Bridge St / Route 26 (330121)

<table>
<thead>
<tr>
<th>Description</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Downstream of Breached Dam (miles)</td>
<td>29.5</td>
<td></td>
</tr>
<tr>
<td>Leading Edge Arrival Time (hr:min)</td>
<td>8:50</td>
<td>6:15</td>
</tr>
<tr>
<td>Peak Flood Arrival Time (hr:min)</td>
<td>22:15</td>
<td>21:45</td>
</tr>
<tr>
<td>Maximum Water Level (ft)</td>
<td>1019</td>
<td>1010.4</td>
</tr>
<tr>
<td>Incremental Rise in Water Level (ft)</td>
<td>7</td>
<td>15.1</td>
</tr>
<tr>
<td>Maximum Flow (cfs)</td>
<td>48,400</td>
<td>23,500</td>
</tr>
</tbody>
</table>
Animation
Animation
Thank you!

Please send any follow up questions to Christine.Suhonen@gza.com.
CT DEEP’s Dam Safety Program – EAP Overview

Ivonne Hall

Supervising Civil Engineer

Dam Safety Program

Connecticut DEEP
CT DEEP Dam Safety Program: How to Submit EAPs

Ivonne Grajko Hall, P.E.
Supervising Civil Engineer
Dam Safety Program
Inventory of Dams in CT

– CT DEEP regulates over 3,000 dams
– 72% are privately owned
– CT DEEP is the single largest owner with 265 dams
Current CT DEEP Dam Staff

Retirements
Art Christian 3/31/18
Ann Kuzyk 3/31/19
Pete Spangenberg 5/31/19
Requirements for EAPs

- RCSA 22a-411a-2 – effective date of February 3, 2016
- EAPs for Class C Dams – DUE DATE February 3, 2017
- EAPs for Class B Dams – DUE DATE August 3, 2017
- Update EAPs every 2 years to reflect changes
Submittal Sequence

EAP Preparation

Dam Owner coordinates with a licensed P.E. & Municipal Emergency Response officials

1 paper copy (and PDF) of EAP submitted to CT DEEP for review & approval
Emergency Action Plans (EAP):
Emergency Action Plans for High Hazard dams were due on February 3, 2017. EAP's for Significant Hazard Dams were due by August 3, 2017.

Important Note to owners of Class C High Hazard dams who have not submitted an updated Emergency Action Plan to the Commissioner as of August 28, 2017. The Department will be proceeding with further enforcement measures which may include civil penalties allowable under Section 22a-6b of the Connecticut General Statutes and Section 22a-6b-1 of the Regulations of Connecticut State Agencies.

Select the following links for a template to use for preparing an EAP, a checklist to use to ensure the EAP will conform to the Dam Safety Regulation, answered questions, and some guidance for dam breach inundation map preparation.

- **EAP Template** (July 2017) (Word Form)
- **EAP Checklist** (December 2016) (pdf)
- **Questions and Answers about EAP Preparation** (July 2017) (pdf)
- **Guidance Document For Inundation Maps for EAPs in CT** (May 2016) (pdf)

FEMA **P-946 Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures** (leave DEEP website)

**Dam Safety Regulation:**
The Dam Safety regulation was most recently revised with an effective date of February 3, 2016. The two sections of the dam safety regulation are available from the Secretary of the State Connecticut eRegulations System by selecting the following links:

- 22a-409: Definitions, Registration, Classification, Inspections
- 22a-411: Definitions, Requirements for Emergency Action Plans
Emergency Action Plan (EAP)

[Name of Dam]

[Name of Impoundment]

Connecticut Dam ID No. [XXXX]

[Name of Dam Owner]

Hazard Class [“C” or “B”]

[City/Town], Connecticut

[Date of EAP]

[Date of Revision / Update]

[Date submitted to DEEP]

This template is provided by the DEEP Dam Safety Section. However, this format is not required by the Regulation. This template should be modified, as necessary, to ensure the specific features of the subject dam are accommodated and the resulting EAP is useful and easy to follow. At a minimum, the information provided in an EAP must meet the requirements of 220-4110-1 and 2 of the Regulations of Connecticut State Agencies (RCSA).

The dam owner and EAP preparer should coordinate with the agencies who will be responsible for providing emergency services during plan activation when developing this plan and preparing an inundation map.

Some of the information in this template is identified as “Optional” or “Recommended”. This information is not specifically required by the Regulations. Items that are optional or recommended may by entire sections of the template or specific statements and guidance within the sections. It is the responsibility of the dam owner and EAP preparer to read and understand the Regulations. If there is any question whether specific items in the template are required, the EAP preparer should refer to the 220-4110-1 and 2 (RCSA).

The dam owner or person preparing the EAP may also call Art Christian of the DEEP Dam Safety Program at 860-424-3880 with any questions regarding the preparation of their EAP.

Including recommended sections will help the preparer assemble a complete EAP that will meet the minimum requirements of the regulation. Please also refer to the Checklist and the Questions and Answers document both available on the Dam Safety webpages: www.ct.gov/deep/dams

Recommended: Insert a photograph of the dam here that provides an overview of the dam.

Recommended: Include EAP Preparer’s name at the bottom.
EAP Checklist

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 operations (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

Last Updated 1/5/2017

Page 1 of 5
Questions and Answers about Emergency Action Plans (EAPs) for Dams
Issued December 29, 2016, Revised July 28, 2017

The DEEP Dam Safety Program has reviewed about 40 Emergency Action Plans submitted to date and has noticed some common errors or omissions amongst the EAP submissions. In an effort to assist in the preparation of EAPs to be submitted, we have put together the following list of questions and answers which are intended to address some of the common issues we have observed. EAPs must conform to the minimum requirements of the Dam Safety Regulation. The answers provided below are based on those requirements.

Q. What should be on the title page of an EAP?
A. The title page must identify the document as an emergency action plan and specify the dam for which it was developed. The dam name, reservoir names, hazard class, and town(s) in which the dam is located shall be included on the title page along with the CT Dam ID number. Additionally, the title page must include date of the EAP, latest revision date (if applicable) and the contact name and address of the engineer who prepared the EAP.

Q. Do I need to reference the National Weather Service when describing the necessary dam monitoring procedure?
A. Yes. The EAP Dam Monitoring Procedure must contain a statement requiring initiation of monitoring when the National Weather Service (NWS) announces a Flood Warning for the area where the dam is located.

Q. Do I need to include the interval for monitoring the dam?
A. Yes. The monitoring interval (e.g. every hour, every half hour or continuously) as warranted by the particular hydrologic and hydraulic characteristics and/or structural components of the dam must be calculated by the engineer and included in the EAP. A separate certification page has been added to the EAP.

This circular is designed to answer general questions and provide basic information and guidance. You should also refer to Section 22a-511(a) in both the CT General Statutes and Regulations of CT State Agencies.
How to Contact Us

Dam Safety Program
DEEP.DamSafety@ct.gov
(860) 424-3706
Ivonne Hall
ivonne.hall@ct.gov
(860) 424-3754
Emergency Response During Construction

Dan Galante
Vice President
T Ford Construction
Emergency Response During Construction

Unforeseen Portadam Breach at the Scalley Dam, Woburn, MA

Dan Galante
Vice President
T Ford Company, Inc.
Scalley Dam Spillway Improvements

- Project located in Woburn, MA, but paid for and administered by Winchester, MA
- Part of a multi-phase, multi-year flood mitigation project
- Engineers – VHB and Pare Corporation (as sub to VHB)
- Spillway expansion with new gate structure
Project Location
Existing Conditions
Water Control Submittal

- Dewatering, Control and Diversion of Water Plan
- Flood Contingency and Countermeasures Plan

---

**Specification Section:** 02400

**Drawing No.:**

**Detail No.:**

**Copies:**

---

**Comments/Remarks:**

Dewatering, Control, and Diversion of Water Plan

---

**Contractor’s Review Statement:**

I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all contract requirements.

**By:**

Dan Galante

VP/PM

---

**Engineers Review Stamp:**
Sawcut and demolish existing right wing walls
Excavate to subgrade and install 2” and 3” dewatering sumps (10 of them!!!)
Pour new spillway wall footings
Hugs and kisses at 2:00 PM project meeting
And then...
At 3:00 PM Uncontrolled Portadam Breach!!! Ahhhh!!!!
Turbulent Flow Through Breach
Remember this guy?? Downstream tail water cofferdam.
Immediate Reaction and Response

- Concrete workers out of the hole
- Debris and equipment out of the hole
- Notify Client and Engineer (who will notify the City of Woburn, other City/Town departments, Police / Fire ODS, etc.)
- Call owner of company with these exact words, “We have a problem.” (very creative I know)
What is our remedy?
- Only option tail water cofferdam augmentation
- What do we have on-site to make this happen?
- What do we have off-site at T Ford’s yard to make this happen?
- Who can help? Town of Winchester, City of Woburn, Crane, Portadam, other subs?
- What did our Flood Contingency Plan say!!!
- Get random “What’s your deal?” text from wife...
Are we going to flood out the basement apartments across the street?? Who can get me the super’s phone number?

Is my phone battery going to die?

“Dan can you come talk to the Woburn Emergency Management department and Mayor and brief them?”

“Dan are we going to close the road it’s your call.”

“It’s prom night??!!”
Insurance Photos

[Images of a building exterior and an interior living space]

[Images of a person standing in the indoor living space]
Municipal Government, Project Team, and Media Attention

- All local news stations
- City of Woburn Mayor, DPW, Water Department, Police, Fire among others
- Town of Winchester DPW
- Office of Dam Safety
- VHB and Pare Corporation
“Whatever you need Dan” is all I heard
The Town of Winchester stole a bunch of supersacks from another contractor
The City of Woburn brought us as much sand as we needed
T Ford shut down all other site crews and mobilized labor & more filled supersacks to site
Nappy Crane sent a crane after hours
Mayer Tree sent a remote controlled hook to us in the middle of the night
The Next Day...Picking Up The Pieces
Remedial Work

- Allow inside / outside cofferdam to equilibrate so that there is no flow through the breach point so it can be assessed
- Divers sent to assess cause / remedial suggestions
- Liner ripped at seam ~25’ wide
- Significant scour beneath ripped section and beneath frames
- Fill scour with sandbags and supersacks and install another liner over existing
Back In Business
Cofferdam Removal / Finish Work
Summary

- Pre-project / submittal planning matters!
- Real time decisions, communication, and collaboration – relationships critical
- W2W4 next time? Layout liner and thoroughly inspect? Install 2 liners right off the bat? Use alternative cofferdam system?
- Experience matters – from all sides of the project team
- Dam work is challenging...Preparation, resources, and emergency response capabilities are critical.
THANK YOU!
Moderated Discussion

Moderator: Matthew Taylor, GZA

Panelists:

• J. Matthew Bellisle, Pare Corporation
• Dan Galante, T Ford Construction
• Ivonne Hall, CT DEEP
• Christine Suhonen, GZA
EBC Connecticut Dam Management Program: Emergency Action Planning