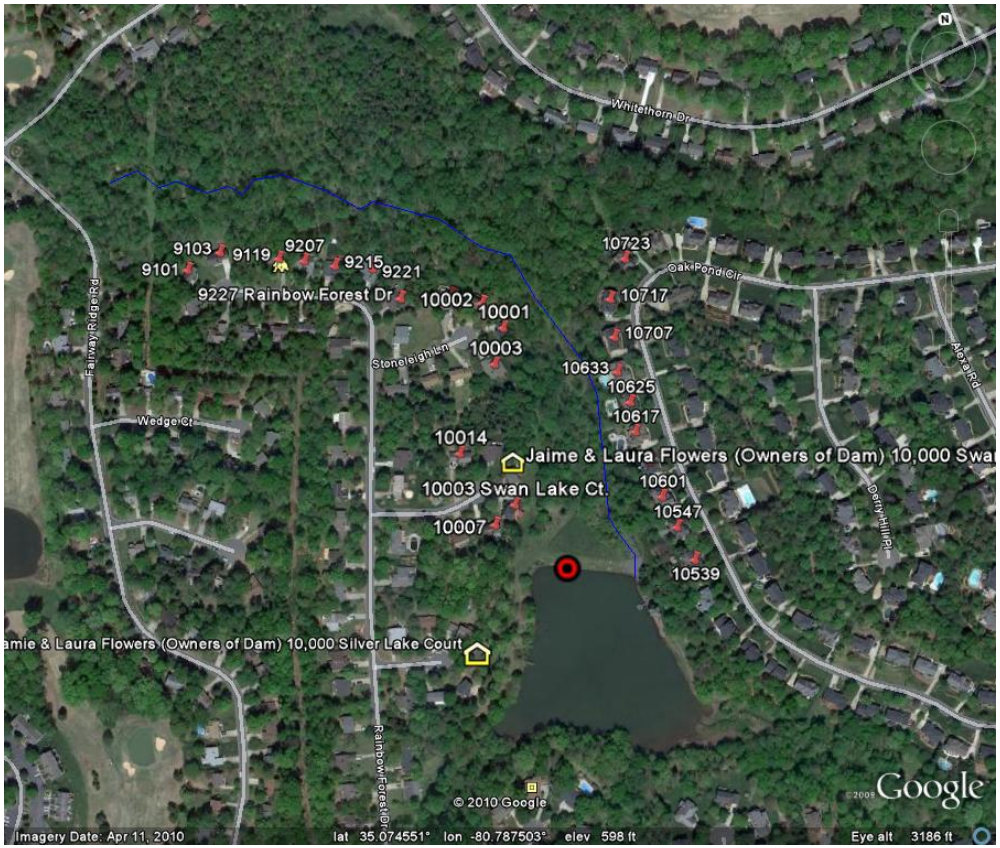
Key EAP Components



Tamera Eplin, PE
Assistant Regional Engineer
Mooresville Regional Office, Land Quality Section

What do EAPs do for Dam Owners?

Minimize loss of life and property damage

Other Functions of EAPs

- Identifies potential emergency conditions that can occur at dams
- Lists preplanned actions to take during emergencies
- Documents emergency notification procedures to aid in warning and evacuations
- Provides downstream hazard maps to help local Emergency Management to develop evacuation plans.

Dam Failure:

An uncontrolled release of water from a dam

New Salem Dam in 2001, Balcones Canyonlands NWR, from ASDSO June 8-9, 2010 Seminar

Typical Post-Failure Breach

A breach is an opening through a dam that results in partial or total failure of the dam

4 Steps of any Dam Emergency Once an Event is Detected:

- Step 1 -Level Determination
- Step 2 -Notifications & Communication
- Step 3 -Expected Actions
- Step 4 -Termination & Follow-up

An EAP assists all involved parties with these actions.

How are emergencies detected at dams?

- Instrumentation systems
- Key personnel/operators
- Dam owners
- Observations by the general public

Who is the key decision maker responsible for initiating an EAP?

Is it

A. NCDENR

B. The governor

C. Local emergency management

D. The dam owner

D. The dam owner

If a dam is failing or flooding is expected to occur, who is responsible for downstream warning and evacuation?

- Incident Commander (determined by local emergency management)
- By having an EAP in place, the local emergency management agency can concentrate on the evacuation because important decisions have already been made.

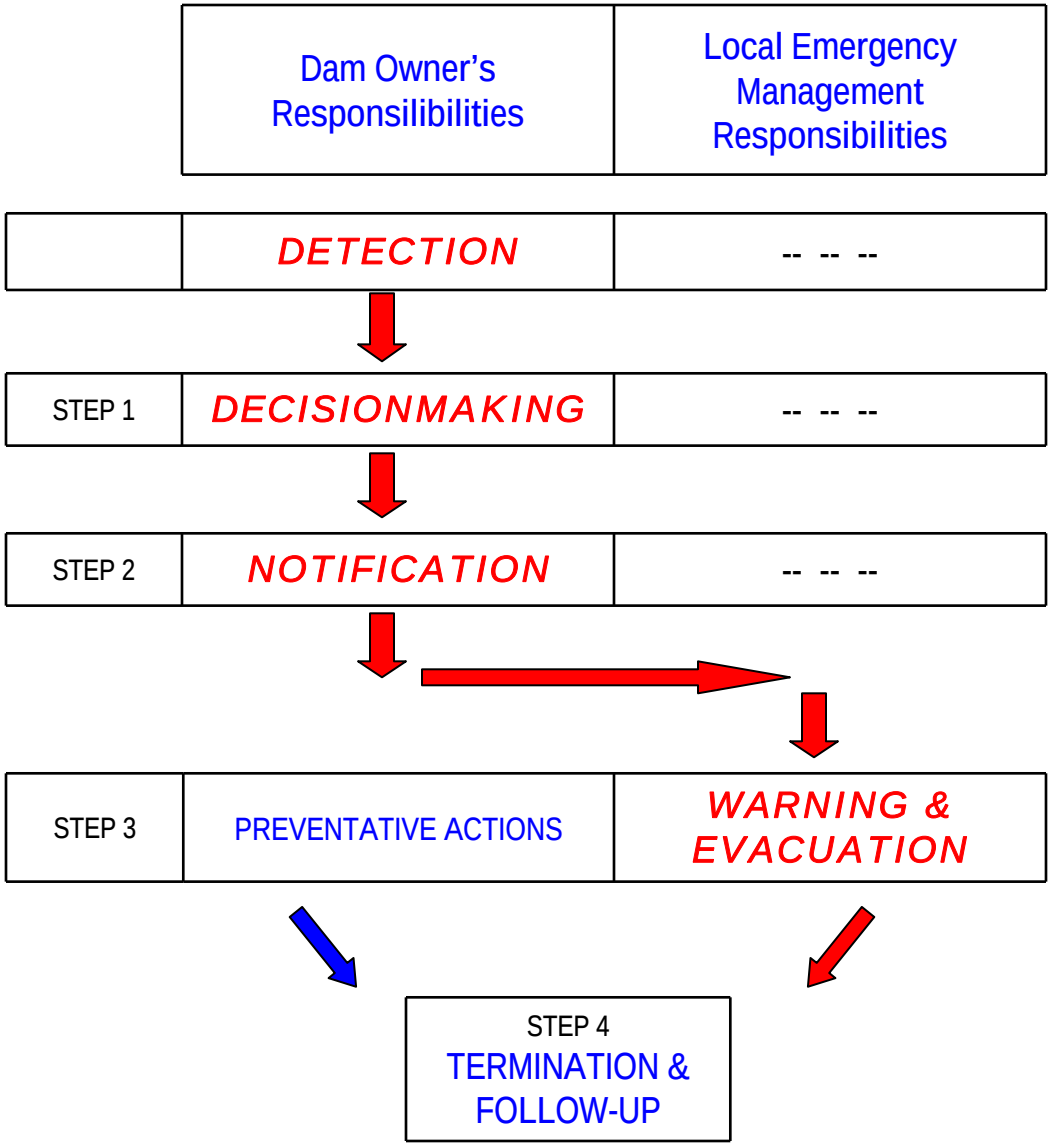
What is the dam owner's responsibility during a dam safety emergency?

- Take actions to prevent dam failure
- Keep all parties updated on the status of the event

What should be done after emergency conditions?

- Terminate the EAP
- Hold a follow-up meeting
- If necessary, stabilize the area
- Develop a repair plan

Summary of Responsibilities



Types of Emergencies

- **Level 3, Green**
- Level 2, Yellow
- Level 1, Red

Types of Emergencies

Level 3, Green Emergency

- Unusual event, slowly developing
- Situation has not yet threatened the operation or structural integrity of the dam
- Examples: New seepage areas (with clear flow) in or near dam, instrument readings beyond normal ranges, new cracks in the embankment without seepage or sliding

Types of Emergencies

Level 2 – Yellow Emergency

- Potential dam failure situation, rapidly developing.
- Situation could lead to dam failure, but there is not an immediate threat of dam failure.
- Monitoring is necessary.

(continued)

Level 2 – Yellow Emergency (cont.)

- Incident Commander should be notified immediately if the condition worsens and failure becomes imminent.
- Evacuation may be necessary.
- Examples:
  - Spillway flowing with active gully erosion
  - Spillway flow that could result in flooding of people downstream if the reservoir levels continue to rise.

Types of Emergencies

Level 1 – Red Emergency

- Urgent!! Dam failure imminent or is in progress.
- Dam failure is occurring or is about to occur and cannot be prevented.
- Evacuation is necessary.
- Examples:
  - Spillway flowing with advancing headcutting that is threatening the control section
  - Earthen dam is overtopping
  - Rapidly enlarging sinkhole.

Introducing

NORTH CAROLINA'S NEW EAP TEMPLATE

Introducing NC's NEW EAP Template

- Fillable form.
- May be expanded/contracted to fit the needs of the individual dam.
- Preferred format for all future EAP submittals.
- Designed to help the affected parties through the 4 step emergency action process.

Who should prepare the EAP?

- The owner/operator
- The landowners
- The stakeholders

Stakeholders are

- Owners
- Operators
- Responders
- Parties that may be affected by flooding or dam failure.

STEP 1 – Event Detection and Level Determination

- Event detection flow charts
- Definitions of emergency levels
- Guidance for determining the emergency levels:
  - Level 3 – Green
  - Level 2 – Yellow
  - Level 1 – Red

Event	Condition	Emergency level*
Earth spillway flow	Reservoir water surface elevation at auxiliary spillway crest or spillway is flowing with no active erosion	3
	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	1
	Spillway flow that is flooding people downstream	1
Embankment overtopping	Reservoir level is 1 foot below the top of the dam	2
	Water from the reservoir is flowing over the top of the dam	1
Seepage	New seepage areas in or near the dam	3
	New seepage areas with cloudy discharge or increasing flow rate	2
	Seepage with discharge greater than 10 gallons per minute	1

STEP 2 – Notifications and Communication

- Notification and communication flow charts for each level emergency.
  - Level 3 – Green
  - Level 2 – Yellow
  - Level 1 – Red
- All needed phone numbers on one page.
- Suggested communication language for emergency responders.

STEP 3 – Expected Actions

- Action data sheets are provided for common events.

Event	Event Level	Action Data Sheet
Earth Spillway Flow	3	A3
	2	A2
	1	A1
Embankment Overtopping	2	B2
	1	B1
Seepage	3	C3
	2	C2
	1	C1
Sinkholes	2	D2
	1	D1
Embankment Cracking	3	E3
	2	E2
Embankment Movement	3	F3
	1	F1

STEP 3 – Expected Actions

- Should be performed as time permits to prevent a dam failure.
- Template should be modified to fit the individual characteristics of the dam.
- Emergency Event Log provided.

STEP 4 – Termination and Follow-up

- Once an EAP has been activated, it must be deactivated, or terminated, when appropriate.
- Procedures are provided for Level 3-Green, Level 2-Yellow, and Level 1-Red Events.

Supporting Data

- Directions to the dam, preferably NOT in the path of a potential breach.

- Emergency access routes map

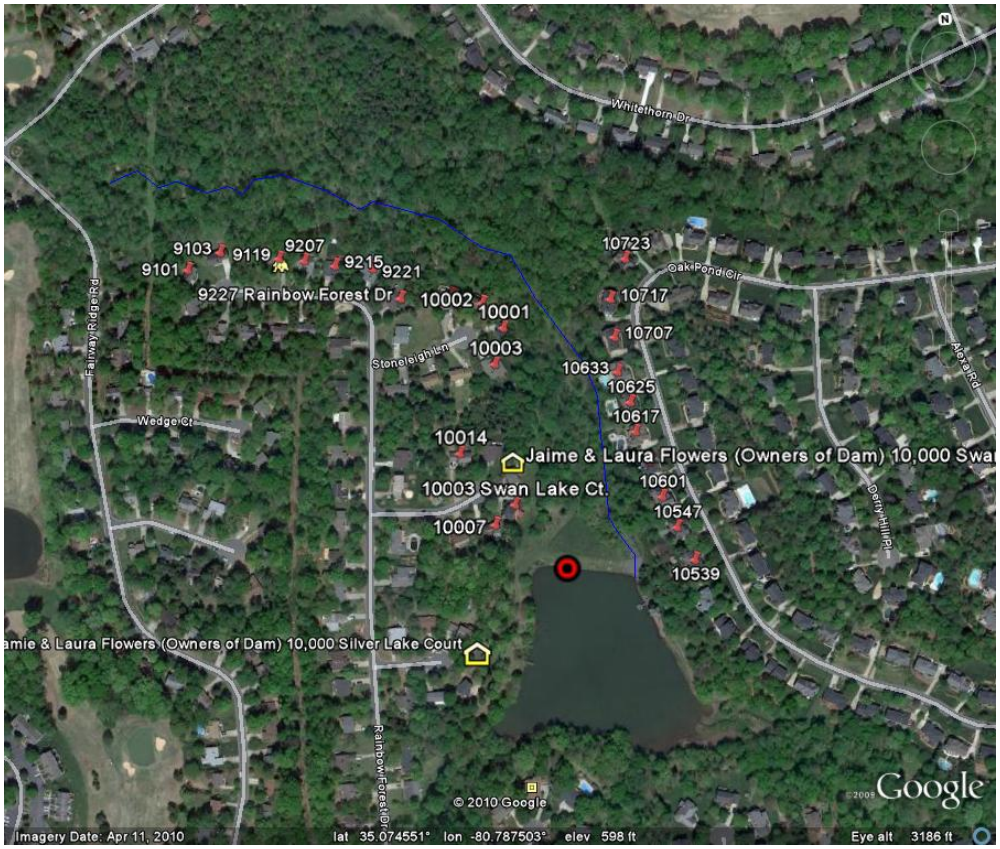
Supporting Data (continued)

- List of residences, businesses, roads at risk.

Entity No.	Resident/business/roads or other impacted entity	Property Address	Phone No. with area code	Distance downstream from dam (mi)
X	Name of entity	Address/location of entity	XXX-XXX-XXXX	Distance from dam
X	Name of entity	Address/location of entity	XXX	Distance from dam
X	Name of entity	Address/location of entity	XXX	Distance from dam
X	Name of entity	Address/location of entity	XXX	Distance from dam
X	Name of entity	Address/location of entity	XXX	Distance from dam

Supporting Data (continued)

- Downstream hazards map.



Supporting Data (continued)

MAPS

- Inundation maps, if available.
- SIMS maps, if available.
- Evacuation map, if developed by local emergency responders.

Supporting Data (continued)

- Locally available resources (equipment, labor, and materials)
- Emergency services contacts

Supporting Data (continued)

- Roles and responsibilities
- EAP distribution list and signatures
- Procedures for EAP review and revisions

Where to get more information

- North Carolina Dam Safety Program website:

*www.dlr.enr.state.**nc**.us/pages/**damsafety**program.html*

- The NC dam safety staff at (919) 733-4574