Louisiana’s NIKE® Approach to EAPs: Just Do It

Presented to:

2007 Louisiana Transportation Engineering Conference Navigating the Waves of Change Tuesday, February 13, 2007 Baton Rouge River Center

Presented by:

Daniel J. Aucutt, P. E.
The Challenge

Update the State inventory of private dams and prepare EAPs for 20 State-maintained dams for less than the cost of 2 or 3 full breach analyses, and within a time frame of two years.

Private Dam Update

Develop Emergency Action Plans
Update the Existing Dam Inventory Database

- Obtain a Copy of the Existing Dam Inventory
- Criteria for Inclusion into Database
- Acquire Reference Maps
- Plot Coordinates of Each Registered Dam
- Search for Unregistered Dams
Obtain a Copy of the Existing Dam Inventory

✓ DOTD Maintains a Database of Inventoried Dams

At the Start of the Contract, there were 534 Dams in 60 Parishes.

Homeland Security Issues Prevented Direct Access to Database.

DOTD Provided a Simplified Version of the Database in Excel Format.
<table>
<thead>
<tr>
<th>ID</th>
<th>Longitude</th>
<th>Latitude</th>
<th>Dam Name</th>
<th>Dam Height (Feet)</th>
<th>Surface Area (Acres)</th>
<th>State Registered Dam</th>
<th>State ID</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>358</td>
<td>-90.6631</td>
<td>30.8297</td>
<td>HOLLANDS POND</td>
<td>8</td>
<td></td>
<td>Y</td>
<td>46-00105</td>
<td>S59,T2S,R5E</td>
</tr>
<tr>
<td>359</td>
<td>-90.6083</td>
<td>30.7950</td>
<td>ROBERTSON POND</td>
<td>10</td>
<td>2</td>
<td>Y</td>
<td>46-00107</td>
<td>S16,T3S,R6E</td>
</tr>
<tr>
<td>360</td>
<td>-90.5981</td>
<td>30.9314</td>
<td>BRABHAMS POND</td>
<td>10</td>
<td>3</td>
<td>Y</td>
<td>46-00108</td>
<td>S27,T1S,R6E</td>
</tr>
<tr>
<td>361</td>
<td>-90.5964</td>
<td>30.8897</td>
<td>YOUNGS POND</td>
<td>20</td>
<td>2</td>
<td>Y</td>
<td>46-00106</td>
<td>S10,T2S,R6E</td>
</tr>
<tr>
<td>362</td>
<td>-90.7017</td>
<td>30.8450</td>
<td>MC FARREN POND</td>
<td>6</td>
<td>3</td>
<td>Y</td>
<td>46-00104</td>
<td>S54,T2S,R5E</td>
</tr>
<tr>
<td>394</td>
<td>-90.6736</td>
<td>30.6806</td>
<td>MORGAN DAM</td>
<td></td>
<td>8.7</td>
<td>Y</td>
<td>46-00417</td>
<td>S44, T4S, R5E</td>
</tr>
<tr>
<td>395</td>
<td>-90.7308</td>
<td>30.9536</td>
<td>PEAY DAM</td>
<td></td>
<td>18.4</td>
<td>Y</td>
<td>46-00416</td>
<td>S4, T1S, R5E</td>
</tr>
<tr>
<td>396</td>
<td>-90.5878</td>
<td>30.8858</td>
<td>ROBERTS DAM</td>
<td></td>
<td>10.9</td>
<td>Y</td>
<td>46-00415</td>
<td>S10, T2S, R6E</td>
</tr>
<tr>
<td>501</td>
<td>-90.7261</td>
<td>30.7075</td>
<td>DBK - LLC DAM</td>
<td></td>
<td>8</td>
<td>Y</td>
<td>46-00418</td>
<td>S8, T4S, R5E</td>
</tr>
</tbody>
</table>
Criteria for Inclusion into Database

LAC 70: Part XIII: Chapter 21 defines the criteria for Dam Registration.

- Dam Height must be > 6 feet.
- Reservoir Storage Volume > 15 acre-feet.
No Preapplication Required.

Structures that must be submitted to the Director, Public Works and Flood Control Directorate for review under the LA State Dam Safety Program.
Acquire Reference Maps

- Download Statewide DOQQ Maps from LSU.
  
  Maps are imported with conventional USGS quad maps.
  
  ArcView software used to facilitate manipulation of maps.
  
  Created Parish by Parish Folders.
  
  Eliminated 15 Low-Lying Parishes.
Plot Coordinates of Each Registered Dam

✓ Enter DOTD Coordinates for 534 Registered Dams.

Resulted in a Database Peer Review.

One Second Error = ~ 88 feet.

One Degree Error = ~ 60 miles.

Two markers in same reservoir.
Visual Search for Reservoirs with No Marker.

Nine (9) Registered Dams in St. Helena Parish.
Reservoir Area Ranged from 2 acres to 18 acres.
<table>
<thead>
<tr>
<th>ID</th>
<th>Longitude</th>
<th>Latitude</th>
<th>Dam Name</th>
<th>Dam Height (Feet)</th>
<th>Surface Area (Acres)</th>
<th>State Registered Dam</th>
<th>State ID</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>358</td>
<td>-90.6631</td>
<td>30.8297</td>
<td>HOLLANDS POND</td>
<td>8</td>
<td></td>
<td>Y</td>
<td>46-00105</td>
<td>S59,T2S,R5E</td>
</tr>
<tr>
<td>359</td>
<td>-90.6083</td>
<td>30.7950</td>
<td>ROBERTSON POND</td>
<td>10</td>
<td>2</td>
<td>Y</td>
<td>46-00107</td>
<td>S16,T3S,R6E</td>
</tr>
<tr>
<td>360</td>
<td>-90.5981</td>
<td>30.9314</td>
<td>BRABHAMS POND</td>
<td>10</td>
<td>3</td>
<td>Y</td>
<td>46-00108</td>
<td>S27,T1S,R6E</td>
</tr>
<tr>
<td>361</td>
<td>-90.5964</td>
<td>30.8897</td>
<td>YOUNGS POND</td>
<td>20</td>
<td>2</td>
<td>Y</td>
<td>46-00106</td>
<td>S10,T2S,R6E</td>
</tr>
<tr>
<td>362</td>
<td>-90.7017</td>
<td>30.8450</td>
<td>MC FARREN POND</td>
<td>6</td>
<td>3</td>
<td>Y</td>
<td>46-00104</td>
<td>S54,T2S,R5E</td>
</tr>
<tr>
<td>394</td>
<td>-90.6736</td>
<td>30.6806</td>
<td>MORGAN DAM</td>
<td>8.7</td>
<td></td>
<td>Y</td>
<td>46-00417</td>
<td>S44, T4S, R5E</td>
</tr>
<tr>
<td>395</td>
<td>-90.7308</td>
<td>30.9536</td>
<td>PEAY DAM</td>
<td>18.4</td>
<td></td>
<td>Y</td>
<td>46-00416</td>
<td>S4, T1S, R5E</td>
</tr>
<tr>
<td>396</td>
<td>-90.5878</td>
<td>30.8858</td>
<td>ROBERTS DAM</td>
<td>10.9</td>
<td></td>
<td>Y</td>
<td>46-00415</td>
<td>S10, T2S, R6E</td>
</tr>
<tr>
<td>501</td>
<td>-90.7261</td>
<td>30.7075</td>
<td>DBK - LLC DAM</td>
<td>8</td>
<td>13</td>
<td>Y</td>
<td>46-00418</td>
<td>S8, T4S, R5E</td>
</tr>
</tbody>
</table>
Average Slope (m) = \[\frac{230 - 210}{1,158}\] = 0.0173 Feet/Feet

\[\frac{H_{\text{DAM}} - 0}{547}\] = 0.0173

\[H_{\text{DAM}} = 9.5\text{ Feet}\]
Ellipsoid Volume \( (V, \text{ac-ft}) \) = \( \frac{4}{3} \pi r_L r_W r_H / 43,560 \)

\( \frac{1}{4} \) Ellipsoid Volume \( (V, \text{ac-ft}) \) = \( \frac{1}{3} \pi L W H / 43,560 \)

\[
V = \frac{1}{3} \pi \times 547 \times 200 \times 9.5 / 43,560 = 24.9 \text{ ac-ft}
\]
Average Slope (m) = \([230 - 210] / 1,158 = 0.0173\) Feet/Feet

\([H_{\text{DAM}} - 0] / 547 = 0.0173\)

\(H_{\text{DAM}} = 9.5\) Feet

Storage Capacity = 24.9 ac-ft
## Results of Program

<table>
<thead>
<tr>
<th>New Reservoirs from DOQQ Study</th>
<th>Any Size</th>
<th>&gt; 5 ac</th>
<th>&gt; 15 ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Helena Parish</td>
<td>75</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Jackson Parish</td>
<td>28</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Statewide (Total)</td>
<td>--</td>
<td>--</td>
<td>291</td>
</tr>
<tr>
<td>Statewide (Eliminated)</td>
<td>--</td>
<td>--</td>
<td>177</td>
</tr>
<tr>
<td>Statewide (Added to Db)</td>
<td>--</td>
<td>--</td>
<td>114</td>
</tr>
</tbody>
</table>
SO NEAR,
The Challenge

Update the State inventory of private dams and prepare EAPs for 20 State-maintained dams for less than the cost of 2 or 3 full breach analyses, and within a time frame of two years.

Private Dam Update

Develop Emergency Action Plans
Develop Emergency Action Plans

“Everything should be made as simple as possible, but not simpler.”
- Albert Einstein

“If you can’t say it in 4 or 5 pages, you are talking too much.”
- Zahir “Bo” Bolourchi
Develop Emergency Action Plans

- Review FEMA guidelines.
- Solicit Examples from ASDSO Members.
- Reduce the EAP to its essential components (about 5 to 8 pages).
  
  Dam Fact Sheet  
  Notification Flow Chart  
  Notification Area Map  
  Emergency Operations Center Map(s)  
  Documentation

- Add Appendices as needed.
Dam Fact Sheet

- Essential information from database
- Distribution List
- Engineer’s Approval
**Hazard Classification**

**Lat./Long.**

**Drainage Area**

**Storage Volume**

**Dam Crest**

**Spillway Crest**

**Spillway Type**

**Drawdown Structure**

**US/DS Impacts.**

---

**Database Info**

**Seal**

**Approvals**

**Focus**

**Responsibility**

---

**PHYSICAL SITE DESCRIPTION:**

<table>
<thead>
<tr>
<th>Dam Name</th>
<th>Bayou D’Arbonne Dam/Reservoir</th>
<th>Impact Classification: Low Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>State ID No.</td>
<td>56-00015</td>
<td>National ID No: LA00015</td>
</tr>
<tr>
<td>City/Town</td>
<td>Farmerville, LA</td>
<td>Parish: Union</td>
</tr>
<tr>
<td>Latitude:</td>
<td>32°42′42″</td>
<td>Longitude: -92°20′23″</td>
</tr>
<tr>
<td>USGS Quad Sheet:</td>
<td>348</td>
<td>River/Stream: Bayou D’Arbonne</td>
</tr>
<tr>
<td>Drainage Area (sq. mi.):</td>
<td>1,585</td>
<td></td>
</tr>
<tr>
<td>Average Reservoir Depth (ft):</td>
<td>16</td>
<td>Maximum Depth (ft): 51</td>
</tr>
<tr>
<td>Dam Crest Elevation (ft, MSL):</td>
<td>94</td>
<td>Dam Height (ft): 54</td>
</tr>
<tr>
<td>Spillway Crest Elevation (ft, MSL):</td>
<td>80</td>
<td>Spillway Type: Ungated Spillway</td>
</tr>
<tr>
<td>Reservoir Capacity (ac-ft):</td>
<td>240,000</td>
<td>Spillway Capacity (cfs): 93,500</td>
</tr>
<tr>
<td>Outlet Other Than Spillway (describe):</td>
<td>Four 5′x5′ Sluice Gates</td>
<td></td>
</tr>
<tr>
<td>Method of Emergency Drawdown (describe):</td>
<td>Gated drawdown structure</td>
<td></td>
</tr>
<tr>
<td>Significant Upstream or Downstream Dams (if any):</td>
<td>Lake Claiborne Dam (Upstream) Situated Approximately 33 miles west of Bayou D’Arbonne Dam</td>
<td></td>
</tr>
</tbody>
</table>

---

**APPROVALS:**

Owner (Bayou D’Arbonne Lake Watershed Dist.): Trott Hunt, Chairman

DOTD District Design Engineer: Paul Colquette, P.E.

DOTD District Maintenance: John Kelly

DOTD Dam Safety Engineer: Elnur Musa, P.E.

Local Police Jury: Dan Morgan, Secretary

State Police: Captain Don McDonald, CMDR Troop F

Parish O.E.M.: Brian Halley

---

**PREPARED BY:**

Name (Signature): Daniel J. Aucutt

Name (Typed or Printed): Aquaterra Engineering, LLC

Address: 3499 I-10 Frontage Road.

City, State, Zip Code: Port Allen, LA 70767

License No: LA 25492

Date: June 13, 2005

Phone: (225) 344-6052
Notification Flow Chart

1. Emergency Situation Observed
   - 911
   - Bayou D’Arbonne Lake Watershed District
     Chairman
     Trott Hunt
     O: (318) 255-6825
     H: (318) 251-1079
   - Closest Downstream Resident
   - Union Parish Sheriff’s Office
     (318) 368-3124
   - Additional Union Parish Downstream Residents
   - Union Parish OEM
     Brian Halley
     O: (318) 368-3124
   - DOTD District Maintenance
     John Kelly
     O: (318) 342-0102
   - DOTD District Design Engineer,
     Water Resources and Development
     Paul Colquette, P.E.
     O: (318) 342-0104
   - Louisiana State Police Troop F
     (866) 292-8320
     (318) 345-0000
   - Dam Safety & Water Resources Engineer
     Elmur Maza, P.E.
     O: (225) 674-4321
   - NRCS District Conservationist
     Monroe Service Center
     Terry May
     O: (318) 343-4467 ext 3
   - NRCS District Conservationist
     Farmerville Service Center
     Todd Sewell
     O: (318) 368-8021
   - Ouachita Parish Sheriff’s Office
     (318) 329-1200
   - Ouachita Parish OEM
     Dean Dozier
     O: (318) 322-2649
   - Additional Ouachita Parish Downstream Residents
   - Louisiana State Police Troop F
     (866) 292-8320
     (318) 345-0000
Notification Area Map

✓ Use Existing Tools.
  Database
  DOQQ maps & USGS maps

✓ Assume Water Level at Dam Crest.
✓ Normal Tail Water.
✓ Instantaneous Removal of Dam.
✓ “Worst Case Sunny Day Breach.”
Bayou D’Arbonne Comparison
Full PMF vs. “Worst Case Sunny Day Breach”
Bayou D’Arbonne Comparison

Error increases with distance from source.
Emergency Operations Center

- Maps depict EOC near each Abutment.
- Provide Written Directions.
“When you’re up to your behind in alligators. It’s hard to remember your job was to drain the swamp.”

-Anonymous

Effective documentation . . .

The EAP is designed to be short and to the point. It is a reference document to assist and keep people focused during an emergency situation.
Appendices

Boiler Plate (can be separate volume):

- Glossary
- Emergency Detection
- General Responsibilities Under EAP
- Preparedness
- Training, Exercising, Updating & Posting
- Construction Drawings
- Dam Safety Inspection Reports
Appendix A: Glossary & Definitions

This will serve as an important resource during an emergency when questions are asked or information is needed and you are not sure of the definition of a particular term.
Appendix B: Emergency Detection, Evaluation and Classification

- In terms of training, this is the heart of the document.
- Following this progressive process is critical to a well managed and successful response to an emergency.
- With each condition more people become involved and the response is more complex.
Appendix C: Responsibilities

This appendix defines the responsibilities for the parties that will be involved in the response.

Statute 38 Section 23 makes it clear that the DOTD Chief Engineer is in charge.
Appendix D: Preparedness

- List phone numbers of key individuals.
- Define the location of the emergency staging area (EOC).
- Provide a list of contractors, equipment and materials.
Appendix E: Training, Updating and Posting

Defines the training requirements for the plan.
Appendix F: Drawings and Inspections

Resource information.
The Next Step

- Test the Plan
- Conduct Table Top Exercises
- Create a “Plausible Emergency”
- Start Exercise with a Call to 911....
- Critique the Plan
- Test the Plan
The Next Next Step

- Work on Notification List
  - Local Utilities
  - Town Hall Meetings
- Perform Numerical Breach Analyses