Post-Flooding Dam Assessment in South Carolina

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Historic Flooding Event

• October 1-6, 2015

• 12 - 25 inches of rain in Columbia area

• Confirmed failure of 51 regulated dams
  • 1 - Federal
  • 7 – High Hazard
  • 16 – Sig. Hazard
  • 27 – Low Hazard
Technical Advisement for Dams in South Carolina

Tasks Included:

• Field assessments and rebuild advisement

• General Advisories

• Recommendations to improve collaboration
Collaborative Approach

**SC DHEC**
- Coordination with dam owners
- Data Sources
- Field Inspections
- Regulatory Help

**FEMA**
- Technical Specifications
- Coordination with stakeholders
- Regulatory Help
- Recovery Funding Sources

**Dewberry**
- Data Collection
- Field Inspections
- Critical structure identification
- Dam Rebuild Advisories
- Fact Sheets
Site Inspections

• Two teams deployed with DHEC staff
• Completed the first round of 31 dams and the Columbia Canal in just over one week
• Assess dam status
• Evaluate failure modes
• Maintenance issues
• Document hazards
Fact Sheets, FAQs, and Rebuild Advisories

- Inventory assets within inundation areas
- Assess dam risk and future potential consequences
- Mitigation strategies
- Recovery recommendations
- Guidance for grant applications
- Increase resiliency
Dam Loading - Rainfall
High Hazard Potential Dams
Precipitation Loading
Significant Hazard Potential Dams
Precipitation Loading

[Graph showing precipitation loading for different SC dams, indicating significant hazard potential.]
Low Hazard Potential Dams Precipitation Loading
Breached Dams – Failure Mode

- Overtopping: 62%
- Piping: 13%
- Embankment: 25%
Breached Dams – Crest Type

- Pavement: 38%
- Grass/Soil: 54%
- Dirt Road: 8%
Embankment Failure
Embankment Failure
Piping Failure
Piping Failure – Relief
Piping Failure
Overtopping Failure
Heavy Vegetation
Heavy Vegetation
Heavy Vegetation
Example 1

*Source: Bing Maps

Emergency Spillway

Flow Direction

Spillway

Dam

Post-Flood SC Dams ASFPM Conference 2017
Example 1
Example 1
Example 2

*Source: Weather Channel, DigitalGlobe, Google
Example 2
Example 3

*Source: Bing Maps*
Example 3

*Source: Weather Channel, AP, Google*
Example 3
Example 3

Upstream

Downstream
Example 4

This clogged that
Example 4

Clogged Spillway
Example 5
Example 5
Example 5
Recommendations for Dam Safety Collaboration

• Identify capability gaps and identify best practices to improve stakeholder collaboration

• Organized into categories:
  1) Preparedness Planning
  2) Communication
  3) Emergency Response
  4) Coordinated Recovery
  5) Training for Dam Incidents and Failures
Preparedness Planning & Communication

• Recommendation #3: **Improved succession planning**

• Recommendation #6: **Encourage wider use of Table Top Exercises for EAPs**

• Recommendation #9: **Ensure dam failure is included in state or community Threat and Hazard Identification and Risk Assessment (THIRA)**
Emergency Response & Coordinated Recovery

• Recommendation #15: Improve collaboration with the Civil Air Patrol for Post Disaster Reconnaissance
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Questions

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