



**Federal Energy Regulatory Commission
Division of Dam Safety and Inspections**



**National Hydropower Association
Hydraulic Power Committee
April 28, 2010 Meeting
Washington, DC**

FERC DAM SAFETY PROGRAM



Federal Energy Regulatory Commission Division of Dam Safety and Inspections



FERC Presenters

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FERC UPDATE

- Time Sensitive EAPs
- Risk Management Initiatives
- Lessons Learned in Surveillance and Monitoring
- Engineering Guideline Chapters
- Security
- Workshops and Training
- ODSP
- Other Issues?



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Time Sensitive EAPS

Please discuss and give some insight on where FERC sees the time sensitive EAP process going.



Time Sensitive EAPs

- Ensuring the Effectiveness of EAPs
- Identifying Time Sensitive Notification



Ensuring the Effectiveness of EAPs – Time Sensitive EAPs

- **Time of sunny day dam breach flood wave arrival compared to time for local EMA to notify and evacuate**
- **Focus on Development Immediately below the dam**
- **Does the EAP provide for the timely notification or evacuation if necessary**



Time Sensitive EAPS

Purpose is to get dam owners to compare the amount of time it takes for people to be impacted from a dam failure versus the time to detect, verify, and notify agencies of an emergency, and the agencies to respond.

The goals are to:

1. Raise awareness of "Timing" of emergency response on dam owners and FERC engineers.
2. Identify projects that need enhancements.
3. Monitor progress.



Time Sensitive EAPS

What We Are Finding:

- If there is a large negative Excess Response Time, the dam owner should be able to improve their detection, verification, & notification procedures.
- If Time to Impact is very small (0-15 minutes) – most likely the residents will be aware of failure before dam owner.
 - For these cases, coordinate with EMA to develop public education.
 - Things to Cover:
 - What to do if river is unexpectedly high and rising
 - What to do if get Reverse 911 call or hear siren
 - Who can they call if they have questions



Time Sensitive EAPS

Possible Enhancements Dam Owners are Coming up with...

Detection Time

- Tighten existing HW/TW alarm set points.
- Install new remote monitoring systems.

Verification Time

- Install redundant/independent alarms.
- Install remote access camera systems.
- Verify high flows with National Weather Service.
- Get non-employee that is closer to verify problem (e.g., local police).



Time Sensitive EAPS

Possible Enhancements (cont.)

Notification Time

- Streamline Internal Procedures (Notification Flow Chart).
- Develop Pre-Scripted Messages.
- Use dam-owner controlled Reverse 911 system to notify several agencies at once.

EMA Response Time

- Licensee Agrees to warn people directly.
- EMA uses reverse 911 system to notify residents.
- EMA uses system to send text messages to residents.
- EMA/dam owner use sirens to warn close-in residents.



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Risk Management Initiatives

Please update FERC's progress and comments on risk management initiatives.



Risk Management Initiatives

- FERC Strategic Plan calls for incorporating Risk-Informed Decision-Making by FY 2014.
- Goal for FY 2010 is to develop an action plan to accomplish the goals of the Strategic Plan.
- D2SI plans to utilize a collaborative process in developing Engineering Guidelines for Risk Assessment. This is similar to the process used for development of Chapter 14.



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Risk Management Initiatives (Continued)

- D2SI has been involved with USACE's development of their risk assessment guidance. It is anticipated that FERC's guidelines will be substantially similar to those of Reclamation and USACE so that the dam community has a common methodology for risk assessment.
- D2SI is developing a Screening Level Portfolio Risk Assessment (SLPRA) tool to get an overview of D2SI's risk profile and to act as a risk assessment training tool for D2SI staff.



Risk Assessment Allows You To

- Analyze non-standard failure modes and to assess their affects on life, health and property
- Gain an understanding of the uncertainty and variability in traditional analyses
- Understand the risk associated with a single dam or the FERC's entire inventory of dams
- Evaluate risk reduction alternatives
- A process to better understand and quantify Potential Failure Modes



Benefits of Risk Assessment to D2SI Dam Safety

- **Assess risk of Category 1 and 2 failure modes**
- **Increase focus of inspections (owners, consultants, FERC)**
- **Increase focus of surveillance and monitoring programs**
- **Provide a means to assess the risk reduction achieved by alternative remediation proposals**
- **Provide input to appropriate design loading conditions**



Benefits of Risk Assessment to D2SI Dam Safety

- Identify FERC's highest risk dams
- Help engineers prepare for and conduct inspections
- Identify dams that may require team inspections
- Identify dams that may require special instrumentation inspections
- Identify dams that may need more, or less, frequent inspections
- Provide a tool to allocate resources commensurate with risk



Lessons Learned in Surveillance and Monitoring

Now that the FERC has over two years with the new DSSMPs & SDDMRs, are there any lessons learned on what they like, dislike, etc? Any feedback that could be shared with the HPC would be helpful and appreciated.



Lessons Learned in Surveillance and Monitoring

DSSMPs & SDDMRs (Licensee Perspective):

- The DSSMP has enhanced the dam safety program by developing well written inspection plans/checklists for their operations staff.
- Instrumentation data is being evaluated to determine the performance of the dam.
- Owners have generally been positive with comments about the improved structure and comprehensiveness.



Lessons Learned in Surveillance and Monitoring

DSSMPs & SDDMRs (FERC Perspective):

- The link between surveillance and monitoring and their identified potential failure modes often neglected.
- In many DSSMPs the failure modes are listed, but there is no attempt to link instruments and the visual surveillance at the project to potential failure modes.
- In many cases the findings do not discuss how the DSSMRs relate to the identified potential failure modes.



Lessons Learned in Surveillance and Monitoring

DSSMPs & SDDMRs (FERC Perspective):

- **Requests for extension of time.**
- **Evaluations should be done in real-time, not just near the time needed for submission to FERC**
- **Established dates usually have allowed for ample time to assemble these submissions.**



Lessons Learned in Surveillance and Monitoring

DSSMPs & SDDMRs (FERC Perspective):

- **Threshold & action levels often not tied to any relevant reading other than being outside of the “normal range”. Not necessarily a problem, (ie., weir or drain flow); however, for piezometers it would be better to link the levels to a stability calculation.**
- **Observation of accumulation of sediment in weirs or even on the ground in the vicinity of drain pipes often is not recognized as evidence of possible internal piping which could lead to failure of the dam.**



Lessons Learned in Surveillance and Monitoring

DSSMPs & SDDMRs (on-going effort):

- Working with CEATI to undertake a collaborative effort with U.S. & international dam owners to develop a best practice document on instrumentation.

Document will cover

- Management Responsibility.
- Instrumentation Needs.
- Data Collection.
- Data Analysis.
- Data Management, including taking appropriate action on adverse instrumentation readings.



Lessons Learned in Russian Accident

What additional FERC requirements, if any, are planned as a result of the Russian hydro incident?



Lessons Learned in Russian Accident

- At this time D2SI does not plan additional requirements as a result of the accident at Sayano-Shushenskaya.
- However, the accident highlights the need to take a larger view of what can affect dam safety.
- During inspections D2SI engineers may ask questions regarding operation and maintenance procedures related to water retaining features including penstocks and pipelines.
- We expect owners to be taking appropriate steps to assure safe and reliable operation.



Lessons Learned in Russian Accident

- A powerhouse accident can have dam safety implications.
- We currently have a project that if the powerhouse is inoperative it can not safely pass the 100 year flow.
- This was not a unique accident. In 1992 Manitoba Hydro had a similar failure with a turbine being ejected through a generator due to failure of head cover bolts.
- Loss of station power made the problem worse as there was no power to lower the head gates.
- Lack of a low-level outlet increases the probability of dam overtopping as the drawdown is limited by the sill elevation of the penstock and spillway inlets.
- Powerhouses are not a reliable outlet for passing flood flows.



Engineering Guideline Chapters

What is the status/schedule of proposed new and updated chapters of the FERC Engineering Guidelines such as: Evaluation of Seismic Hazards, Embankment Dams, Water Conveyance, Dam Safety Performance Monitoring, etc.?



Engineering Guideline Chapters

Chapter 4 (Embankment Dams):

- Static Analysis posted on the FERC Website.
- Further revisions to include the state of practice in analyzing dams subject to liquefaction.

Chapter 12 (Water Conveyance):

- Pending internal review.



Engineering Guideline Chapters

Chapter 13 (Evaluation of Seismic Hazards):

- Draft posted on FERC Website.
- Pending final Issuance of draft.

Chapter 14 (Dam Safety Performance Monitoring):

- Draft in preparation that incorporated Chapter 9 (Instrumentation) into Chapter 14.
- Integrates Potential Failure Modes with the DSSMP.



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Security

It is still anticipated that a hydro security plan template will be available for use by licensees before the end of the year?



Security

- Hydro Security Assessment template is being considered. It consists of series of security questions, paired with a FERC Security Checklist filled out by the licensee and accompanying text. Draft is being reviewed by FERC staff (and other licensees), and we hope to make it available in a few weeks.
- Template for Security Plans was created by DHS, using FERC security plan guidelines as reference. FERC staff is reviewing the DHS SP template. If acceptable, we will make it available at same time. Currently available at DHS's HSIN website.
- Hard-copy examples of the drafts are being provided to you.



Workshops and Training

Please summarize what FERC workshops are available and what new ones are anticipated in the future.



Workshops and Training

- EAP Workshop – June 29-30 – Coeur d’Alene, Idaho.
- Security – FERC-specific security training already held on East and West coasts during March 2010.
- Security – National Dam Security Forum at ASDSO Conf. September 21-22 – Seattle, WA (18 presentations).
- Risk – Similar to ODSP training, Risk Training for licensees will be made available in the future (TBD).



Owners Dam Safety Programs (ODSP)

- During our annual Dam Safety Inspection, we will continue our efforts to review your ODSP. This will include a FERC internal assessment as well as discussion with the owner on your program.



(ODSP) What is a Good Dam Safety Program?

- Understand Responsibility.
- Good Communication.
- Clear Designation of Responsibility.
- Sufficient Allocation of Resources.
- Learning Organization.
- Integration of the DSSMP into the ODSP.



Owners Dam Safety Programs (ODSP) What is a Good Dam Safety Program?

- One Size Does Not Fit All
- Program Meets Needs of Inventory
- For Guidance on What FERC Believes Constitutes a Good Dam Safety Program See the Taum Sauk Stipulation and Consent Agreement on the FERC-D2SI Website at:

<http://www.ferc.gov/industries/hydropower/safety/projects/taum-sauk.asp>



Owners Dam Safety Programs (ODSP)

- Discussing Importance of ODSP With Owners
- Met With Owners With Good/Not So Good Programs
- Internal FERC Assessment
- Specific Focus of Last Year's Annual Inspections
- Owners Self Assessment Evaluation Parameters



Other Issues

Has the FERC become aware of any other pressing issues like the time sensitive EAPs and corrosion of post tensioned anchors?



Other Issues

Has the FERC become aware of any other pressing issues like the time sensitive EAPs and corrosion of post tensioned anchors?

- **No, there are no new initiatives.**



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Questions?