

Notes from Pumped Storage Project Meeting November 1-3, 2006

The meeting began with an address by Constantine “Gus” Tjoumas, Director of the FERC’s Division of Dam Safety welcoming the participants and outlining the Goals and Objectives of the meeting. The following areas were listed as discussion points for the meeting:

Instrumentation and Monitoring

Decision Processes

Security

Training

Succession Planning

Research

Communication

Coordination

Controls (added)

A goal of reviewing existing Guidelines and Procedures and identifying areas for improvement with an objective of convening a group to develop a guidance document was established.

Various representatives of pumped storage owners, consultants and FERC made presentations on:

The Taum Sauk Failure

The Taum Sauk Dam Safety Program and Project Operations

Pump Storage Operation and Monitoring

Operation Problems and Solutions from Post Taum Sauk Reviews

Fault Tree Analysis

Training for Project Operators and Succession Planning

Facilitated discussion sessions focused on Identification of Important Operational and Safety Issues and Development of Pump Storage Project Operations Guidelines – Draft Outline.

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Key concepts discussed during the presentations included:

Major accidents are caused by a combination of multiple failures; not a single mistake or failure.

ISO 9001 Quality Management Systems includes 22 components; many of which are applicable to hydro operation.

- Design Control
- Document Control
- Purchasing
- Product Identification and Tracking
- Control of Production
- Inspection and Testing
- Testing Inspection and Measuring Equipment
- Control of Non-Conformance
- Corrective Action
- Preventative Action
- Handling/Storage
- Quality records
- Internal Audits
- Training
- Special Processes
- Facilities Maintenance
- Project Management
- Commitment Tracking
- Emergency Planning
- Chemistry Controls
- Plant Security

There is a need to understand the design basis of a project. Decisions related to design modifications, operation and maintenance should be reviewed against the design basis to ensure they do not affect facility safety

Don't be complacent by having the same people (Part 12D Independent Consultant, other consultants, FERC inspector) looking at the year after year.

Need to consider Instrumentation and Controls in PFMA's

There is great value in having a geologist involved in PFMA's

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None of us is doing inspections as well as we can; there is always room to improve. Don't be complacent – Strive to improve.

Some owners test over pumping protection by actually pumping past limits, others tweak the controls to fool the system into thinking they have over pumped.

Some owners put staff on site if staff gage is not visible on control room screen.

One owner always uses “elevation” 100.00 on staff gage as full level at all reservoirs to eliminate having multiple reservoir elevations at different projects.

Water level instrumentation for operational purposes and the water level system for over-pumping protection perform fundamentally different functions and should not be combined

FERC should establish minimum requirements for over-pumping shutdown.

Fault tree analysis is valuable in considering the impacts of equipment and human performance

FERC's Engineering Guidelines on Dam Safety Performance Monitoring (Chapter 14) will be expanded to include fault tree/event tree analysis.

NRC has a policy on on-site staffing. The USACE NWD has an outline for justifying automation and/or staffing reductions. Value to us?

Need to consider things besides over-pumping upper reservoir. In some cases over generation may jeopardize lower reservoir

Need multi-disciplinary teams

Every hydro is unique

Licensees operate under financial constraints

Manned vs. unmanned operation

Knowledge transfer is important

Succession planning

Don't lose track of why we do things when staff turns over

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Operating Manual

The human element is important

The ability to gain valuable information related to operations and safety is lost when the operator sits in a control room vs. walking around the plant.

Watching the rate of change rather than just absolute value has value.

Should an engineer of record annually verify control/protection systems?

What protocols do licensees have in place when PLCs are changed? (under what circumstances are PLCs changed?)

Is it more appropriate for FERC to assure that licensees have a good, structured, program in place to evaluate the safety implications of changes in systems? What should be the structured program and what should be included in the program?

Is there a fundamental difference between SCADA systems for controls vs. safety systems?

Should FERC put together a team to inspect PSPs?

The discussions related to Identification of Important Operational and Safety Issues included the following:

Human Factors

- Training

- Manned or Unmanned Operation

- Breadth of Responsibility for each Individ – are they stretched

- Decision making responsibilities

- Staffing – what's reasonable?

- Support staff to project

- Response to abnormal data

Organizational Processes

- Decision Processes

- Security

- Training

- Succession Planning

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Communication

 Internal

 External

Coordination

Change Mgmt

Configuration Control

Third Party Evaluations vs Working as a group

Maintaining historic info recording history

Interdisciplinary review of data

Program for design control

Response Time

Cost to implement / cost of failure

Reporting Process on data with conclusions and evaluation

Over Pump Protection/Water Mgmt

Spillway (DS hazard / No DS Hazard / Capacity)

Timing of overtopping

 Capacity of pumps vs. capacity of spillway

Design basis for spillway

Functional testing vs simulation

Functional test period

Performance of dam under overtopping

Failsafe design

Time for Response

Description of alarms, alarm levels

EAP

 Security – sabotage – hacking

 Public Education

Coordination with EMS

Testing

Alarms vs tripping

Equipment

Instrumentation and Monitoring

 Visual

 Instrumentation

 Calibration of levels

 Control Survey

 Visual surveillance

Interrogating data to see if it's real – check vs other data in dbase

Credibility of instruments – do you have what you need? – do you have stuff you don't need

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- Credibility of data
- Controls
 - Measuring rate of change/trends
- System Redundancy
 - Instrumentation
 - Power supply
 - Locale of system operators

Preventative Maintenance aspects

WHAT'S THE DAM SAFETY IMPLICATION OF ABOVE

The discussions related to development of the guidance document focused on what the document should look like and what should be included. Suggested formats for the document included:

- A new chapter in FERC's Engineering Guidelines
- Guidance/best practices
- Philosophical discussion of what's important
- Considerations and principles to be incorporated

Items suggested to be considered in the guidance documents included:

Develop a questionnaire re: various issues (staffing, redundancy, basically capture info from phone calls so it can be shared.

The document should help us from relearning problems from past

The document should be an informational doc that allows sharing of concerns technical, staffing, experience, human factors, etc.

Guidance/best practices – develop Principles and objectives for following:

- Decision process on overtopping protect
- Decision process on over generation
- If needed, guidance on fail safe shut off
- Level monitoring
- Redundancy
- Communication among staff and systems
- Training/retention

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Real time sharing of incidents vs a document that is updated periodically

Concern about FERC helping with staffing and budgeting

Department of Homeland Security dam portal – could establish a partition on it to share info.

Annual workshops to discuss?

Principles and objectives – things to be considered

Need to consider special cases where site conditions warrant

Concern about focusing too much effort in one area

Let PSUG and HPC do their thing and have FERC review?

Is there a doc that describes an effective dam safety program – See AMEREN – get together a group under HPC/PSUG to refine?

Continue discussions

Work with ASDSO/USSD?

Need to find weak links in system and work to make sure that those things are addressed

Owners should take back what they learned here and review their own programs

Should FERC review dam owners' programs to assure they are being operated according to the owners' programs and being followed?

How does FERC assure dam is being operated safely?

Upriver was a warning that may have helped prevent later failure.

Licensing and Compliance put together a best management practices document that later led to changes in licensing. May be a model we want to follow.

We haven't done a good job of sharing best practices. Hydro community may benefit. Suggestion that hydro community may help themselves by taking this opportunity to put together some form of guidance – risk based?

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Put together a doc with things to think about? i.e. Calibration of instrumentation, etc. What do you think about when making changes to plant?

(considerations and principles)

The following organizations and/or people volunteered to assist in draft the guidance document:

AMEREN	Warren Witt
Dominion Generation	Mike Wood
First Energy	
Exelon	
SCG&E	
NYPA	Bob Knowlton
AEP	Bernie R
Southern Company	
Paul Rizzo	
PG&E	
Oglethorpe	Bill Tharp
Duke Energy	Ernie Brockman
NE Generation	
SCE	

FERC will propose dates and a location for the initial meeting of the group.