POTENTIAL FAILURE MODES ANALYSIS (PFMA) AN OWNER'S DAM SAFETY PROGRAM

FERC Dam Safety Conference

Ensuring Dam Safety in the United States

December 5, 2008

Presented by:
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Hydro Engineering Manager

Brief Description of Who We Are

- 4 Dams (3 FERC, 1 State)
- 2,000 MW of Generating Capacity
- Second largest non-Federal hydroelectric producer in the U.S.

Brief Description of Who We Are

- 50-year Habitat Conservation Plans
- All environmental goals are met without reducing dam safety
- All dam safety goals are met in an environmentally responsible manner

Potential Failure Modes Analysis (PFMA)

18 CFR Part 12D Dam Inspection

- Description and What's Different
- Look for General Groups of Causal Factors
- Consider Dam Characteristics
- Assess and Systematically Reduce Risk

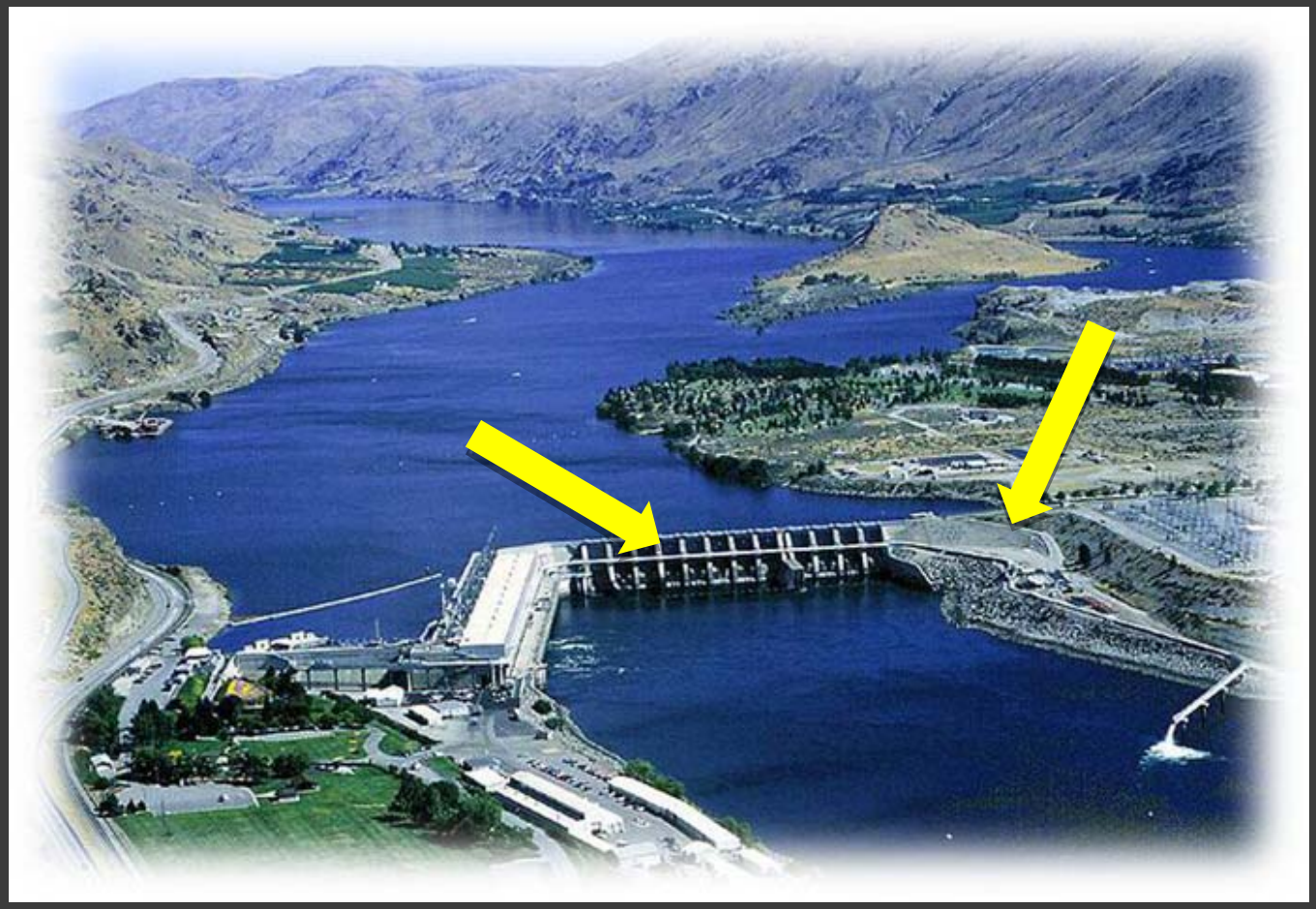
PFMA: Why?

"Monitoring of every dam is mandatory because dams change with age and may develop defects. There is no substitute for systematic and intelligent surveillance." Dr. Ralph Peck ICOLD Conference Sept 2000

Regional Causal Factors

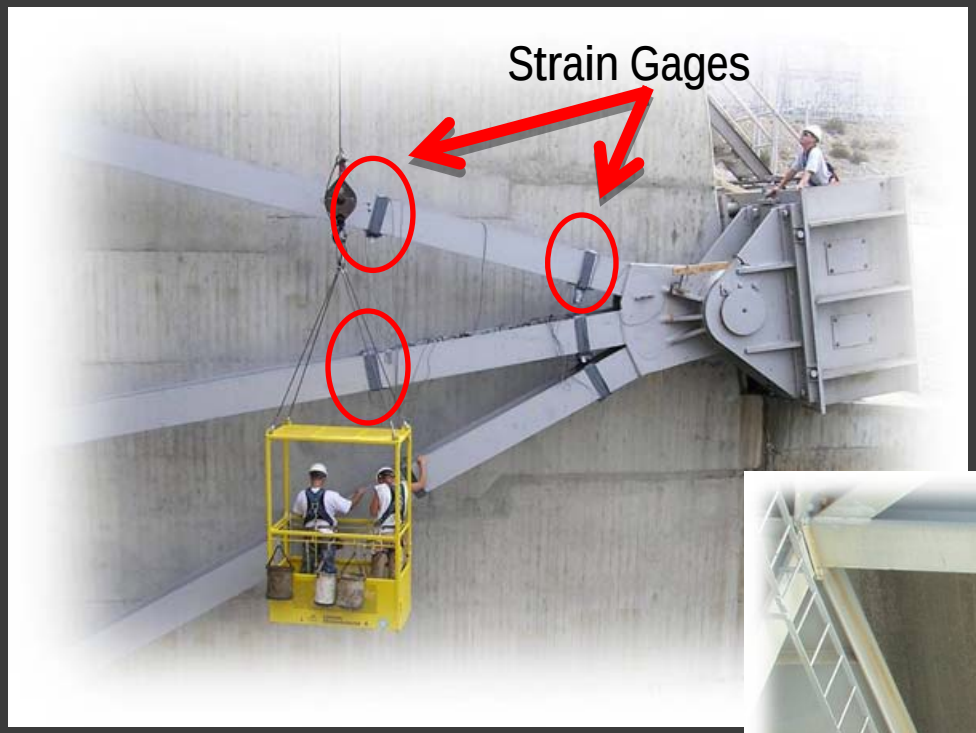
- Large basin with seismic, flooding, security, and environmental issues
- No excuses – safely pass floods, safely withstand earthquakes, robust security plans

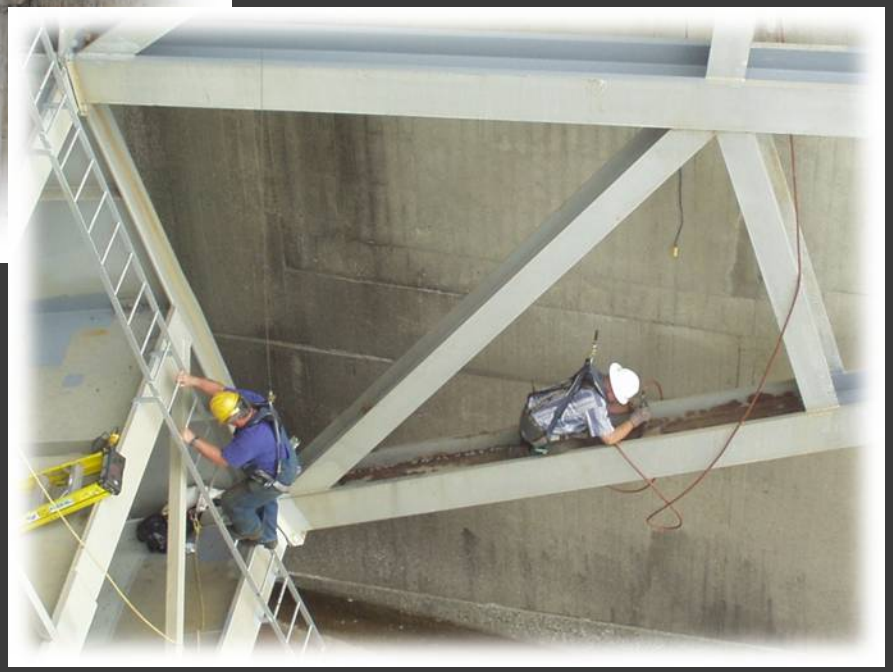
PFMA: Consider Unique Dam Characteristics



Dam Specific Causal Factors

- Aging mechanical systems
- Operational mistake
- Lack of succession planning



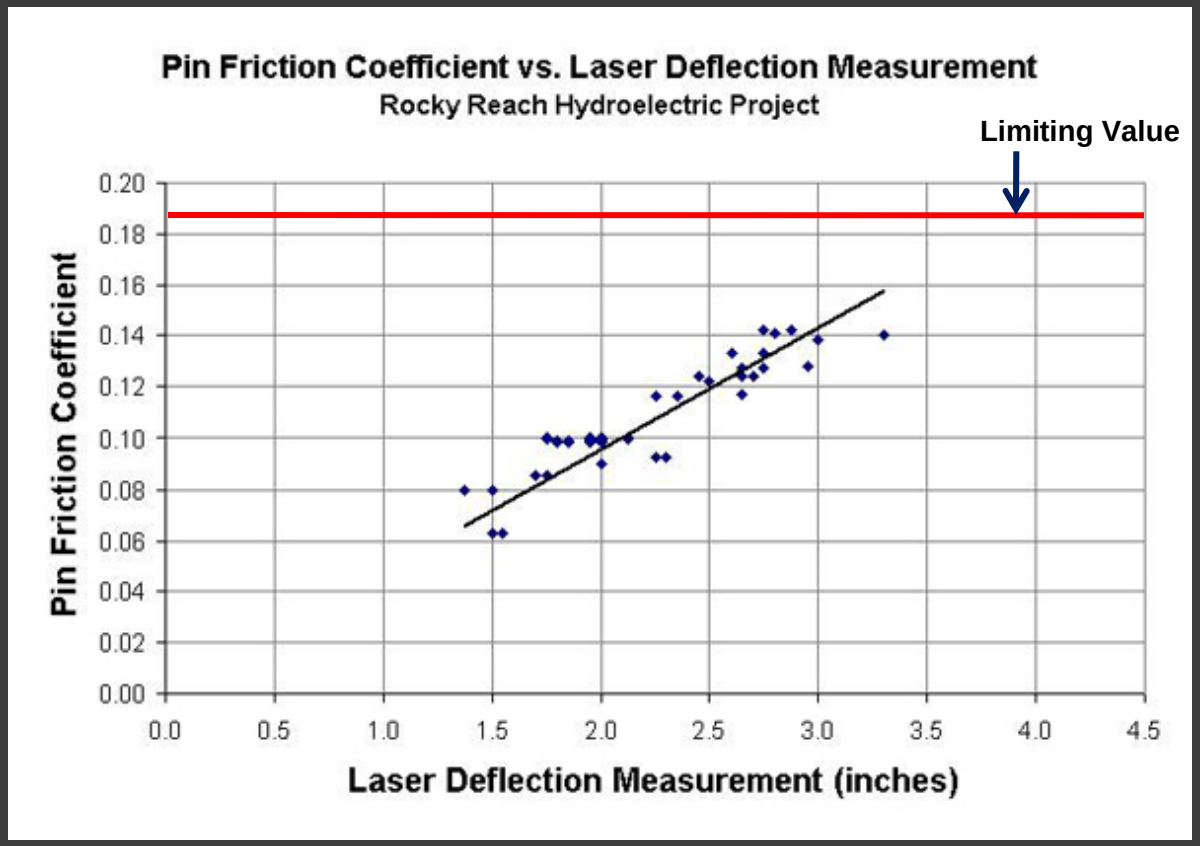


Incorporating PFMs For Risk Reduction

Surveillance and Monitoring Program

Incorporating PFMs

Correlation Between Gate Deflection and Bushing Performance



[1]Pin friction coefficient determined from strain gage testing and computer modeling.

Corporate Prioritization Process

Priority 1: Projects that must be expedited to:

- Comply with safety, environmental or FERC regulations;
- Avoid loss of life or property;
- Avoid loss of production, distribution, water supply, communications or network capability

Priority 2: Projects that:

- Provide a significant, positive impact on the reliability of services

Priority 3: Projects that:

- Provide a positive impact on the cost of power;
- Preserve essential equipment

Priority 4: Projects that:

- Enhance functionality;
- Have value or benefits that can't be quantified;
- Have a low return on investment

Northwest Hydro Operators Regional Forum

Management Issues

Forum location:
Puget Sound Energy
Auditorium
10885 NE 4th Street
Bellevue WA 98009-9734
425-462-3063
Contact: Ruth Carleton

Attire: Business casual

Date/Time:
September 21-22, 2006
Thursday 9:00am – 5:30pm
Friday 7:30am – 2:00pm

To register complete the attached registration form and return to:
Ruth Carleton
ruth.carleton@pse.com
Fax: 425-462-3223
Office: 425-462-3063

Prior registration is encouraged.

TO REGISTER
double click on paperclip

September
21-22, 2006
Bellevue, WA

Don't miss the Snoqualmie Falls Plant Tour - Fri, Sept 22, 12:00 (Noon)

Hydroelectric project and regulatory executive and management staff are invited to attend and participate in a round-table format designed to continue the "Management Issues" track of the successful and well attended Northwest Dam Safety Regional Forum held during February 2006.

This two-day Forum will continue to build on collaborative knowledge sharing and issue-exploration initiatives important to executive decision-making and strategic planning associated with hydroelectric projects within the Pacific Northwest. We will share valuable knowledge related to project management, explore emerging issues critical to our industry, and conclude with collaborative approaches for moving forward, opportunities for continued networking, and strategize next steps.

Management Issues	*Agenda Topics*
	• Security and Incident Command • New NERC/ERO Standards • Compliance Issues • Workforce Development • Asset Management

Participants: Federal Energy Regulatory Commission Office of Dam Safety, Army Corps of Engineers, Bureau of Reclamation, Northwest Public and Private Utilities

Collaborating with Others

- FERC
- US Bureau of Reclamation
- US Army Corps of Engineers
- Chelan County PUD
- Washington State Patrol
- Douglas County PUD
- Grant County PUD
- FEMA
- Chelan County Sheriff
- Avista Utilities
- Seattle City Light
- Bonneville Power Administration

Summary

Potential Failure Modes Analysis

- Focus attention on the potential failure modes for any specific/unique dam
- Design the Surveillance and Monitoring Plan to address the specific PFMs
- Develop risk reduction measures to reduce the potential for failure
- Use major findings and understanding from the PFMA to help guide future annual, daily, and Part-12 inspections

Summary

Owner's Dam Safety Program

- Dam Safety is Appropriately the Responsibility of the Dam Owner
- Understanding of PFMs and Surveillance/Monitoring
- Qualified Staff
- Corporate Commitment for Dam Safety
- Clear Understanding and Respect for Regulatory Dam Safety Requirements

Contact

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