Tacoma Power’s Dam Safety Program

Toby Brewer
Chief Dam Safety Engineer

Public Utility Board Study Session
Dec. 12, 2018
Agenda

• Tacoma Power’s Hydroelectric Projects
• Hydropower Benefits and Risks
• Regulatory Authority
• Owners Dam Safety Program Components
• Recent and Future Projects
• Team
• Questions

Safety is our top priority
Our Hydroelectric Projects
Hydropower Benefits

Clean, renewable electricity

Fishing

Wildlife lands protection

Recreation

Habitat restoration

49% of Customer Load
Hydropower Risks

- Human lives
- Property loss
- Economic
- Environmental
Hydropower Risks

Oroville Spillway, February 2017
Regulatory Authority

Federal Power Act - Code of Federal Regulations

- Volume 18, Part 12 contains dam safety regulations
- Owners have a legal obligation to ensure the safety of their dams
- Regulations are a Minimum
- Dam Safety is a cooperative effort between licensees, consultants and the Federal Energy Regulatory Commission (FERC), but...

“Licensee shall be liable for all damages occasioned to the property of others by the construction, maintenance or operation of the project works…”
Licensee must ensure its Dam Safety Program is **acknowledged and supported** throughout the organization.
Owners Dam Safety Program (ODSP) Components

**DAM SAFETY**

**PEOPLE**
- Chief Dam Safety Engineer and alternate
- Public Utility Board Management
- Project staff

**PLANS**
- Emergency Action Plans
- Security Plans
- Dam Safety Surveillance Monitoring Plans
- Public Safety Plans

**STUDIES**
- Probable Maximum Flood Studies (PMF)
- Dam Break Studies
- Stress and Stability Studies
- Geology and Geography Studies

**DRAWINGS**
- Exhibit Drawings
- Project Drawings
- Inundation Maps

**INSPECTIONS AND AUDITS**
- Internal Inspections
- Annual FERC Inspections
- Part 12D Independent Consultant Inspections
- ODSP External Audits

**DOCUMENTS**
- Potential Failure Mode Analyses (PFMA)
- Dam Safety Surveillance Monitoring Reports
Program Components

**PEOPLE**
- Chief Dam Safety Engineer and alternate
- Public Utility Board Management
- Project staff

**DAM SAFETY**
Program Components - People

- Chief Dam Safety Engineer with direct access to senior management
- Ensure program support by Public Utility Board, management and Project staff
- Ensure technical competence of responsible personnel (Training)
- Ensure all Risks are Assessed and Mitigated as Required by Laws and Ethics
Program Components

PLANS

- Emergency Action Plans
- Security Plans
- Dam Safety Surveillance
- Monitoring Plans
- Public Safety Plans
Program Components - Plans

Emergency Action Plans

- Tailored for each Project
- Distributed to 45 external Emergency Management Agencies
- Updated annually (minimum)

- Full reprint every five years
- Annual training and exercises/drills
- Table Top and Functional Exercises - rotate through Projects every five years
Program Components - Plans

Notification Flowcharts
Program Components - Plans

Security Plans

• Tailored for each Project
• Flexible – allows for change depending on national or regional threats

• Includes option to close or restrict each Project’s recreational facilities and roads
• Includes cybersecurity
• Reviewed annually by FERC
Program Components - Plans

Dam Safety Surveillance Monitoring Plans

- Publish plan annually for each Project
- Tailored to the Potential Failure Modes (PFMs)
Program Components

DAM SAFETY

DOCUMENTS

Potential Failure Mode Analysis (PFMA)

Dam Safety Surveillance Monitoring Reports
Program Components – Documents

Potential Failure Mode Analysis (PFMA)

• Joint sessions between Dam Safety engineering team, consultants and FERC for each Project
• Develop and maintain Supporting Technical Information Documents

• PFMA sessions conducted every five years as part of Part 12D inspections
• Full update done about every 15 years
• Updates required when conditions change
Program Components

DAM SAFETY

INSPECTIONS AND AUDITS

- Internal Inspections
- Annual FERC Inspections
- Part 12D Independent Consultant Inspections and Reports
- ODSP External Audits
Program Components – Inspections and Audits

• Conduct dam safety, security and public safety inspections (daily, weekly, monthly, annually)
• Conduct joint annual inspection of Projects with FERC

• Submit Part 12D Independent Consultant Inspections and Reports for FERC approval every five years
• Owners Dam Safety Program external audits
Program Components

STUDIES

- Stress and Stability Studies
- Seismic Studies
- Probable Maximum Flood Studies (PMF)
- Dam Break Studies

DAM SAFETY
Program Components

DRAWINGS
Exhibit Drawings
Project Drawings
Inundation Maps

DAM SAFETY
Program Components – Drawings

Inundation Maps

- Cities and counties
- Arrival time of leading edge
- Peak of flood wave
- Maximum rise from normal water surface

 Shows Worst Case
Recent Dam Safety Projects

2006: Alder Dam post tensioning
Recent Dam Safety Projects

2011: Cushman Dam No. 1 spillway core wall
Future Dam Safety Projects

Seismic resilience - Mossyrock Dam spillway system

• After reviewing updated earthquake information from the USGS, we lowered Riffe Lake in 2017 by about 30 feet.

• Because public safety is our top priority, we will keep the lake lowered at least well into the next decade.

• The structural integrity of the dam has not changed; only the Spillway.

• No major concrete arch dam is known to have failed due to an earthquake.
Future Dam Safety Projects
Seismic resilience - Mossyrock Dam spillway system

- Our concern lies with the spillway system
- Four gates are held in place by five piers
- During a large earthquake the piers could break, causing an uncontrolled water release
Future Dam Safety Projects

Mayfield Dam tendons

Penstock slope – seismic loading        Spillway structure – flood loading
Future Dam Safety Projects
Barrier Dam apron scour repairs
# Dam Safety Program Team

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<tr>
<th>NAME</th>
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<tr>
<td>Woodrow Jones</td>
<td>Public Utility Board</td>
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<td>Karen Larkin</td>
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<td>Bryan Flint</td>
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<td>Mark Patterson</td>
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<td>Christine Cooley</td>
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<td>Jackie Flowers</td>
<td>Director of Utilities</td>
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<td>Chris Robinson</td>
<td>Power Superintendent</td>
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<td>Chris Mattson</td>
<td>Generation Manager</td>
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<td>Terry Ryan</td>
<td>Assistant Generation Manager</td>
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<td>Toby Brewer</td>
<td>Chief Dam Safety Engineer</td>
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<td>Sharon Roach</td>
<td>Assistant Dam Safety Engineer</td>
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<td>Jon Sigafoos</td>
<td>FERC Coordinator and Instrumentation Analysis</td>
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<td>Jayson Lelli</td>
<td>EAP Coordinator</td>
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<td>All Staff</td>
<td>Hydro Projects</td>
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Licensee must ensure its Dam Safety Program is acknowledged and supported throughout the organization.
Special Project of Limited Duration

Tacoma Public Utilities

Public Utility Board Study Session
• Presentation Agenda
  • Resource Strategy Overview
  • Workforce Connect Project Designation
  • 19/20 Project Portfolio Designation
  • AMI Program Designation
  • Review, Q&A and Comments
  • Appendix
    • Resource Benchmarks

• Presentation Objectives
  • Provide overview on Resource Strategy
  • Provide overview on Special Projects of Limited Duration requests
• Resource Strategy
  • Staff augmentation via bench contracts
    • Existing bench contracts
    • Short-term resourcing demands
  • Permanent FTE staff
    • Long-term resource demands
  • Project FTEs, via Special Projects of Limited Duration
    • Allows flexibility for non-permanent resourcing demands for longer duration initiatives
    • Reduces resource costs by creating temporary project FTE positions

• Resource Planning
  • During capital planning and budgeting, UTS met with all impacted divisions identified as project participants
  • Outcome: Detailed resource plan with agreed upon mitigations for resource constraints, which included identified Project FTEs
• Workforce Connect (WFC) Request
  • Project overview
    • Replaces existing field mobile system (MDSI)
    • 200+ field users receive work wirelessly, project expands user base to ~500
    • Project completes end of 2020, ~24 months duration
  • 1 Senior Project Manager (Tacoma Power)
  • 1 Project Lead (Tacoma Power)
  • 1 Test Manager (Tacoma Power)
  • 1 Office Assistant (Tacoma Power)
  • 1 Management Analyst (Tacoma Water)
  • 1 Field Technician (Customer Services)
2019/20 PORTFOLIO DESIGNATION

- 2019/2020 Portfolio Request
  - Portfolio/Project overview
    - Multiple projects impacted
      - Network and Security Operations Center
        Proactive monitoring of critical TPU technology assets, network and cybersecurity.
      - Other key technology initiatives;
        - TPU TV Tacoma Upgrade
          Moves TPU’s TV Tacoma broadcast to High Definition and rebuild of control room.
        - TPU Conference Room Technology Upgrades
      - Analytics, Networking, Telecomm, GIS
  - 1 Telecomm Engineer (Tacoma Power)
  - 1 Project Lead (Tacoma Power)
  - 1 Management Analyst I (Tacoma Power)
  - 1 Management Analyst II (Tacoma Power)
Advanced Metering Infrastructure (AMI) Program Request

Program overview
- Special Project of Limited Duration, previously approved to support planning and procurement phase in 2018
- New resolution with project resources needed to support systems integration and deployment phase through end of 2021

AMI Resource Demand

- 10 Meter Readers (Customer Service)
- 5 Management Analysts I (Cust. Svc, Power)
- 1 Engineering Sr. Principal (Power)
- 1 RF/Communications Engineer (Power)
- 1 Systems/MDMS Lead (Power)
- 2 Management Analysts III (Water)
- 2 Service Workers (Water)
- 2 Utility Workers (Water)
- 1 Meter Repair (Water)
- 1 Lead Meter Tech (Power)
• **Strategy and Requests Review**
  • Project FTEs, key component of Resource Strategy
  • Detailed resource planning conducted across portfolio, projects and programs

• Workforce Connect (WFC), Special Project of Limited Duration Designation
  • Mobile replacement, 6 Project FTEs

• 2019/2020 Technology Portfolio, Special Project of Limited Duration Designation
  • Multiple projects, 5 Project FTEs

• Advanced Meter Infrastructure (AMI), Special Project of Limited Duration Designation

• Q&A, Comments
• Benchmarking % of FTEs to Contractors
  • Gartner Research Firm; Utilities shows a 74-26% ratio
  • TPU UTS currently maintains ~ 91% FTE ratio, with 9% staff augmentation
  • FTE ratio includes both Internal and Project FTE headcount

• Demand Accumulation
  • Depicts resource demand, accumulative hours – by resource type (FTE Internal Resources, Project FTE and Contractors)
  • Resource demand %
    • Internal Resource Labor, approximately 50%
    • Project FTE/ Backfill, approximately 40%
    • Contractor, approximately 10%