

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



49% of Customer Load

Fishing



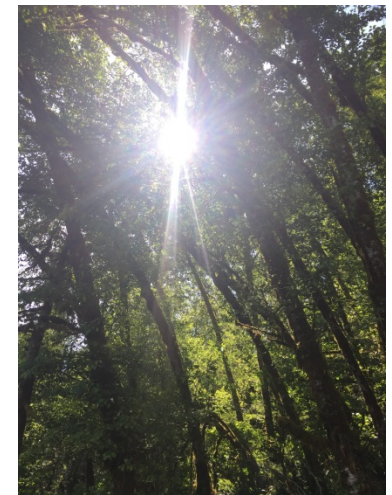
Recreation



Wildlife lands protection



Habitat restoration



Hydropower Risks

- Human lives
- Property loss
- Economic
- Environmental



Hydropower Risks

Oroville Spillway, February 2017



Regulatory Authority

Federal Power Act - Code of Federal Regulations

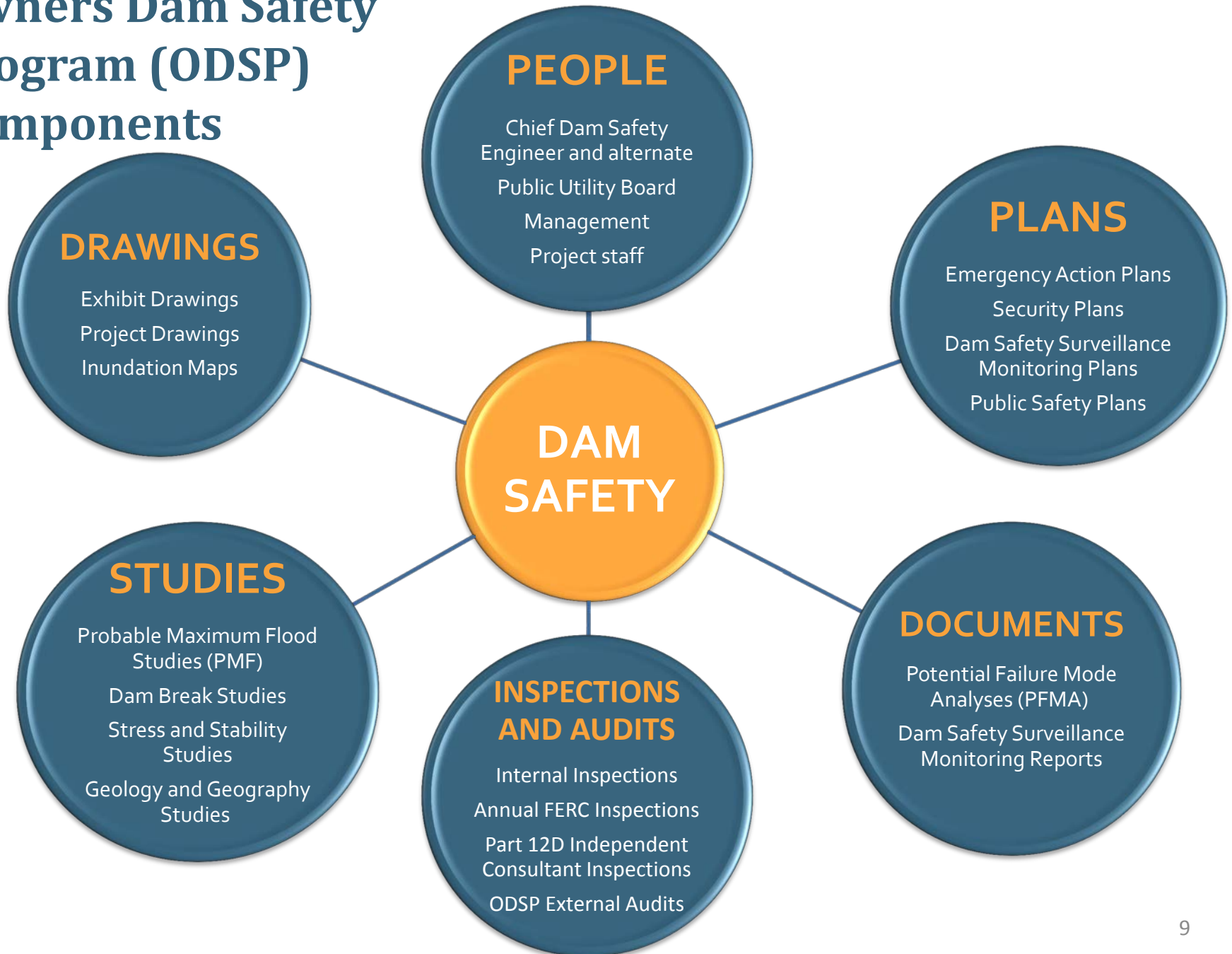
- Volume 18, Part 12 contains dam safety regulations
- Owners have a legal obligation to ensure the safety of their dams
- Regulations are a Minimum
- Dam Safety is a cooperative effort between licensees, consultants and the Federal Energy Regulatory Commission (FERC), but...

"Licensee shall be liable for all damages occasioned to the property of others by the construction, maintenance or operation of the project works..."

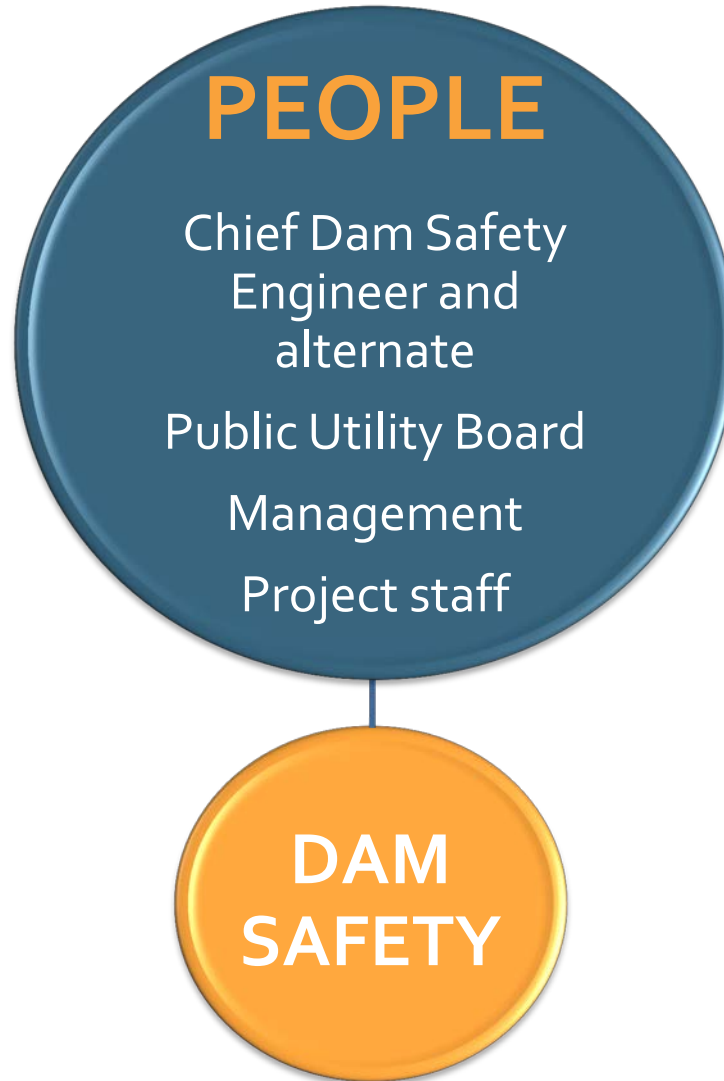
Regulatory Authority

Licensee must ensure its Dam Safety Program is *acknowledged and supported* throughout the organization.

Owners Dam Safety Program (ODSP) Components



Program Components



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



Program Components - Plans

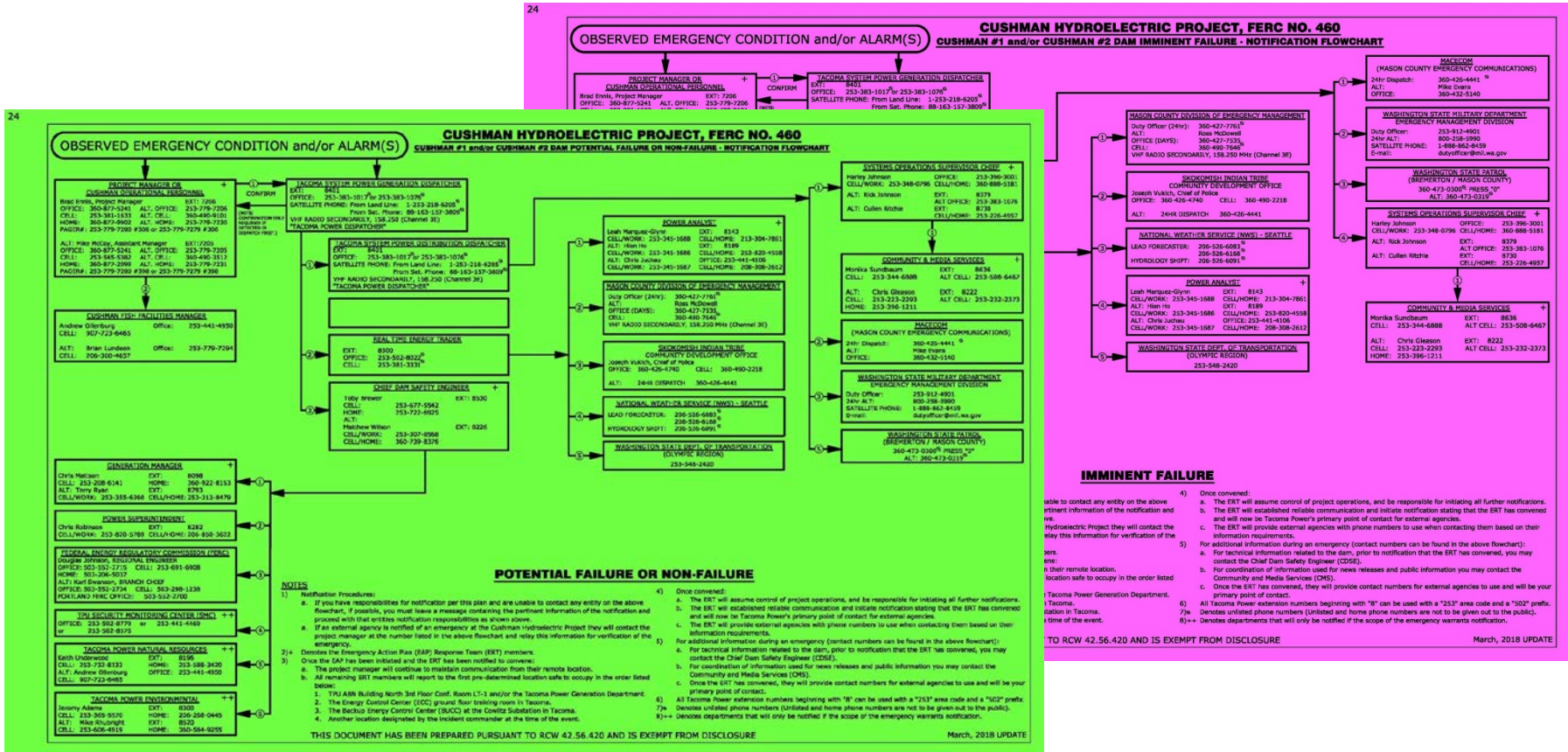
Emergency Action Plans

- 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



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

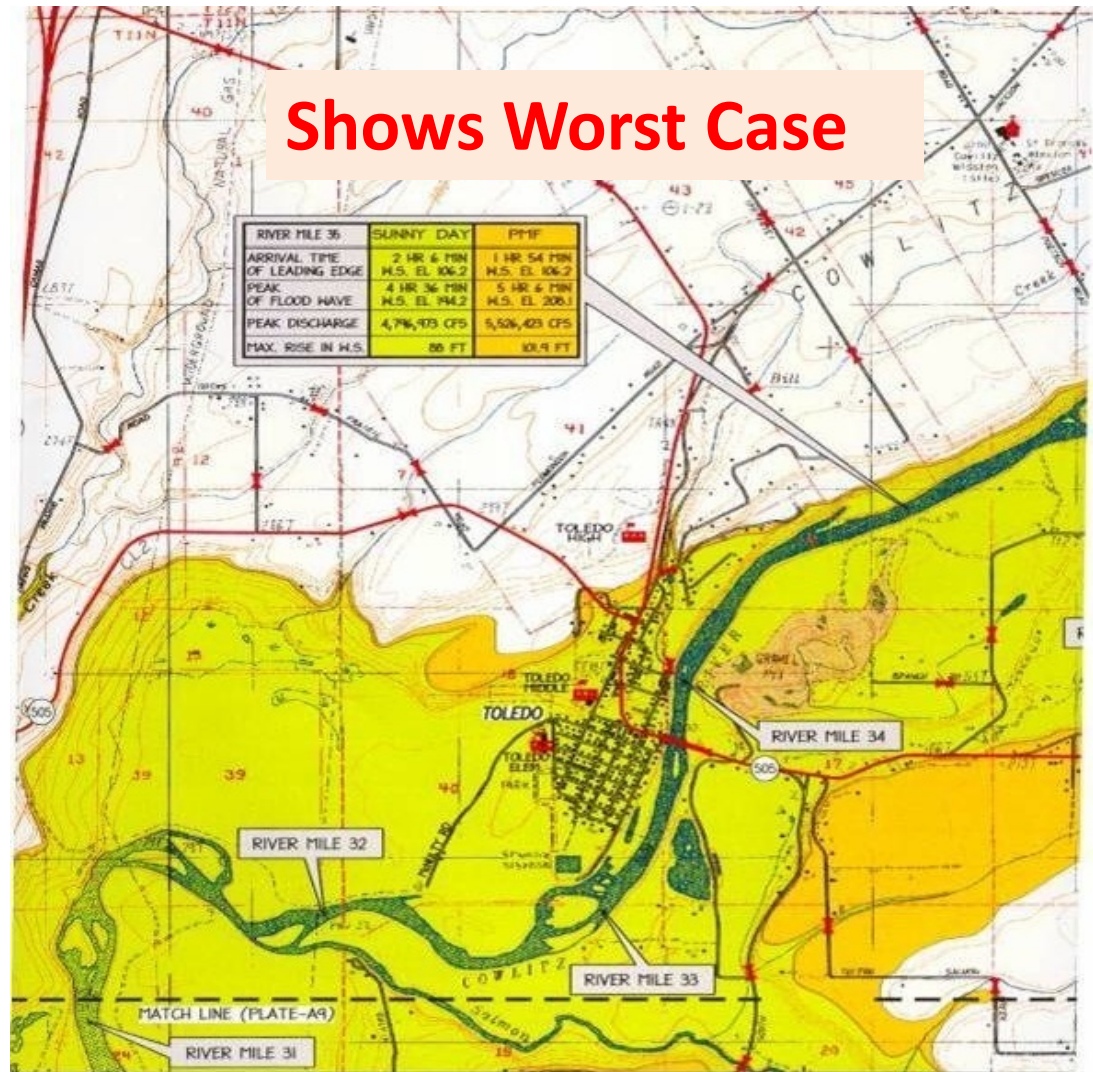
Inundation Maps

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



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

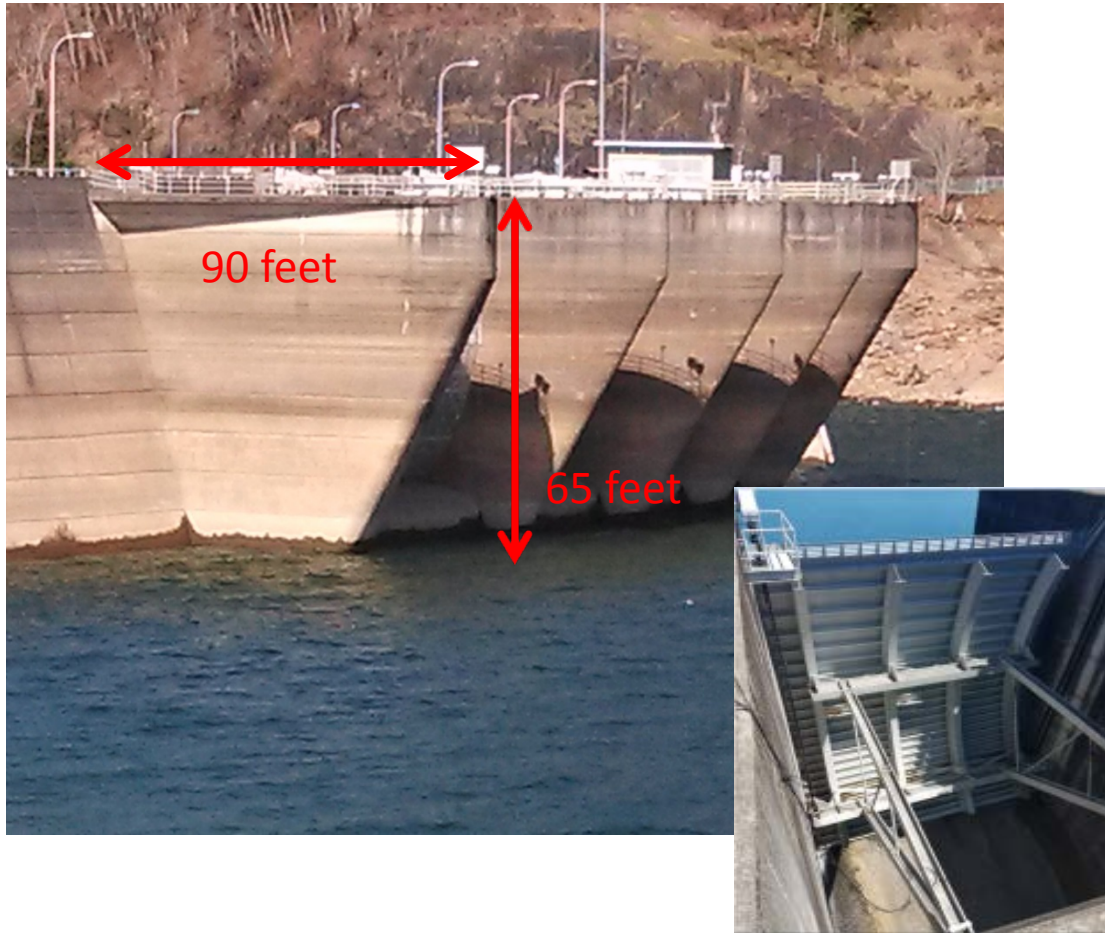
Seismic resilience - Mossyrock Dam spillway system



- 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

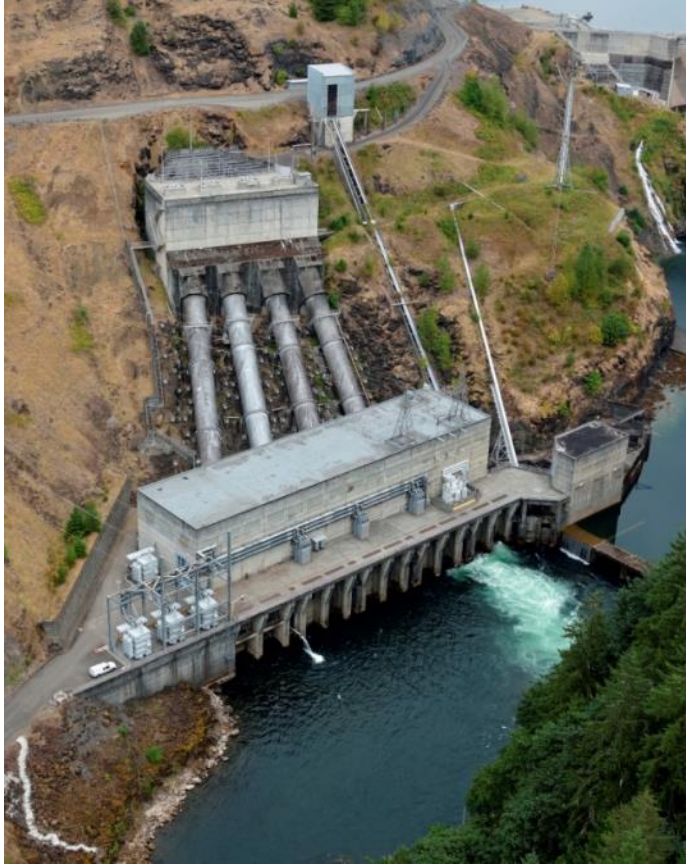


- Our concern lies with the spillway system
- Four gates are held in place by five piers
- During a large earthquake the piers could break, causing an uncontrolled water release

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

NAME	ROLE
Woodrow Jones Karen Larkin Bryan Flint Mark Patterson Christine Cooley	Public Utility Board
Jackie Flowers	Director of Utilities
Chris Robinson	Power Superintendent
Chris Mattson	Generation Manager
Terry Ryan	Assistant Generation Manager
Toby Brewer	Chief Dam Safety Engineer
Sharon Roach	Assistant Dam Safety Engineer
Jon Sigafoos	FERC Coordinator and Instrumentation Analysis
Jayson Lelli	EAP Coordinator
All Staff	Hydro Projects

Dam Safety Program

Licensee must ensure its Dam Safety Program is *acknowledged and supported* throughout the organization.

Questions?





Special Project of Limited Duration

Tacoma Public Utilities

Public Utility Board Study Session



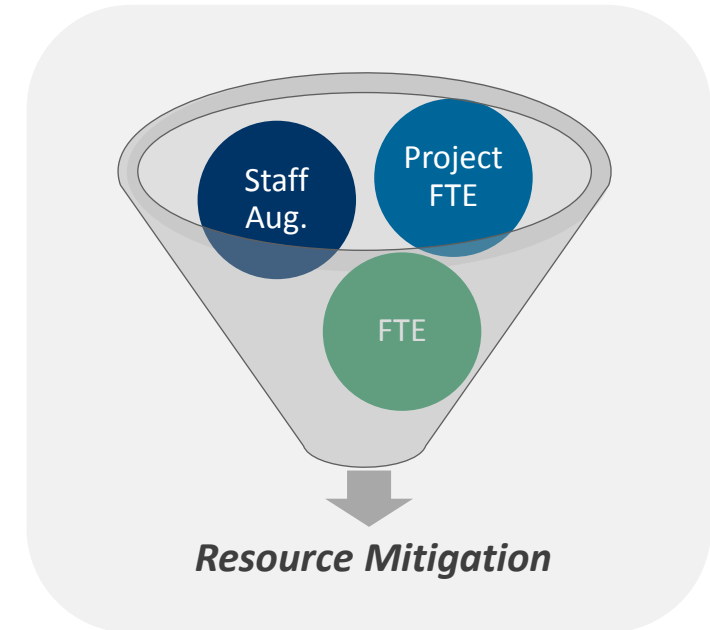
AGENDA & OBJECTIVES

- 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

- 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

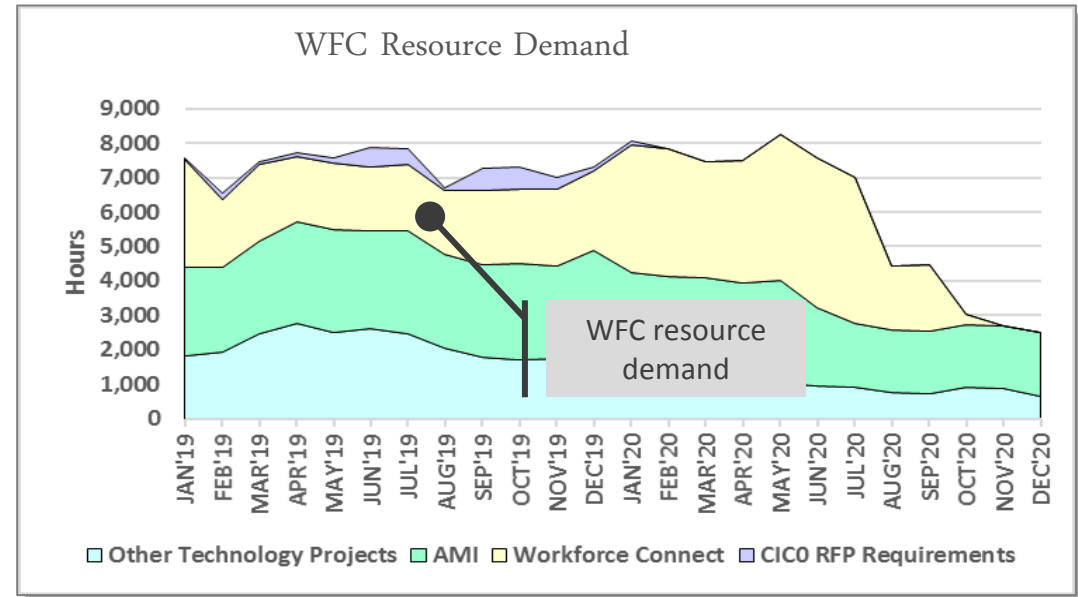
WORKFORCE CONNECT DESIGNATION

• 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)



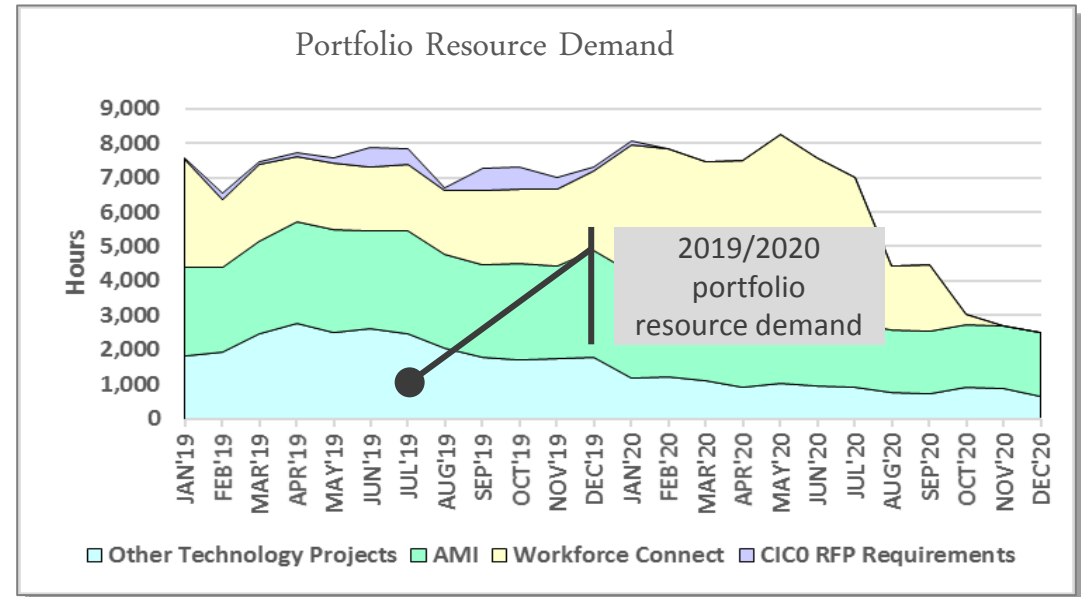
2019/20 PORTFOLIO DESIGNATION

- 2019/2020 Portfolio Request

- Portfolio/Project overview

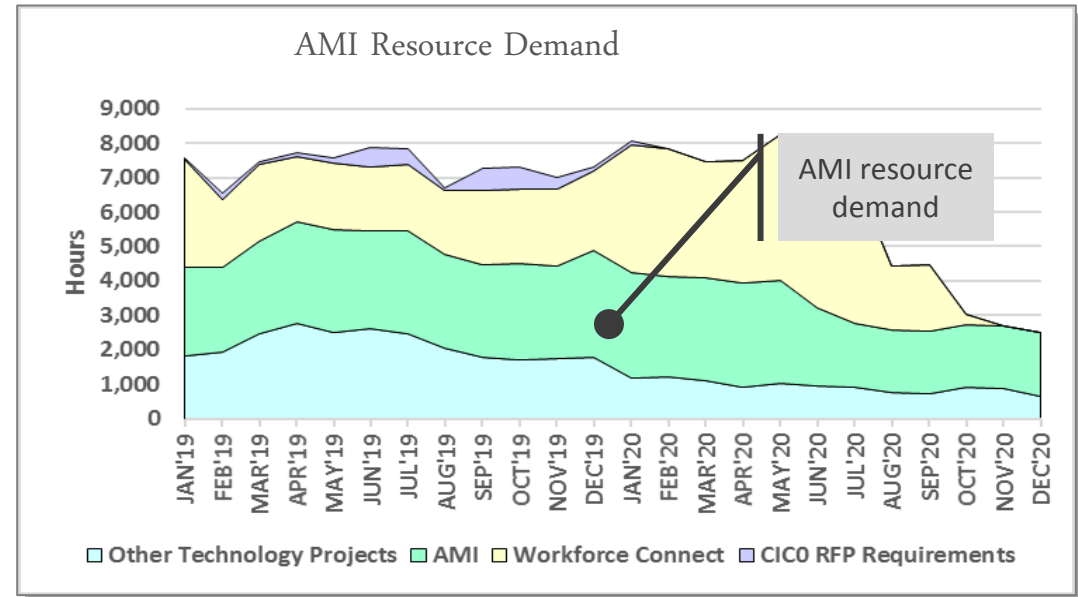
- Multiple projects impacted
 - Network and Security Operations Center
 - *Proactive monitoring of critical TPU technology assets, network and cybersecurity.*
 - Other key technology initiatives;
 - TPU TV Tacoma Upgrade
 - *Moves TPU's TV Tacoma broadcast to High Definition and rebuild of control room.*
 - 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)



AMI PROGRAM DESIGNATION

- 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



- | | | |
|--|-------------------------------------|-----------------------------|
| • 10 Meter Readers (Customer Service) | • 1 Systems/MDMS Lead (Power) | • 1 Meter Repair (Water) |
| • 5 Management Analysts I (Cust. Svc, Power) | • 2 Management Analysts III (Water) | • 1 Lead Meter Tech (Power) |
| • 1 Engineering Sr. Principal (Power) | • 2 Service Workers (Water) | |
| • 1 RF/Communications Engineer (Power) | • 2 Utility Workers (Water) | |

REVIEW, Q&A

- 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



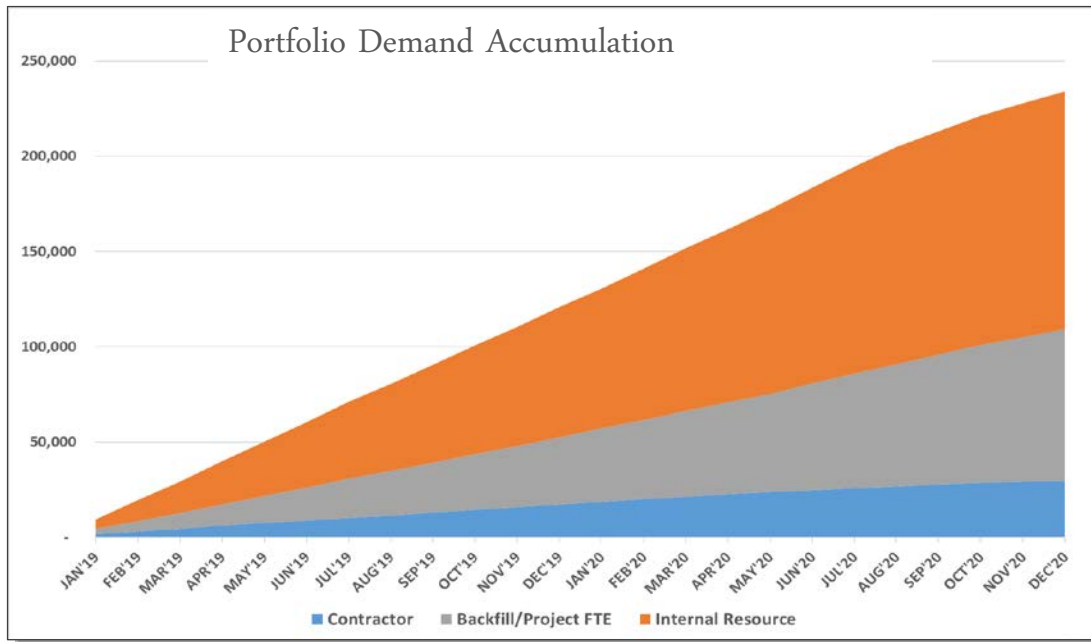
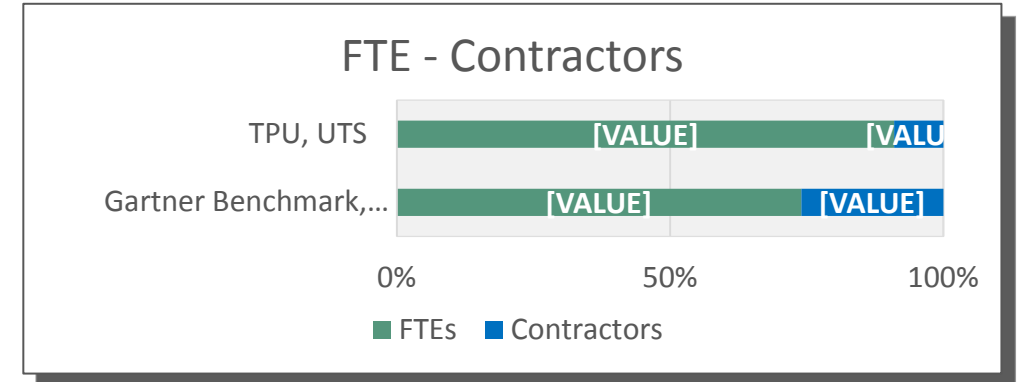
APPENDIX: RESOURCE BENCHMARKS



Source: Gartner IT Key Metrics Data (Dec. 2017)

• 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%