Electric Risk & Compliance Committee Meeting

May 5, 2022

SAFETY MOMENT: REMOTE WORKPLACE

- ❑ Earthquake: Know the safest places to duck, cover, and hold, such as under sturdy desks and tables

- ❑ **Fire**: Know your exits, escape routes, and evacuation plan. If safe to do so, use your compliant fire extinguisher. Exit the house, and call 911

- ❑ **Active Shooter**: Get out, hide out, take out, and call 911

- ❑ **Medical Emergency:** Know who can perform first aid/CPR. Call 911 if you're alone or share your location with the leader of the call. If you have an AED, ensure you and others in your household know where it's located and how to use it.

- ❑ **Psychological Safety**:
  - ❑ We care for each other
  - ❑ We look out for one another
  - ❑ We create a safe space for all
  - ❑ We welcome new ideas from everyone
  - ❑ We practice self-care

- ❑ **Ergonomics**:
  - ❑ Practice ***30/30*** (every 30 minutes, move/stretch for 30 seconds)
  - ❑ Ensure proper ergonomics
  - ❑ Use and update RSI Guard

- ❑ **Emergency Planning**:
  - ❑ Update emergency contacts via *PG&E@Work for Me*
  - ❑ Create/update a personal emergency preparedness plan

- ❑ **Resources:**
  - ❑ Nurse Care Line: 888-449-7787; Power Gen/Fresno/San Carlos Service Centers 877-888-8656
  - ❑ Employee Assistance Program (EAP): Reach Out. Get Help. Feel Better. 888-445-4436
  - ❑ Speak Up Now page
  - ❑ Current COVID-19 information

On the road, off the phone.

Ground Rules

- Assume and have positive intent
- Act with genuine humility
- Think big
- Have each other's back
- Have fun!
- Listen for understanding
- Seek alternative perspectives
- Explore unintended consequences
- It's okay to say "I don't know"
- Have direct conversations to foster healthy relationships
- Demonstrate support for others in the room
- Encourage and provide space for everyone to participate
- Say what you're thinking in the room
- Own decisions and outcomes
- Accept and learn from mistakes
- At the start of meetings clarify desired outcomes and make the decision-making process overt
- At the close of meetings review MOLOSA and action items
- Respect each other

Speak Up, Listen Up, Follow Up!

AGENDA

Date/Time:	**May 5, 2022 @ 1:05 pm – 3:55 pm**	**Committee Chair:**	**Joe Bentley**
Meeting Location:	Microsoft Teams Meeting	**Facilitator:**	[redacted]
Attendees:	**Required** – Joe Bentley, Wade Smith, Christine Cowsert, [redacted], Ahmad Ababneh, Jeff Deal, [redacted]. **Presenters** – [redacted]. **Standing Invitees** – Sumeet Singh, Mark Quinlan, Stephen Cairns, [redacted], Alex Vallejo, [redacted] **Guests** – [redacted]	**Recorder:** **Timekeeper:**	[redacted] [redacted]
Subject:	Electric Risk and Compliance Committee Meeting		
Purpose:	Review, approve, and provide feedback on Electric Risk and Compliance items brought to the Committee		

#	Agenda Item	Inform/Decide	Presenter(s)	Duration	Start Time	End Time
1	Safety	Inform	[redacted]	5	1:05	1:10
2	Action Items Review	Inform	[redacted]	10	1:10	1:20
3	Transmission Underground Risk Deep Dive	Inform	[redacted]	60	1:20	2:20
4	Owners Dam Safety Program Audit	Inform	[redacted]	15	2:20	2:35
5	Break	-	-	10	2:35	2:45
6	[F02] Substation Infrared Inspections	Decide	[redacted]	20	2:45	3:05
7	[F02] Substation Supplemental Inspections	Decide	[redacted]	20	3:05	3:25
8	[F02] Substation Preventative Maintenance	Decide	[redacted]	20	3:25	3:45
9	Pre-Read Questions, Review Action Items, & MOLOSA	-	All	10	3:45	3:55

Inform ☑ Decision ☐

Action Items

[redacted], Sr. Manager, Risk Management & Safety

Desired Outcome: To record, track, and update the Risk and Compliance Committee members on topics and actions previously and requested follow-on actions as needed.

ACTION ITEM TRACKER

#	Owner	Accountable Officer	Action Item	Assigned	Target Date	BRAG	Comment
A1	[redacted]	Wade Smith	Review and revise plan for alternatives to Bay Area black start generation resources. Provide a monthly update to the RCC (Marsh Landing only)	4/30/19	6/2/22	Off Track	CAP# 117295595; CAP # 121496001 (Marsh Landing) • CAISO has informed PG&E that Marsh Landing has completed one outage in June. • PG&E submitted operational guidelines for Marsh landing to RC West. • Black-start testing were delayed at request of CAISO as the Reliability Coordinator. • CAISO and PG&E conducted RC Restoration Drills on 2/24/2022 and 3/3/2022. • Testing on 3/26 and 3/27 resulted in a BESS breaker failed and evaluation not completed. • Test must be conducted again on April 23 or April 30th.
A2	[redacted]	Christine Cowsert	GOV-1038S: Develop F-01 Inspections, F-02 Work Plans develop a RACI, Technical Documents, and seek RCC approval.	11/18/21	6/30/22	On Track	• 13 of 19 of the F02s between Dx, Tx, and Substations have been approved. • 3 F-02s are being presented/decided today. • Remaining 3 F02s scheduled for 5/20 presentation. • RACI, tracking of approved actions, and extensions to be completed 5/20.
A3	[redacted]	Christine Cowsert	Review how forced out assets are recorded and reported.	12/17/21	7/31/22	On Track	• Meeting on 3/3/2022, Asset Strategy, [redacted], and [redacted]. • Identified a process gap with GO 95 Rule 18 regarding emergent conditions for A-tags. • Additional meetings need to occur to address the process gap.
A4	[redacted]	Christine Cowsert	Provide an update on the EPIC project in relation to transformer replacement and wood poles.	12/17/21	6/30/22	On Track	• Meeting occurred on 2/10/2022, currently EPIC solution being used for transformers does not work for wooden poles due to technology involved. • [redacted] and [redacted] working on technology solutions that may be used. • [redacted] working on monthly updates on transformer replacement for EPIC project. • [redacted] summarizing RADA model for machine learning solution on wooden poles.
A5	[redacted]	Christine Cowsert	Add to schedule additional items identified to the RCC.	1/3/22	6/2/22	On Track	• Inertia and Retired Generators presented in February 2022.
A6	[redacted]	Christine Cowsert	Pull the data on the backlog of NOVs and connect with Regulatory Affairs to see if we can work with the CPUC to obtain closure letters for audits and NOVs like Gas Ops receives.	2/3/22	11/30/22	On Track	• Need to get a list of NOVs and status of all corrective actions • Work with Quality and Compliance teams to validate completed corrective actions • Schedule a meeting with CPUC to talk about Closure Process and obtain concurrence • Partner with SMEs to pull together evidence to support closure w/CPUC.
A7	[redacted]	Christine Cowsert	Integrate new Remote Grid asset family with Grid Operations.	3/25/2022	11/30/22	On Track	• Asset Registry Management Business Plan has been developed. • Working with Raymond Trinh for GOV-1038S process in May. • Planning Asset Registry development scheduled for June 2022.
A8	[redacted]	Christine Cowsert	Provide a breakdown by cable type and associate CEM and storage on spare inventory issue.	3/25/2022	11/30/22	On Track	• Partly being cover [UG] in the Deep Dive presentation today. • Storage has been identified as an obstacle that needs to be addressed.

Inform ☑ Decision ☐

TRANSMISSION UNDERGROUND RISK DEEP DIVE

[redacted] Sr. Manager, Elec Transmission Asset Strategy

Asset Overview

Types of Assets

Conductor (Main Assets)

Pipe-Type (HPFF)

Pipe-Type Conductors
- High Pressure Fluid Filled (HPFF)
- High Pressure Gas Filled (HPGF, HPGF-LPP)
- Older technology, installed between – 1948-2010

XLPE

Extruded Dielectric
- Cross Linked Polyethylene (XLPE, Triplex-XLPE)
- Newer technology, installed between – 1989-2020

Sub-Assets:

- Pipe Type Cable Carrier
- Cable Terminations
- Pumping Plants
- Low Pressure Tripping System (LPTS)
- Vaults
- Splices
- Transition Station
- Surge Arrestors
- Monitoring and Alarms (Distributed Temperature Sensing - DTS)

Pumping

LPTS

Splices

Counts of Assets - Conductors

- 57 electric transmission underground lines owned and operated by PG&E with a total length of approx. 190 circuit miles
- 34 lines are hybrid (mix of overhead and underground)
- Voltage ranges – 60 kV, 70 kV, 115 kV, 230 kV (500 kV future)
- More than 50% of the conductor fleet consists of pipe-type conductors

Transition Station

Potheads

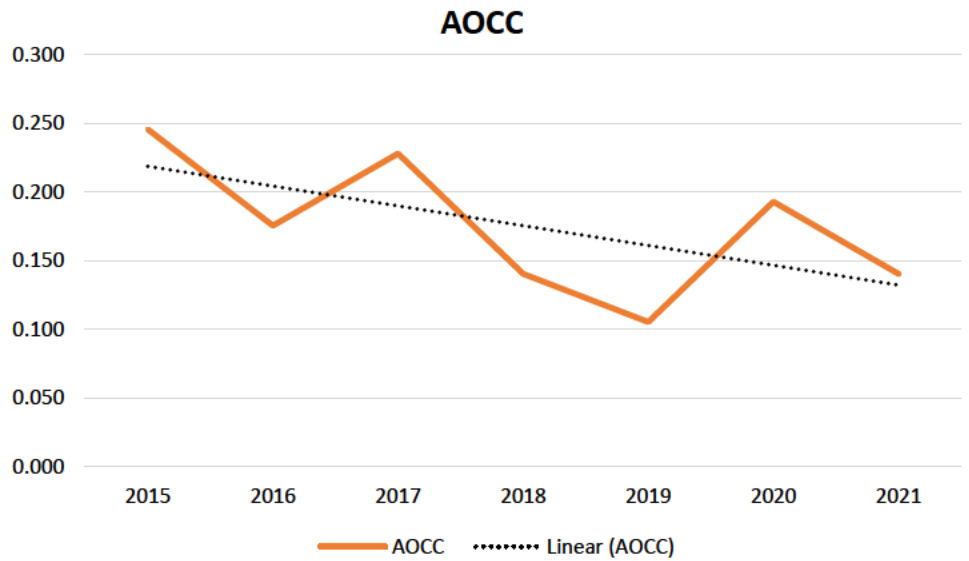
Surge Arrestors

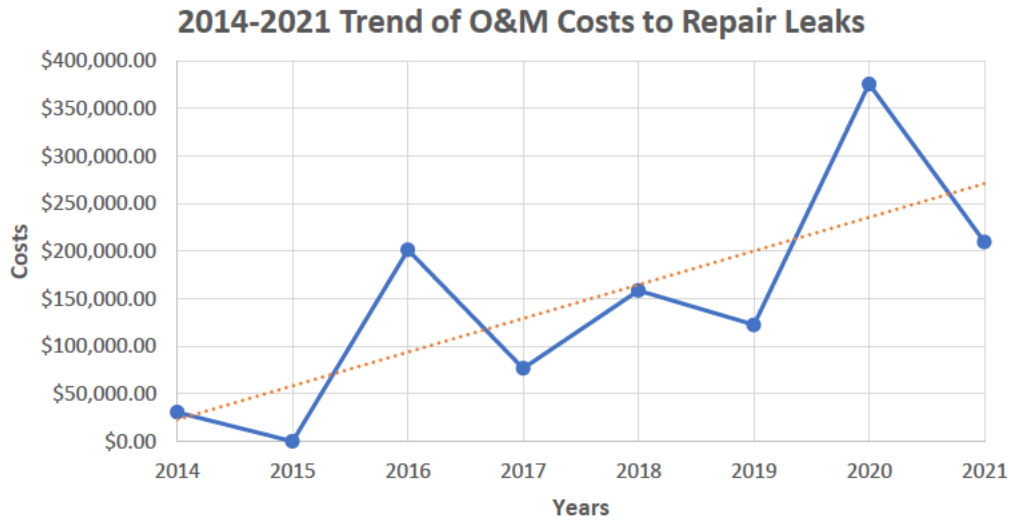
Key Metrics

Status: On-track / At-risk / off-track

Key Takeaway: Preventative maintenance activities have reduced outages of transmission underground lines but rising costs.

Name	Current Value	Current Status	Comments
Average Outages per Cables that have Circuits (AOCC)	<=.140		Costs for maintaining underground cable are





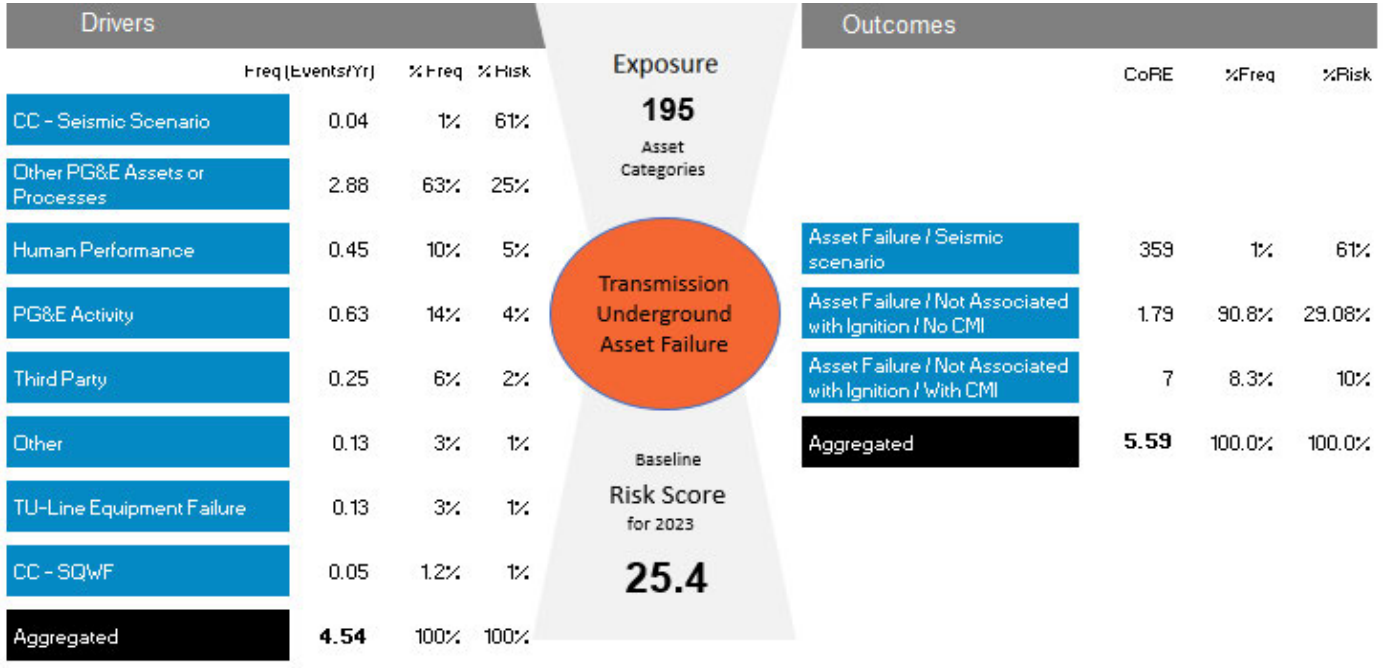
Since 2015:

- AOCC has been decreasing from .240 to .140
- Preventative asset maintenance in our aging infrastructure has contributed to deceasing interruptions
- Increased on the job training for maintenance activities
- Timely completion of notifications (no backlogs of maintenance notifications)

Failure of Transmission Underground Assets Bowtie

Based on historical interruptions, 98% of the risk is a result of pipe-type cables.

TUNGD Tranche Categories	Description	% of Exposure	% of Risk Score	Risk Score / Exposure
Pipe	High pressure gas or fluid filled pipe-type for underground transmission cables	55%	98%	0.23
Non-Pipe	Non-pressurized, insulated, underground transmission cables	45%	2%	0.01



Overall TUG Risk Score (25.4) was calculated from historic failures between 2014-2021 by estimating impacts to:

- Financial
- Reliability
- Safety

- These failures were categorized into two leading sub risk drivers (tranches): Pipe-Type and XLPE Cables.
  - Pipe Type cables have accounted for 98% of our Transmission Underground Risk
  - Over the past 8 years, there were 2 XLPE cable type failures.

Failure of Transmission Underground Assets Bowtie

On-track
At-risk
off-track

Current PG&E Model Output – Frequencies & Outcomes

Sub-drivers		Drivers		Controls (Preventative)	Mitigations (Preventative)
Sub-driver Name	Freq | % Freq	Driver Name	Freq | % Freq	RAG Status	RAG Status
Substation System Design Distribution Caused	2.1 | 75% .3 | 11% .4 | 14%	Other PG&E Assets or Processes	2.8 | 63%	Employee Staffing & Training	Installation & Integration of Monitoring Systems to SCADA
Safety Clearance	.8 | 100%	PG&E Activity	.8 | 14%	Risk Models & Analysis	Proactive Equipment Replacement/ New Equipment Installation
Inattention Not Following Procedures	.4 | 80% .1 | 20%	Human Performance	.5 | 11%	Inspections & Testing	Alarms
Unknown Outage Cause	.1 | 100%	Other	.1 | 11%	Engineering Controls	
Connector / Hardware	.1 | 100%	T-Line Equipment Failure	.1 | 3%	Studies/Assessments	
Foreign Object	.3 | 100%	Third Party	.3 | 6%	USA 8-1-1	

Exposure(1)
~195 miles

Total Annual Frequency
~4.5
per year

Failure of Transmission Underground Assets

(1) Exposure of primary cable miles

Failure of Transmission Underground Assets Bowtie

On-track
At-risk
off-track

Current PG&E Model Output – Frequencies & Outcomes

Exposure(1)
~195 miles

Total Annual Frequency
~4.5
per year

Failure of Transmission Underground Assets

Example Controls (Detective)	Mitigations (Detective)	Consequences
Emergency Underground Equipment Replacement and Repairs	Spare Inventory & Fault Locating Tools	Safety
Non-Emergency Underground Replacement and Repairs	Installation & Integration of Monitoring Systems to SCADA	Reliability
Underground Restoration Plan	Overhead Shoofly Material	Financial
Protective Systems/Operating Procedures	Alarms	
CAP Program		
Asset Failure Evaluation (T-Safe, Root Cause Analysis)		
Product Inspection (MPR)		

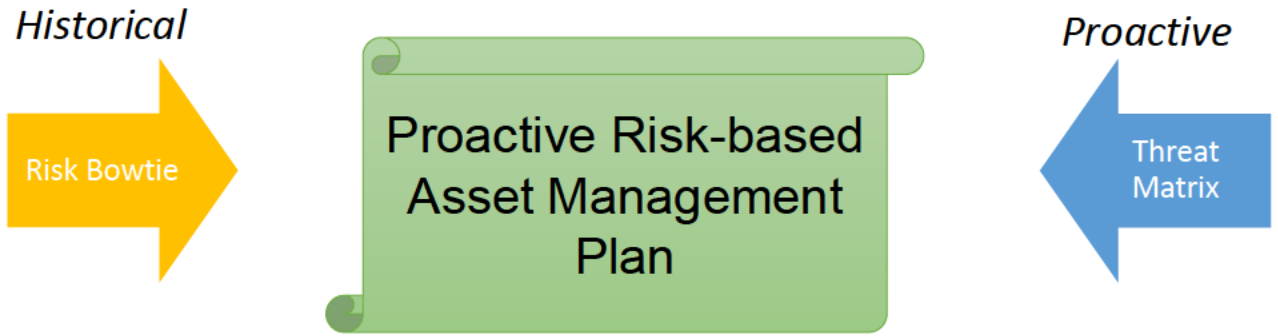
Outcomes

- Asset Failure / Seismic Scenario
- Asset Failure / Not Associated with Ignition / No CMI
- Asset Failure / Not Associated with Ignition / With CMI

(1) Exposure of primary cable miles

HAZARDS & THREAT MATRIX

A complementary approach informs the proactive risk-based asset management plan including: 1) Historical 'failure' data analyzed from the risk bow-tie & 2) Forward-looking threat matrix



- The risk bowtie examines historical "failure" data and assigns a risk factor based on attributes and associated consequences
  - Allows for comparison of LOB specific risks for company-wide investment decision-making
  - Output depends on data quality and is blind to risk drivers not yet observed

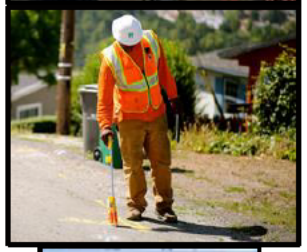
- The threat matrix is used to proactively identify component-level threats and hazards (risk drivers)
  - Drivers that may result in failures which have not yet been observed can be captured
  - Component groupings are used to determine which specific threats and hazards are active
- The threat matrix complements the risk bowtie to ensure proper targeted mitigations and controls for each component grouping
- We are moving to include threat matrix into our risk strategy

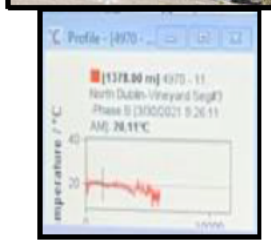
Controls & Mitigation

Together, Building
a Better California

CONTROL & MITIGATION SUMMARY

Status: On-track / At-risk / off-track





Control/Mitigation	Driver	Process Owner	RAG Comments	RAG
Proactive Equipment Replacements / New Equipment Installation	T-Line Equipment Failure	[redacted]	Proactive equipment replacements due to asset condition and equipment obsolescence	
Emergency Underground Equipment, Replacement, & Repairs **Spare Inventory & Fault Locating Tools**	T-Line Equipment Failure Human Performance	[redacted]	Lack of spare equipment and fault locating tools to perform emergency repairs	
Employee Staffing & Training	T-Line Equipment Failure Human Performance	[redacted]	Lack of employee staffing to perform underground inspections, repairs, and USA based service requests. Lack of training specific to transmission underground	
Installation & Integration of Monitoring Systems to SCADA	T-Line Equipment Failure	[redacted]	Lack of condition monitoring devices and their integration to SCADA	
Risk Model & Analysis	T-Line Equipment Failure Human Performance	[redacted]	Lack of composite health and consequence model to determine risk based on a circuit level basis.	

Proactive Equipment Replacements & New Equipment Installation

Status: On-track / At-risk / off-track

Key Takeaway: Replacing aging pipe-types eliminates obsolete sub-assets, increases reliability, and reduces O&M costs.

Problem Description

- Older pipe-type assets require more frequent expensive maintenance, sub-assets, and are more at risk of failure.

What is at Risk?

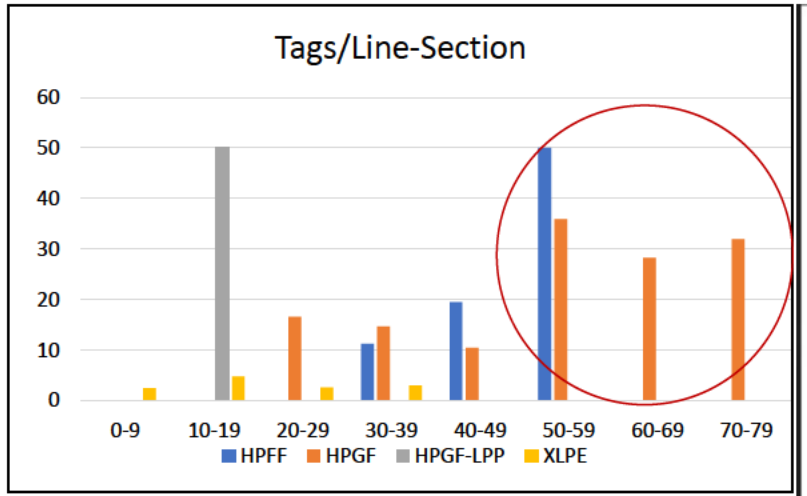
- Increased O&M costs over time
- 60% of pipe-type cables are beyond their useful life
- Aging sub-assets could lead to UG cable failure
- Increased emergency replacement costs

Ongoing Improvement & Efforts In Progress

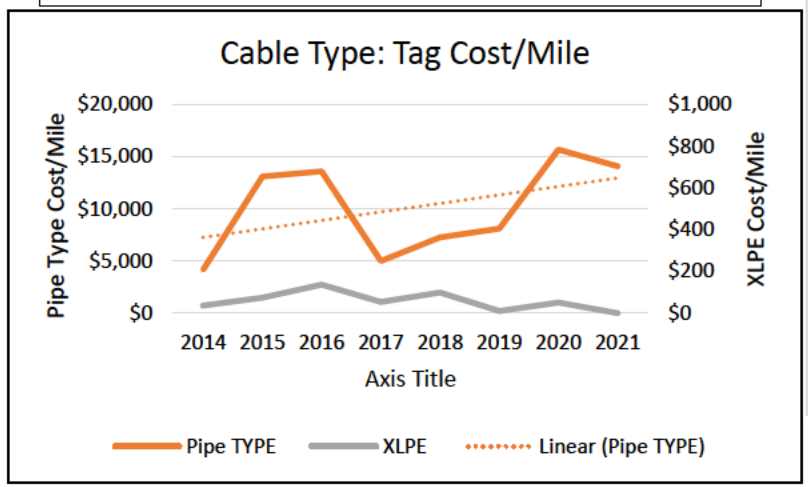
- Replacement programs under MWC 72Z
  - Cable replacement
  - Obsolete LPTS
  - Corroded cable racks
  - Cathodic protection Improvements
- External Corrosion Direct Assessment (ECDA)

Path to Green

- Additional replacement of pipe-type cables with XLPE
- Replacing pipe-type reduces need for sub-assets
- Replacement of obsolete and corroded sub-assets
- Completion of capital replacement projects from 2023 – 2025.



> 60% of Pipe-type cables are currently over 50 years old, past its useful life
> Pipe-type cables account for 55% of total circuit miles
> 82% of all tags are for pipe-type cables



Beyond the gap in achieving a steady state and clearing the backlog of end-of-life assets, there are other potential consequences of not increasing funding levels to meet TUG demand. Several risks of deferral and potential actions to mitigate these risks are shown in Figure 11.

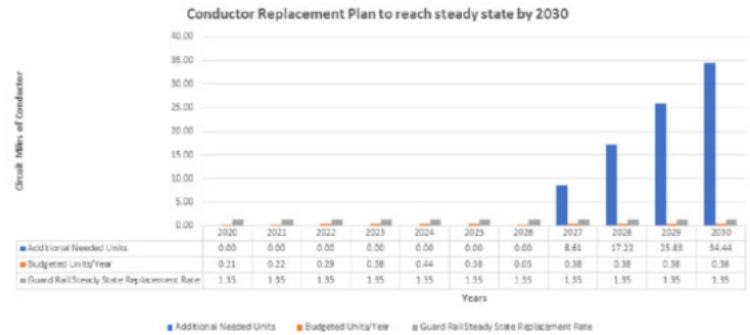
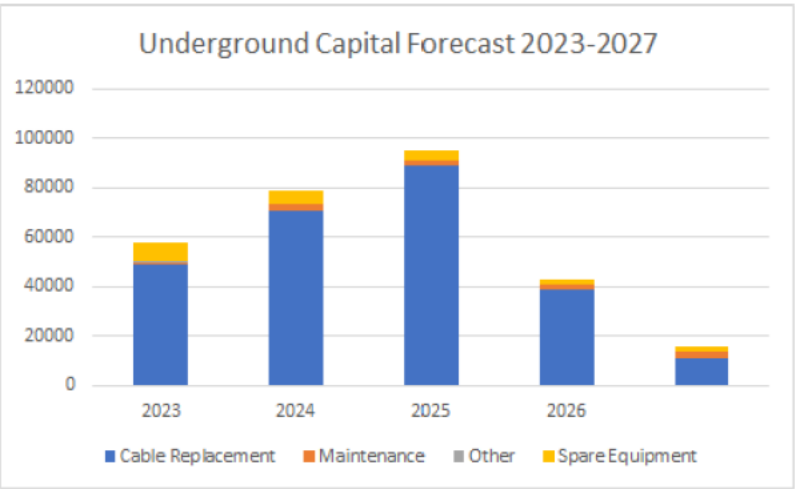
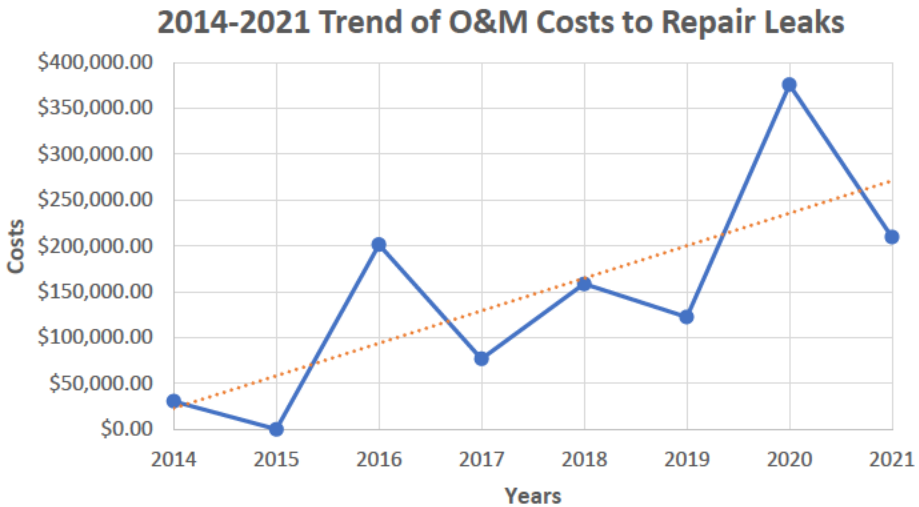


Figure 10. Underground Conductor Replacement Plan to Reach Steady State by 2030

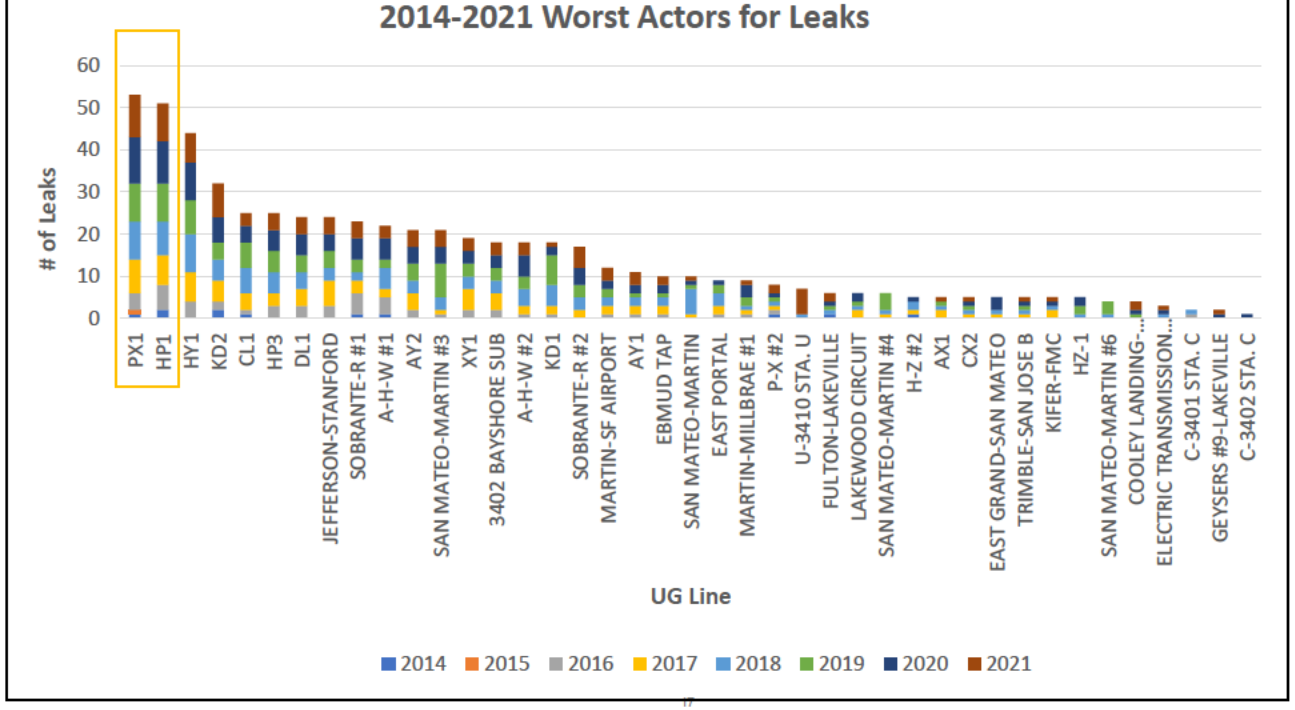


Leaks Analysis

- As pipes of pipe-type cables age, they are subject to leaks due to ground movements, vibrations, corrosion etc.
- Operations & Maintenance (O&M) costs from 2014-2021 were tracked to identify costs associated with repairing leaks.
- There is an upward trend in O&M costs to repair leaks.
- PX1 and HP1 (San Francisco) are among the oldest pipe-type conductors in the fleet (74 years) and at highest rate of leaks.



Total 2014-2021: $1,176,131.50
Average: $147,016.44
Upward Trend – reasonable as pipes are aging



Emergency Underground Equipment Replacement & Repairs + Spare Inventory & Fault Locating Tools

Status: On-track / At-risk / off-track

Key Takeaway: Need more emergency spare material and permanent solutions to store and manage spares.

Problem Description

Spare Cable & Hardware Inventory:
- Need emergency spare cable inventory, hardware, fault locating tools to respond to emergencies
- Okonite only approved supplier of pipe-type cables

Storage & Management:
- Limited indoor storage for UG reels
- Spare inventory not centrally managed

What is at Risk?

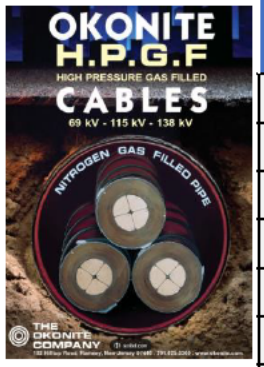
- Failure to respond effectively in an emergency
- Prolonged outages and reduced redundancy

Ongoing Activities & Efforts In Progress

- Spares workshop conducted in 2021
- 2023 - 2027 Capital Investment Plan
- Working with CRESS to find indoor storage

Path to Green

- Restock spares inventory
- Procurement of fault locating tools and training
- Centrally managed and tracked inventory (SAP)



Pipe-Type (HPFF)

Type	Voltage (kV)	PG&E Longest Section (ft)	Length Per Order	# of reels 2023	# of reels 2024	# of reels 2025	# of reels 2026
HPFF	230	2560	3000 ft per reel	3	---	---	---
HPFF	230	2384	3000 ft per reel	6	---	---	---
HPFF	230	2957					
HPGF	60	2842	3000 ft per reel	3	---	---	---
HPGF	60	3198	3500 ft per reel	3	---	---	---
HPGF	115	2297	3000 ft per reel	---	---	6	---
HPGF	115	2560					
HPGF	115	2485	3000 ft per reel	---	6	---	6
HPGF	115	2732					
HPGF	115	2715					
HPGF	115	2814	3000 ft per reel	3	---	6	---
HPGF	115	2602					

Employee Staffing & Training

Status: On-track / At-risk / off-track

Key Takeaway: Need adequate level of staffing and specialized training to manage transmission underground assets

Problem Description

- Inadequate transmission M&C resources, high turnover, and more specialized training required.

What is at Risk?

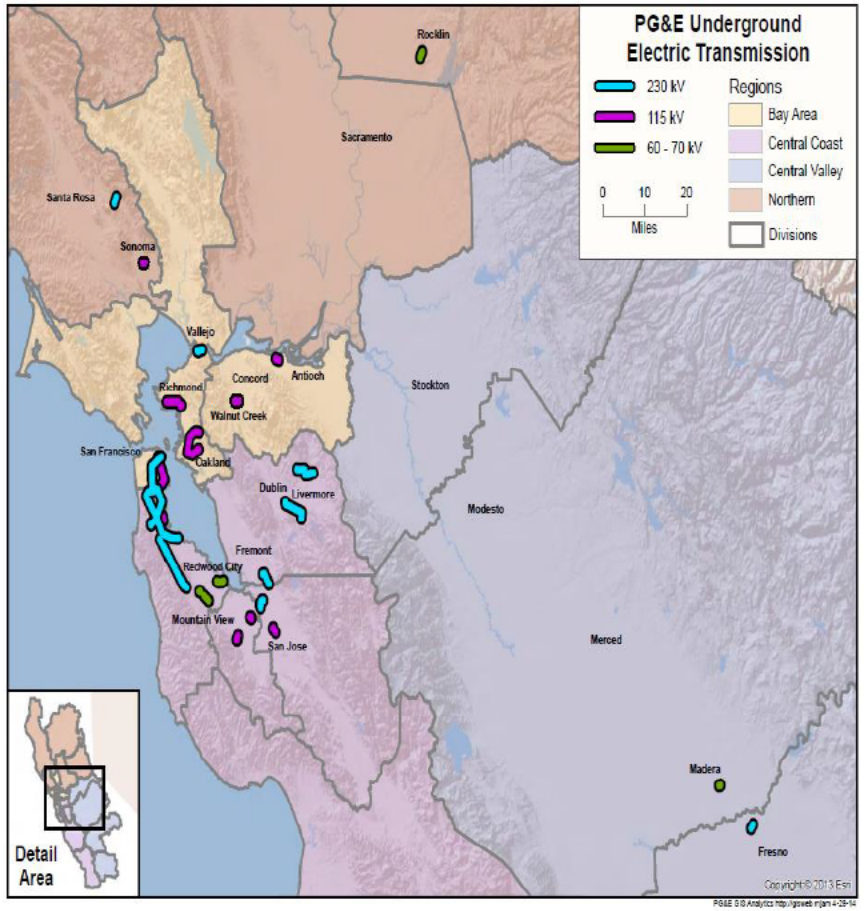
- Increased underground failures and/or dig-ins
- Inadequate emergency response, prolonged outages, and reduced operational redundancy in critical urban areas.

Ongoing Activities & Efforts In Progress

- Addressed GOV-1038S F01
- Hiring of T-Line M&C, QEW Qualified Personnel
- Create training plan for underground inspections.

Path to Green

- Maintaining an adequate levels of staffing.
- Establishing training curriculum for transmission underground
- Insourcing to other internal PG&E departments.



Installation & Integration of Monitoring Systems & SCADA

Status: On-track / At-risk / off-track

Key Takeaway: Install more real-time monitoring equipment to SCADA to proactively determine asset condition & perform mitigation

Problem Description

- Unknown condition of XLPE conductor due to less than 50% assets connected to DTS, not linked to SCADA data, or remote access.

What is at Risk?

- Health of XLPE conductors
- No proactive mitigation possible and no remote access

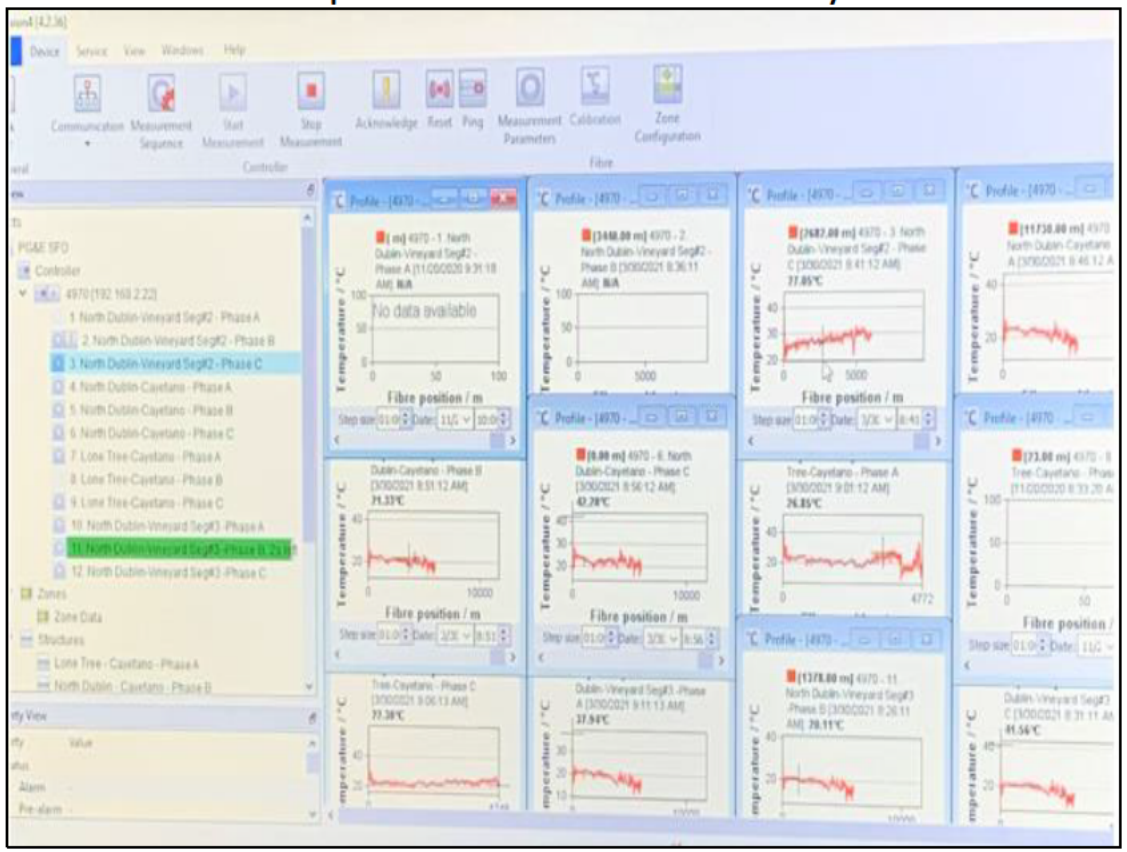
Ongoing Improvement Activities & Efforts In Progress

- Operational Business Intelligence (OBI) to connect all DTS to SCADA, alarms for high temperature, disruption to service, and remote accessibility to the DTS.
- 2023-2027 Investment Planning - DTS on existing XLPE lines
- Revised standard – New Construction DTS with SCADA
- Identify trends with DTS by quarterly temperature readings
- Installation of monitoring devices

Path to Green

- Connect all existing all DTS to SCADA and remote access.
- Remote monitoring underground lines and link to SCADA.
- Integrate asset condition data into future modeling tools.

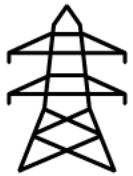
DTS – Temperature Profile of Tri-Valley Circuits



Risk Models & Analysis

Status: On-track / At-risk / off-track

Key Takeaway: Develop risk models for prioritized and efficient underground maintenance



Problem Description

Lack of easily accessible asset information

- Lack of industry benchmarking information (inspections, replacement and repair strategies, unit costs, replacement rates)
- Paper-based inspection forms (hard to query long-text)

Lack of comprehensive Risk Model

- Needed to determine probability of failure based on asset health and consequence of failure (reliability, financial, safety)
- Need in-depth review of Failure Modes & Effect Analysis (FMEA)

What is at Risk?

Maintenance can not be properly prioritized

- No models to predict probability of failure and consequence of failure
- Inefficient allocation of PG&E's resources

Ongoing Improvement Activities & Efforts In Progress

- Development of interim risk ranking spreadsheet by T-Line Asset Strategy and its monthly update
- Efforts with System Inspections to digitize the inspection forms

Framework development:

- Technical Basis Document Creation (CAP #: 122895012) which will require a deeper review of the FMEA and perform benchmarking activities
- Efforts with ATS on developing a Hazards & Threats matrix for Transmission Underground

Threat/hazard-specific model development:

- Probabilistic risk analysis of seismic hazard for San Francisco (Phase 2 completed); Oakland and Atherton-Menlo Park (Planning
- External Corrosion Direct Assessment (ECDA) as needed to understand severity of corrosion

Path to Green

- Development of composite risk ranking models/tools to determine long-term and short-term strategies on a circuit level
- Use of digitized underground inspection forms
- Conduct industry benchmarking surveys and participation in benchmarking forums
- Development of Technical Basis Document

Other Risks and Sub-Drivers Summary

The small number of historical transmission underground failures prevents adequate understanding for prevention of future failures.

- The following risk-drivers have not been captured in the risk bow-tie
  - A comprehensive understanding of sub drivers will be covered in the Hazard & Threat Matrix being developed by ATS.

Risk Driver	Controls	Mitigations	RAG Comments	RAG Status
Environmental Hazards (ex: Seismic & Corrosion)	Employee Staffing & Training Risk Models & Analysis Inspections & Testing Studies/Assessments USA 8-1-1 Emergency Underground Equipment Replacement/Repairs Underground Restoration Plan Alarms	Proactive Equipment Replacement/ New Equipment Installation Alarms Spare Inventory & Fault Locating Tools Overhead Shoofly Material Alarms	Planning for seismic activity and other environmental threats such as corrosion	
Poor Condition of Riser Poles			Poor conditions of riser wood poles may pose as a threat to underground cable systems	
Environmental Changes			Construction activities near the underground cables can cause changes in the soil condition, resulting in changes in ampacity	

Environmental Hazards - Seismic

Status: On-track / At-risk / off-track

Key Takeaway: The Bay area is vulnerable to seismic activity; system hardening is needed in the likelihood of a catastrophic event.

Problem Description

The Bay Area is a seismically active region where a large magnitude earthquake could lead to **simultaneous, widespread, and prolonged outages.**

What is at Risk?

- Soil liquification and cable sheering
- Oil spills from HPFF cables
- San Francisco is most vulnerable to HPGF failure

Ongoing Improvement Activities & Efforts In Progress

Understanding Risk:

- Probabilistic Risk Analysis of Bay Area communities.

System Hardening:

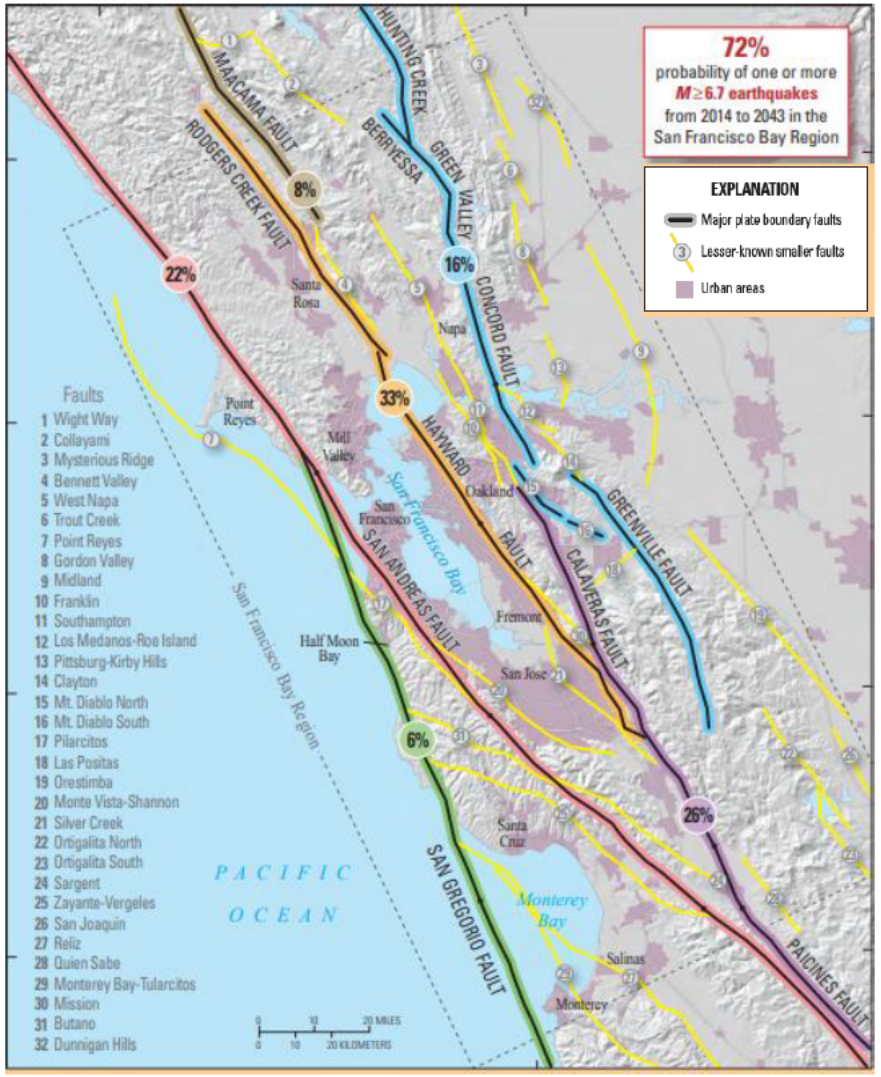
- Underground Restoration Plan
- Overhead Shoofly Material – temporary overhead
- Constructing seismically resilient lines in San Francisco as part of Phase 1 of seismic upgrades

Path to Green

- Underground Restoration Plan
- Increasing replacement cable supplies

Failed XLPE-Type Cable due to Liquefaction
Christchurch Earthquake, New Zealand (6.2 M)

Map of known active faults in San Francisco Bay Area



Environmental Hazards - Water and Corrosion

Status: On-track / At-risk / off-track

Key Takeaway: Development of proactive mitigation strategies to respond to environmental hazards.

Problem Description

- Rising water levels and high corrosivity are expected to damage underground infrastructure leading to

What is at Risk?

- Reliability of the transmission UG cable system
- Environmental impact of oil spilled (HPFF cables)

Ongoing Improvement Activities & Efforts In Progress

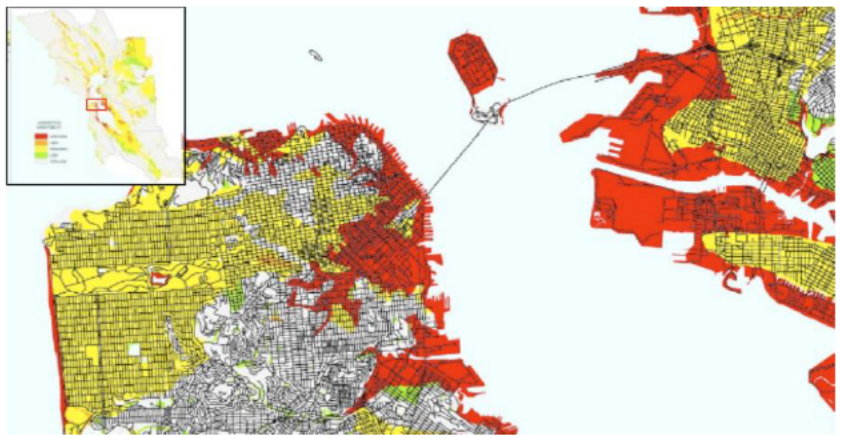
Corrosion:

- External Corrosion Direct Assessment (ECDA)
- Cathodic Protection improvement projects
- Proactive replacement of corroded cable racks
- 2023-2027 Capital Investment Plan

Path to Green

- Replacement of pipe-type in high liquefaction zones
- replacement plan of HPFF cable in HFTD to XFLP
- Maintenance to assets most affected by corrosion.

San Francisco and Oakland Liquefaction Zones



Riser Poles

Status: On-track / At-risk / off-track

Key Takeaway: Inspection and replacement of riser poles is needed to maintain reliability of hybrid transmission underground lines.

Problem Description

- For hybrid circuits, the condition of the riser poles can impact the underground line.
  - For pipe-type (fluid-filled or gas-filled), failure of the riser pole could result in an outage cause by loss of fluid/gas flow.
- Riser poles for EBMUD 115 kV Tap and Jefferson-Stanford 60 kV were found to be in deteriorated condition (both are stubbed)
  - Both lines feed customer owned substations and the riser poles are on busy streets

Ongoing Improvement Activities & Efforts In Progress

- UG cables and associated equipment per ETPM manual
- Wood pole test & treat every 10 years
- Kicked-off project for EBMUD 115 kV Wood pole replacement
- Conducted site-walk with [redacted] to plan Jefferson-Stanford 60 kV wood pole replacement project

What is at Risk?

- Customer Impact
- Public & employee safety
- PG&E's Reputation

Path to Green

- Inspect riser poles more frequently
- Complete replacement of riser pole and/or underground cable
- Adequate staffing level, spare material and fault locating tools to respond to an emergency

Stubbed Riser Pole on Jefferson-Stanford 60 kV

Environmental Changes – Changes in Soil Conditions

Status: On-track / At-risk / off-track

Key Takeaway: Changes in soil condition affect the ampacity of transmission underground cables

Problem Description

- Underground cable ampacity ratings are based on soil properties like soil ambient temperature and thermal resistivity
- If there are physical changes in the soil surrounding the cables (ex: soil movement, additional soil on top of the conductors, etc.), cable ampacity ratings (cable's ability to dissipate heat) can be affected
- If not detected early, cable could operate at higher operating temperatures for extended periods of time which could cause early deterioration of cable insulation eventually leading to cable failure
- Changes in soil condition at the San Bruno Interchange (SBI) corridor

What is at Risk?

- Health of Transmission Underground Cables
- Unplanned outages & emergency replacement

Ongoing Improvement Activities & Efforts In Progress

- USA 811 provides notification of some soil changes.
- Soil sampling and ampacity studies for SBI corridor to confirm ampacity ratings
- SBI Cable Replacement Project budgeted under MWC 72Z in 2023-2027 Capital Investment Plan

Path to Green

- Complete SBI cable replacement project
- Identify other regions where soil conditions may have changed due to construction activities after cable installation
- Adequate staffing to perform USA 811 based activities and get notified of construction projects near PG&E's underground transmission lines

San Bruno Interchange (SBI)

TRANSMISSION UNDERGROUND ASSET MANAGEMENT PLAN (AMP) UPDATE

TD-8102 - Transmission Underground Asset Management Plan (AMP) Updates

Chapter	2021 Transmission Underground AMP
All Chapters	• Updated formatting throughout document by following a new template: • Chapter 1: Executive Summary • Chapter 2: Goals, Objectives, Safety, and Risks • Chapter 3: System Strategy • Chapter 4: Asset Portfolio • Chapter 5: Investment Plan
Chapter 1: Executive Summary	• Discussed Asset Introduction, Company Vision, Risks and Strategy, Key Asset Risks and Mitigating Programs and Controls, Investment Plan, Continuous Improvements
Chapter 2: Goals, Objectives, Safety, and Risks	• Strategic Goals: discussed how transmission underground strategic goals alight with the Asset Management strategy – TD-8100. • Objectives and Targets: aligned with PG&E's company goals • Safety and Risks: discussion regarding Risk Spend Efficiency (RSE score) • Enterprise Risk – Event Based Risk Register • RAMP – 2020 Risk Assessment Mitigation Plan (RAMP); transmission UG risk did not fall in the top 40% of PG&E safety risks therefore it is described in Chapter 19 (Other Safety Risks) of the 2020 RAMP report. Inputs to this risk model were from the risk bow-tie and PG&E specific failure data. • Illustration of Risk Bow-tie, risk score, risk drivers and outcome
Chapter 3: System Strategy	• "Guardrail" approach → 1/x * Asset Population = Replacement Units/Year where x = Expected Asset Lifespan • Risk Management Framework – Transmission UG is High Risk. Discussed gaps and future composite risk model for transmission underground. • Discussed continuous improvement in near-term and long-term
Chapter 4: Asset Portfolio	• Updated asset inventory and relevant tables and figures • Included analysis of 2020 tags and indicated worst actors for leaks • Updated replacement strategy for conductors – included factors which are not part of bow-tie (condition, • RAG status for each control and mitigation for each component in the transmission underground system
Chapter 5: Investment Plan	• Investment strategy – guard rail approach for asset replacement and asset risk management (asset condition, performance, capacity, and consequence of failure) • Programs – 60W, 72Z, 92U, BF, IB, ICU • Discussed ramp-up of asset replacement starting in 2026 based on guard rail approach (risk-based replacements not included). • Resource strategy and constraints : discussed Investment Gaps and consequences - not reaching steady state of replacements), Regulatory Strategy – deferring CAISO approved projects to meet funding requirements in 2021-2026 and its potential consequences and Ramp Up Plan and Executability – need to ramp up the investment levels in 2022-2026 to address the existing and projected gaps.

COMPLIANCE

Key Internal Audit (IA) Finding

IA Finding: N/A
IA Finding Owner: N/A

No finding(s) to report.

<u>2022 Planned Work</u>

Audit Name : Inspectors and Maintenance

Planned Scope : Evaluate processes and controls over the inspection and maintenance of transmission underground assets.

Planned Start : 2022 Q3

Key Corrective Action Plan (CAP)

Corrective Action Description	Action Owner	Deliverable	Action Due Date	Progress (4/25/2022)
A formal training program for Electric Transmission Underground (ETU) crew members to become proficient in their role, could not be provided to EQA. There is no specific apprenticeship for this type of work.	[redacted]	To solve this, it was determined there should be technical training put in place for crew members.	January 31, 2024	Open
Replace Equipment for Transmission Underground	[redacted]	Provide seven new vehicles for Transmission Underground in order to have safe and reliable vehicles.	March 31, 2021	Completed
Towing truck for the nitrogen trailers needed , currently there is only one and when it is not available for use there is no truck to tow the nitrogen trailers.	[redacted]	One truck has been provided to tow nitrogen trailers.	January 28, 2021	Completed
Transmission underground crew is understaffed, making the crew have limited ability to respond to emergencies and not be able to provide inspections for more than one location.	[redacted]	Hire four new crew members to provide more support.	November 12, 2020	Completed

LEADERSHIP SUPPORT

Controls & Mitigations	Ask	Consequence of No Action
Employee Staffing & Training	Hire more T-Line M&C crew for transmission underground inspections, corrective maintenance, and USA based activities Develop a specializing training program for T-Line M&C	Inability to follow inspection schedule and respond to USA 811 based activities which could lead to more equipment failures Difficult to retain employee as there is no natural flow of progression
Emergency Underground Equipment	Central location to track and maintain adequate spare inventory Indoor storage location to store future spare cable inventory	Spare inventory will be maintained by individual stakeholders and information will be lost as employees change jobs Cable reels are designed to be stored indoors. Storing cable reels outdoors may result in deteriorating condition of cable reels, copper thefts, vandalism etc.
Risk Models & Analysis	Development of asset health index and composite risk models to develop long-term and short-term strategies and prioritize repairs and replacements	Difficult to develop long-term and short-term strategies without composite risk models

Inform ☑ Decision ☐

OWNERS DAM SAFETY PROGRAM AUDIT

AS OF APRIL 29, 2022

[redacted] Director, Power Generation Asset Excellence

Note: Inform EO RCC Team of Audit and Submission of FERC required 5 year audit of Owners Dam Safety Program.

What is the FERC Requirement for ODSP Audit?

FERC Part 12D requires an independent audit of the Owners Dam Safety Program on interval not to exceed 5 years.

§ 12.65 Independent external audit and peer review.

(a) Applicability. For licensees of one or more dams or other project works classified as having a high hazard potential, as defined in §12.3(b)(13)(i), an independent external audit or peer review of the Owner's Dam Safety Program, and the implementation thereof, shall be performed at an interval not to exceed five years.

(b) Qualifications. A statement of qualifications for the proposed auditor(s) or peer review team that demonstrates independence from the licensee and its affiliates shall be submitted to the Regional Engineer for review, and written acceptance thereof must be obtained from the Regional Engineer prior to performing the audit or peer review.

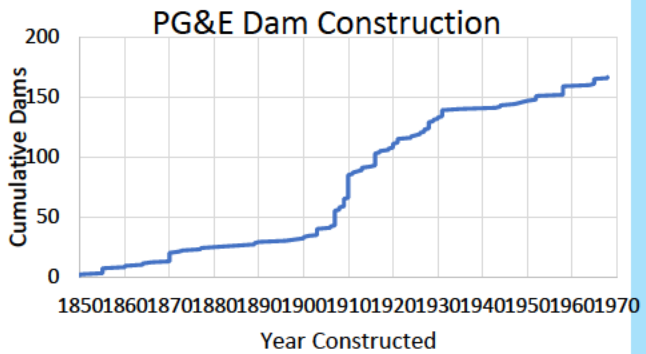
(c) Reporting.

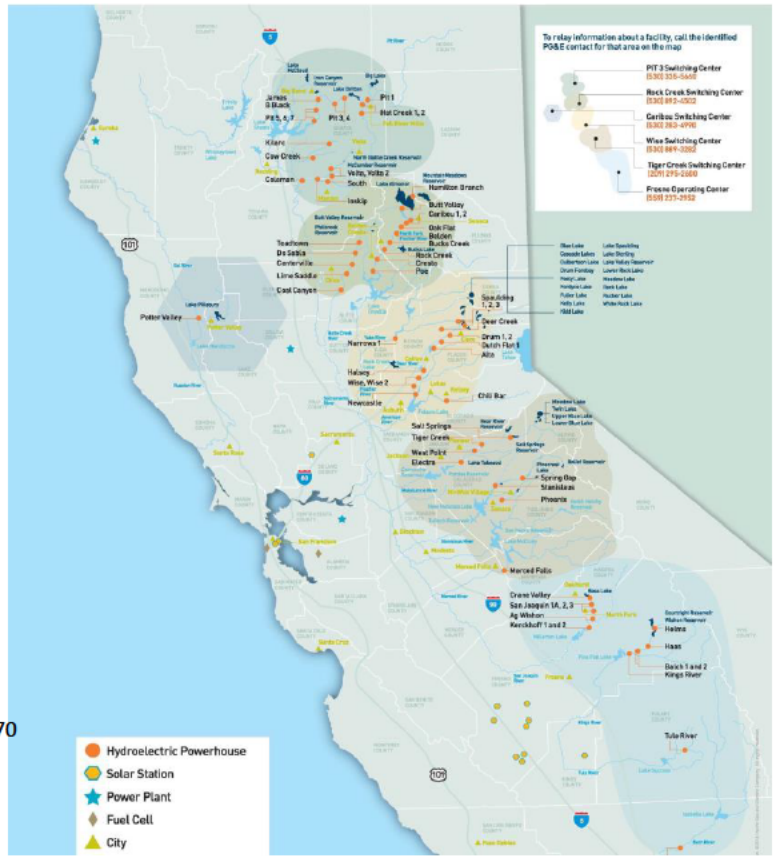
(1) The auditor(s) or peer review team shall document their findings in a report.

(2) The report on the audit or peer review shall be reviewed by the Owner, Chief Dam Safety Engineer or Chief Dam Safety Coordinator, and management having responsibility in the area(s) audited or reviewed.

(3) The report on the audit or peer review shall be submitted to the Regional Engineer

Hazard Classification of PG&E Dams			
		Jurisdictional	
	Total	FERC	DSOD
Dams	170	164	96
Low		103	28
Significant		13	15
High		48	39
Extremely High			14





OWNERS DAM SAFETY PROGRAM FINDINGS

ODSP Audit Conclusion: "PG&E is a responsible owner across all components of the Dam Safety Program."

OPERATIONS, MAINTENANCE AND TESTING
- Reservoir operations are well managed with good communications internally and other dam owners
- SCADA appears sound
- SDOC drives ownership of discharge facilities
- Separate geotechnical instrumentation managed by external provider; timeliness of data communication

DAM SAFETY SURVEILLANCE AND MONITORING
- Implementation of DamWatch is impressive. Usefulness will improve with time.
- Inspections are robust and timely
- Field procedures and data recording are excellent
- Staff are informed, engaged, and dedicated

EMERGENCY PREPAREDNESS
- Overall strong (e.g., EAPs) and improving (e.g., inundation maps, public safety program)
- Exercises, critiques, and field observations are positive

EXTERNAL COMMUNICATIONS AND REPORTING
- Communications with FERC and DSOD appear good
- Deputy CDSE roles and responsibilities maturing

AUDITS AND ASSESSMENTS
- Strong, both QV and internal audits
- CEATI and other assessments are self-critical

INTERNAL COMMUNICATIONS AND REPORTING
- Improved due to leadership presence and DSE resources
- Informal lines of communication
- Organizational goals not uniformly understood

REPAIRS, ALTERATIONS AND NEW DESIGNS
- Dam Safety is appropriately engaged for oversight
- Dam Safety provides input for project prioritization
- Dam Safety has oversight on interim risk reduction actions (e.g. reservoir restrictions) and construction
- *Move toward asset management basis for prioritization of projects is still aspirational*

DAM SAFETY ISSUES, IDENTIFICATION, AND MANAGEMENT
- Identification driven by regulatory inspections
- Analyses performed internally and by consultant
- Identified deficiencies are resolved through projects
- *Move toward risk-informed basis for screening and prioritization is still aspirational*

TRAINING
- Rigorous foundational web-based program
- *Needs and opportunities for professional development across DSP*

FERC FILING COMPLIANCE
- Continued progress on overdue issues
- *Impacts on resources and work plan stressful to achieve compliance*
- *Over reliance on extension of time requests*

DOCUMENTS AND RECORDS
- Compliance backlog visibility achieved and improvement on metrics
- *Maintenance backlogs are large and SAP items not closed out*

Compliant, Area of Strength

Compliant, Area for Improvement:

Notes: Findings of 8-19 NOV 2021 ODSP Audit

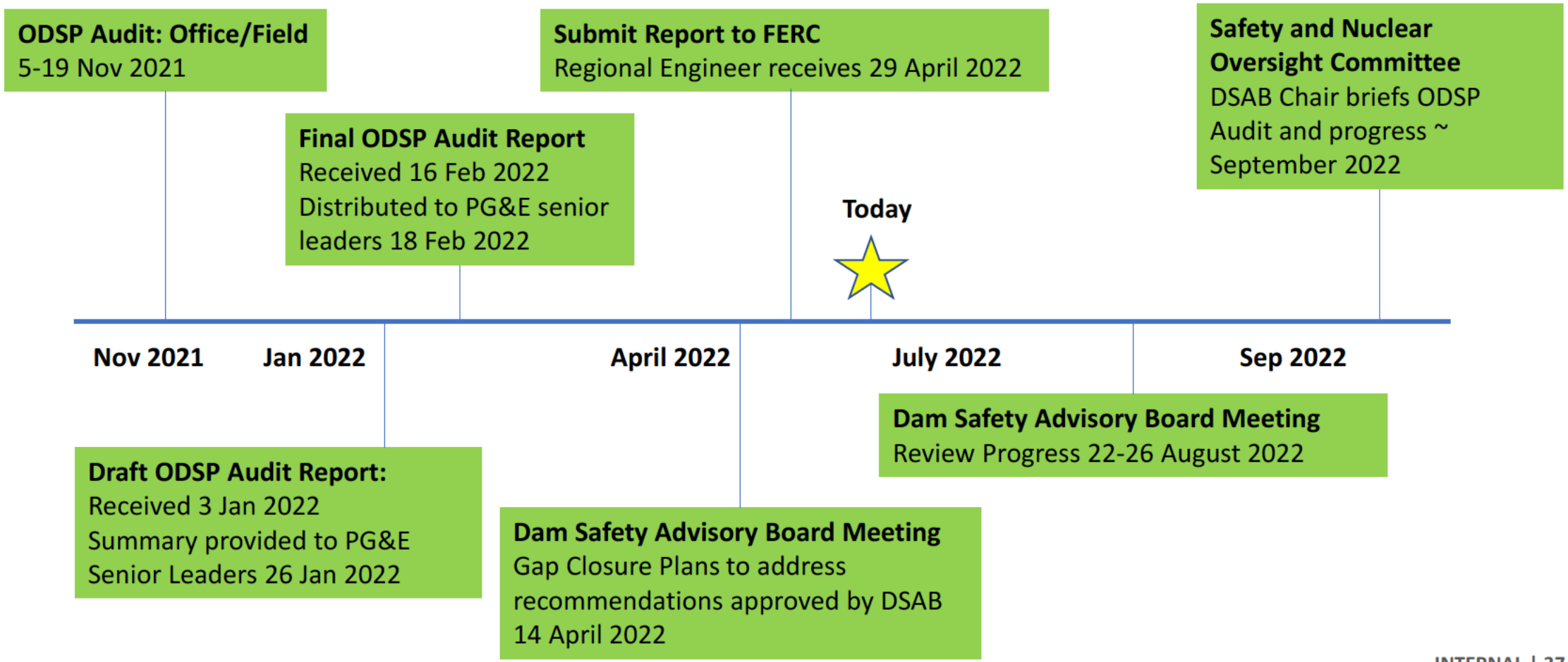
GAP CLOSURE PLANS FROM ODSP AUDIT

Dam Safety Advisory Board 14 April 2022: "*DSAB supports Gap Closure Plans for all Audit recommendations.*"

Recommendation	Owner(s)/Lead(s)	Corrective Action Plan Title and CAP#	RAG Status
R1: Strengthen ODSP capability and effectiveness	[redacted]	*CAP(s) to be created after DSAB review*	See below
R1.0: Update and enhance ODSP guidance documents to reflect current organization and include defined roles, responsibilities, accountabilities, and training requirements	[redacted]		12/21/23
9R1.1: Strengthen alignment of employees to business goals	[redacted]		9/30/22
R1.2: Implement periodic briefings of executives by the CDSE	[redacted]		12/31/22
R1.3: Develop an effective means to track dam safety issues to resolution	[redacted]		10/28/22
R1.4: Implement additional training opportunities.	[redacted]		1/31/24
R2: Improve hydro work management program and closure of work items **R3A:** Develop resource loaded plan to address large civil maintenance backlog	[redacted] / [redacted]	Hydro Work Management Program Issues **CAP: 122807122**	1/20/23
R3B: Develop a resource loaded plan to address the FERC regulatory backlog	[redacted] / [redacted]	HC Notification/Task Closure Required **CAP: 122627784**	12/25/22
R4: Develop strategy for long-term management of automatic data acquisition system (ADAS) equipment and data	[redacted] / [redacted]	*CAP to be created after DSAB review*	5/31/24
R5: Establish measure for civil asset maintenance critical to dam safety	[redacted] / [redacted]	*CAP to be created after DSAB review*	2/20/23
R6: Develop a systematic approach for issue identification and tracking for low-hazard dams	[redacted] / Deputies	*CAP to be created after DSAB review*	6/30/23
R7: Add external members to the next internal CEATI self-assessment team	[redacted] / [redacted]	*CAP to be created after DSAB review*	12/15/23

ODSP Audit: Completed and Upcoming Dates

As of 5/5 EO RCC, PG&E's ODSP Audit has been submitted to FERC. PGEN will leverage RCC to provide progress updates against Recommendations in the ODSP Audit Report.



BREAK!

Inform ☐ Decision ☑

Substation Infrared, Preventative Maintenance and Supplemental Inspections Programs

Action Plan - GOV-1038S

Dated materials: 4/1/2022

Asset Owner:

[redacted] Director, T/S & Storage Strategy

Presenter:

[redacted] Substation Asset Strategy, Maintenance Specialist

Desired Outcome: Review three separate Substation Inspection Action Plans [F-02] including Infrared, Preventative Maintenance, and Supplemental Inspections with the Committee Members, for feedback and vote on a decision to adopt.

Substation Inspection and Maintenance Overview

Objective: Approval of Infrared, Preventative Maintenance and Supplemental Inspections GOV-1038 F02 Actions

Summary of all Four Substation Programs:

1. Routine Inspections (GO174) – (*Approved Feb 2022 RCC)*
2. Infrared Inspections (IR)
3. Preventative Maintenance (PM)
4. Supplemental Inspections (Enhanced for wildfire)

Current Status:

- All corrective actions completed for high priority action items from previous self-assessments
- Reassessed all programs January 2022
- Developed new action plans to close remaining gaps

	Asset Count (EOY 2021)	Routine Inspection Monthly or bimonthly	Infrared Inspection annual	Preventive Maintenance variable	Supp Inspections annual (HFTD/HFRA)
Substations	933	Yes	Yes	Yes	Yes
Major Assets	15,757	Yes	Yes	Yes	Yes
Minor Assets	39,044	Yes	Yes	No	Yes

Substation Preventive Maintenance Program

PM Program History:

- Overall substation maintenance “barometer” suggests our programs are reasonable, lagging the industry and technically lean
- Decades of development and expertise have refined the program
- Once a best-in-class substation maintenance program
  - Load Tap Changer (LTC) Maintenance Methods
  - Developed industry leading Dissolved Gas Analysis (DGA) algorithms
  - Strong OEM partnerships and rigorous material selection processes still in use across industry!

- **Program proactively identifies and detects asset performance issues, condition and trends**
- **Look back ~20 years:**
  - Asset degradation and impacts from cost saving and efficiency initiatives of the early 2000’s (post bankruptcy)
  - Extended maintenance intervals
  - Reduced maintenance activities
  - Depleted expertise (attrition)
  - Reduced detectability

- **Reduction in major substation asset replacements will increase need to improve PM**
- **In 2022:**
  - Increased detectability through incremental transformer and mobile transformer PF testing intervals and spare transformer evaluations
  - Improved DGA testing frequency and improved algorithms (annual for all transformers)
  - Introduce online monitoring programs
  - Life extension/capitalization offset efforts

Future State Goals:

- Increased level of expertise and sound maintenance strategy
- Targeted for certain minor equipment maintenance programs i.e., air switches, PTs CCVTs etc. (~22,800 assets)
- Build out monitoring program

Substation Infrared Inspection Program Assessment

Summary of All Findings from January 2022 Self Assessment:

High priority – 1

Medium priority - 7

Question #	Priority	Status	Question	Finding
9	**High**	**Partial**	**Has a technical basis document been developed?**	**The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program**
11	Medium	Not Implemented	Has a risk-reduction target been set and incorporated into inspection requirements?	No risk reduction targets have been established at this time.
12	Medium	Not Implemented	Has the inspection method been assessed for effectiveness in identifying each failure mode?	The inspection methods have not been assessed for effectiveness in identifying each failure mode.
28	Medium	Not Implemented	Is there a management of change process in place to ensure results from the quality control audits are used to inform and make improvements to the inspection process (such as procedure adjustments, training materials, retraining, or disqualification of non-performing personnel)?	Not implemented. Need to develop a process to incorporate audit findings into the program.
31	Medium	Not Implemented	Are the results of the inspections programmatically integrated into the asset management process?	No process exists to programmatically integrate inspection results into the asset management process.
40	Medium	Partial	Is there a feedback loop to inform all stakeholders of Notices of Violation?	No. The LOB only receives high level notification of the initial NOV. It trickles down on a "need to know" or "need to react" basis.
41	Medium	Not Implemented	Is there a feedback loop to inform asset management personnel of inspection findings or feedback from the inspection team on the effectiveness of inspection techniques and inspection frequency?	There needs to be a feedback loop to inform Asset Strategy of inspection findings.
48	Medium	Not Implemented	Are there standards or procedures that define independent reviews of changes to decisions and required dates?	Need to develop a procedure that defines independent reviews of changes to decisions and required dates.

Substation Infrared Inspection Program Actions

Action Plan (2022):

High Priority:

Assessment Question	Findings	Corrective Action Description	Current Status	Action Owner	Completion Date
9	The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program	Create a new technical basis document using the new template attached to GOV-1038S using the information in the FMEA	In Progress CAP #123223309	[redacted]	3/31/2023

- 14-year program
- Strong maturity

Medium Priority:

These issues will be addressed as a part of the implementation of the technical basis document per GOV-1038S

Substation Supplemental Inspection Program Assessment

Summary of All Findings from January 2022 Self Assessment:

High priority – 1

Medium priority - 7

Question #	Priority	Status	Question	Finding
9	**High**	**Partial**	**Has a technical basis document been developed?**	**The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program**
8	Medium	Partial	Is the inspection process documented end to end?	It is documented in the TD-3328S and TD-3328P-01, which covers most of the process. However, detailed processes for ground and aerial inspections are in draft form and are not currently published.
11	Medium	Not Implemented	Has a risk-reduction target been set and incorporated into inspection requirements?	No risk reduction targets have been established at this time.
12	Medium	Not Implemented	Has the inspection method been assessed for effectiveness in identifying each failure mode?	The inspection methods have not been assessed for effectiveness in identifying each failure mode.
31	Medium	Partial	Are the results of the inspections programmatically integrated into the asset management process?	Periodic reviews of the inspection findings are performed by Substation Asset Strategy however these are ad hoc, and the process is not documented in a guidance document.
40	Medium	Partial	Is there a feedback loop to inform all stakeholders of Notices of Violation?	There needs to be a feedback loop to inform all stakeholders of NOVs.
41	Medium	Partial	Is there a feedback loop to inform asset management personnel of inspection findings or feedback from the inspection team on the effectiveness of inspection techniques and inspection frequency?	Periodic reviews of the inspection findings are performed by Substation Asset Strategy however these are ad hoc, and the process is not documented in a guidance document.
48	Medium	Not Implemented	Are there standards or procedures that define independent reviews of changes to decisions and required dates?	Need to develop a procedure that defines independent reviews of changes to decisions and required dates.

Substation Supplemental Inspection Program Actions

Action Plan (2022):

High Priority:

Assessment Question	Findings	Corrective Action Description	Current Status	Action Owner	Completion Date
9	The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program	Create a new technical basis document using the new template attached to GOV-1038S using the information in the FMEA	In Progress CAP #123223309	[redacted]	3/31/2023

- Four-year program existence

Medium Priority:

These issues will be addressed as a part of the implementation of the technical basis document per GOV-1038S

Substation Preventative Maintenance Program Assessment

Summary of All Findings from January 2022 Self Assessment:

High priority – 1

Medium priority - 7

Question #	Priority	Status	Question	Finding
9	**High**	**Partial**	**Has a technical basis document been developed?**	**The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program**
11	Medium	Not Implemented	Has a risk-reduction target been set and incorporated into inspection requirements?	No risk reduction targets have been established at this time.
12	Medium	Partial	Has the inspection method been assessed for effectiveness in identifying each failure mode?	The inspection methods have not been assessed for effectiveness in identifying each failure mode.
28	Medium	Not Implemented	Is there a management of change process in place to ensure results from the quality control audits are used to inform and make improvements to the inspection process (such as procedure adjustments, training materials, retraining, or disqualification of non-performing personnel)?	Need to develop a process to incorporate audit findings into the program.
31	Medium	Not Implemented	Are the results of the inspections programmatically integrated into the asset management process?	No process exists to programmatically integrate inspection results into the asset management process.
40	Medium	Partial	Is there a feedback loop to inform all stakeholders of Notices of Violation?	There needs to be a feedback loop to inform all stakeholders of NOVs.
41	Medium	Not Implemented	Is there a feedback loop to inform asset management personnel of inspection findings or feedback from the inspection team on the effectiveness of inspection techniques and inspection frequency?	There needs to be a feedback loop to inform Asset Strategy of inspection findings.
48	Medium	Not Implemented	Are there standards or procedures that define independent reviews of changes to decisions and required dates?	Need to develop a procedure that defines independent reviews of changes to decisions and required dates.

Substation Preventive Maintenance Program Actions

Action Plan (2022):

High Priority:

Assessment Question	Findings	Corrective Action Description	Current Status	Action Owner	Completion Date
9	The substation FMEA is currently being used as the technical basis document. The new technical basis template needs to be created for the program	Create a new technical basis document using the new template attached to GOV-1038S using the information in the FMEA	In Progress CAP #123223309	[redacted]	6/30/2023

- PM program many decades of maturity

Medium Priority:

These issues will be addressed as a part of the implementation of the technical basis document per GOV-1038S

Inform ☑ Decision ☐

Pre-Read Questions, Review Action Items, & MOLOSA

By Email

APPENDIX

Inform ☑ Decision ☐

APPENDIX: GOV-1038S UPDATES

Desired Outcome: To record, track, and report on assigned tasks/actions assigned to PG&E employees in order to meet the Risk and Compliance Committee's expectations.

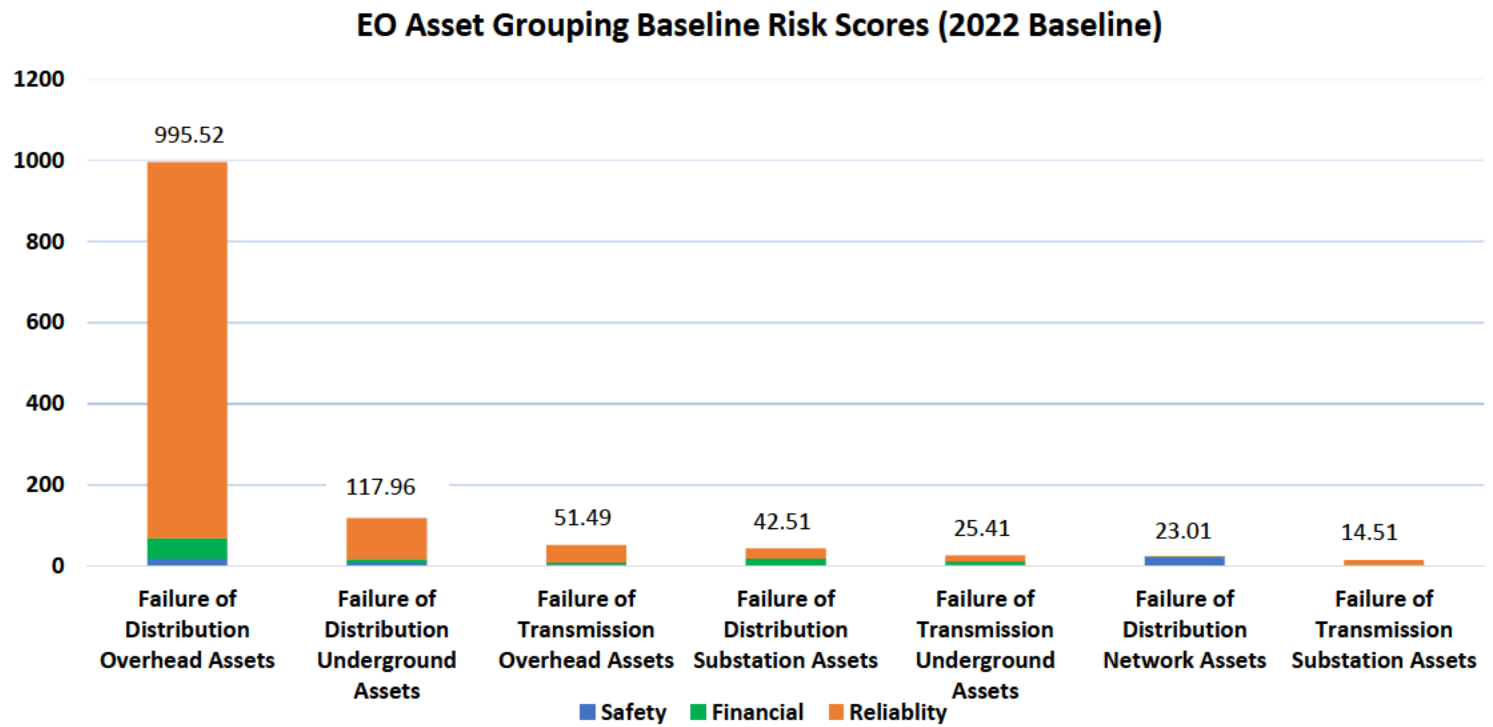
GOV-1038S Task Tracker

GOV-1038S	Owner	Action Item	Assigned	Target Date	BRAG	Comment
A: F-02	[redacted]	Streetlight Only Pole Inspection Look into benchmark data from other utilities for streetlight pole inspections.	1/7/2022	7/7/2022	On Track	• [redacted] will reach out to SoCal Edison and San Diego Gas & Electric as well as other utilities to see what they are doing as far as streetlight-only pole inspections.
B: F-02	[redacted]	Distribution Infrared Inspection Align on standards of thermal inspections and loading requirements and investigate correlation between find rate and loading conditions.	1/7/2022	8/4/2022	On Track	• Reassigned to [redacted] in agreement with [redacted] and [redacted] • Date has been extended out due to reassignment.

APPENDIX: TRANSMISSION UNDERGROUND RISK DEEP DIVE

PG&E Risk Scores – EO Risk Register

Key Take-Away: Failure of Underground Transmissions ranks relatively low with a risk score of 25.41 compared to other categories



TUG FAILURES

Third-Party Dig-Ins

Year	Line Name	Notes
1989	Sobrante-Richmond 1 & 2 115 kV Cable	---
2004	Vineyard 230 kV Cable	---
2004	Wolfe-Stelling Nos. 1 & 2 115 kV Cable	○ Resulted in a 12-hour outage (47,038 customers). ○ Both cables (B phases) hit by drill from fiber optic construction.
2006	Hunters Point-Mission No.1 115 kV Cable	---

Year	Line Name	Notes
1997	Hunters Point-Mission No.1 115 kV	○ Cable failure due to hot spot (co-location). ○ Cable out of service for 7 weeks.
2001	Castle Rock-Lakeville 230 kV	○ Opening the wrong valve caused pothead failure (Work Procedure Error). ○ Cable out of service for 1 year (cycle time, not repair time).
2007	Hunters Point-Mission No.1 115 kV	○ Inadvertent injection of current into cable while performing tests (Work Procedure Error). ○ Cable out of service for 50 minutes.
2013	Hunters Point-Mission No.1 115 kV	○ Cable failure due to water intrusion into insulation. ○ Cable out of service for 7 weeks.

TUG Failures

Asset Failures: XLPE

Year	Line Name	Notes
2020	Jefferson-Martin 230 kV	○ XLPE cable fault (Phase B to ground) occurred between vault 32 and 33. ○ Defect found in the semi-con layer. Longitudinal defect found on the failed sample and the intact cable sample sent for testing. This is a manufacturing defect. ○ Fault occurred at the location where the defect was present. ○ Cable out of service for almost 4 weeks. ○ Cable was repaired with spare XLPE cable ○ New spare cable reels are being ordered due to limited spare inventory

Spare Inventory by Cable Type - HPFF

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter (inches)	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping Cables to Order
Pipe Type - HPFF	230	1250	Al	8.63	Figarden Tap #1	2560	Phelps Dodge Cable and wire	None	**3 reels x 3000ft per reel**
				8.63	Figarden Tap #2		Phelps Dodge Cable and wire		
		2500	Cu	10	San Mateo-Martin	2384	General Cable	1 reel - 770 ft	Order **6 reels x 3000ft per reel of 2500 kcmil Cu** to cover 2500 kcmil Cu and 3500 kcmil Al.
				10	HZ-1		Anaconda and General Cable		
				10	HZ-2		Anaconda and General Cable		
		3500	Al		San Mateo-Martin	2957	General Cable	1 reel - 900 ft	
				10.75	Fulton-Lakeville #1A		Phelps Dodge Cable and wire		
				10.75	Fulton-Lakeville #1B		Phelps Dodge Cable and wire		
				10.75	Geysers #9-Lakeville #2A		Phelps Dodge Cable and wire		
				10.75	Geysers #9-Lakeville #2B		Phelps Dodge Cable and wire		

SPARE INVENTORY BY CABLE TYPE - HPGF

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter (inches)	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping Cables to Order
Pipe Type - HPGF	60	800	Al	5.56	Jefferson-Stanford-Stanford	2842	Okonite	1 reel - 305ft	**3 reels x 3000ft per reel**
		2000	Al	6.63	Cooley Landing-Stanford	3198	Pirelli (Prysmian)	None	**3 reels x 3500 ft per reel**
				6.63	Jefferson-Stanford-Jefferson		Okonite		
	115	500	Al	5.53	EBMUD	2297	Okonite	None	Order **6 reels x 3000ft per reel of 500 kcmil Cu** to cover 500 kcmil Cu and 500 kcmil Al.
			Cu	5.56	GR-1	2560	General Cable	3 reels - 2575 ft	
				5.56	GR-2		General Cable		
				5.53	EBMUD		General Cable		
		1000	Cu	6.63	PX-2	2485	General Cable	3 reels - 873 ft	Order **12 reels x 3000ft per reel of 2000 kcmil Cu** to cover for 1000 kcmil Cu, 1250 kcmil Cu and eventually 2000 kcmil Cu if required in the future.
				6.63	HY-1		Anaconda		
				6.63	AX-1		General Cable		
				6.63	HP-1		General Cable		
				6.63	PX-1		General Cable		
					HP-3		General Cable		
		1250	Cu	6.63	CX-2	2732	General Cable	3 reels - 1200 ft each (Martin), 1 reel - 1700 ft (Stockton)	
				6.63	AY-1		General Cable		
				6.63	DL-1		General Cable		
				6.63	CL-1		Okonite		
				6.63	DL-1		Okonite		
				6.63	AX-1		General Cable		
				6.63	HY-1		General Cable		
				6.63	CL-1		General Cable		
				6.63	XY-1		General Cable		
					HP-3		General Cable		
		2000	Cu	6.63	AHW-1 (HPGF-LPP)	2715	Okonite	3 reels - 2032 ft each (Martin), 9 reels (3 reels - 1735 ft each, 3 reels - 2735 ft each, 1 reel - 2727 ft, 1 reel - 2757 ft, 1 reel - 2781 ft) (Stockton)	
				6.63	AHW-2 (HPGF-LPP)		Okonite		
				8	KD-1		General Cable		

SPARE INVENTORY BY CABLE TYPE – HPGF

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter (inches)	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping Cables to Order
Pipe Type - HPGF	115	3000	Al	8.63	AY-2	2814	Okonite	None	Order **9 reels x 3000ft per reel of 3000 kcmil Cu** to cover for 3000 kcmil Cu and 3000 kcmil Al
				8.63	DL-1		General Cable		
				8.63	CL-1		General Cable		
				8.63	KD-2		General Cable		
				8.63	San Mateo-Martin #3		General Cable		
				8.63	East Grand-San Mateo		General Cable		
				10	Martin-Millbrae #1		General Cable		
				8.63	Martin-SF Airport		General Cable		
				8.63	San Mateo-Martin #6		General Cable		
			Cu	8.63	Trimble-San Jose B	2602	Okonite	1 reel - 1858 ft	
				8.63	Kiefer-San Jose B		Okonite		

SPARE INVENTORY BY CABLE TYPE – XLPE

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping
XLPE (single core)	60	1750	Al	NA	JEFFERSON-LAS PULGAS	TBD	Silec	None	N/A - cable replacement work
	70	1750	Al	NA	BORDEN-GLASS	TBD	Fujikura	None	**3 reels x 2000 ft each**
	115	2500	Cu	NA	CX-3	2112	Nexans	3 reels - (1 reel - 2201 ft, 1 reel - 2001 ft, 1 reel - 2260ft)	**Order 6 reels x 3000ft each of 3500 kcmil Cu** to cover for 2500 kcmil Cu, 3000 kcmil Cu, 3200 kcmil Cu, 3500 kcmil Al and 3500 kcmil Cu.
				NA	Lakeville-Sonoma		Nexans		
				NA	Atlantic Del Mar		Nexans		
				NA	Newark-Applied Materials		Sagem (General Cable)		
				NA	Applied Materials-Britton		Sagem (General Cable)		
		3000	Cu	NA	Atlantic Del Mar (DEL MAR-ATLANTIC #1 operating at 60 kV)	2218	Nexans	1 reel - 2319 ft	
				NA	Pittsburg-Los Medanos #1A		Silec (Sagem, General Cable)		
				NA	Pittsburg-Los Medanos #1B		Silec (Sagem, General Cable)		
				NA	Pittsburg-Los Medanos #2A		Silec (Sagem, General Cable)		
				NA	Pittsburg-Los Medanos #2B		Silec (Sagem, General Cable)		
		3200	Cu	NA	Stelling - Monte Vista	1962	Alcatel (Nexans)	None	
				NA	Monta Vista-Wolfe		Alcatel (Nexans)		
		3500	Cu	NA	H-P #4	TBD	Nexans	TBD	
		3500	Al	NA	CX-3	1972	Nexans	None	

SPARE INVENTORY BY CABLE TYPE – XLPE CONTD…

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping
XLPE (single core)	230	2000	Cu	NA	North Dublin-Vineyard Seg 1	2215	Forte (Southwire)	4 reels (1 reel - 768 ft, 1 reel - 2068 ft, 1 reel - 2306 ft, 1 reel - 618 ft)	**Order 6 reels x 3000ft each of 2500 kcmil Cu** to cover for 2000 kcmil Cu and 2500 kcmil Cu lines
				NA	North Dublin-Vineyard Seg 2		Nexans		
				NA	North Dublin-Vineyard Seg 3		Nexans		
				NA	North Dublin-Cayetano		Nexans		
				NA	Lonetree-Cayetano		Nexans		
				NA	Vineyard-Newark		Forte (Southwire)		
		2500	Cu	NA	Jefferson-Martin	1793	Pirelli (Prysmian)	7 reels (1 reel - 1845 ft, 1 reel - ?, 1 reel - 1845 ft, 1 reel - 1845ft, 1 reel - 1845 ft 1 reel - 1845 ft, 1 reel - 1858ft)	
				NA	Newark-Los Esteros A & B		Sagem (General Cable)		
				NA	Los Esteros-Metcalf A &B		Sagem (General Cable)		
				NA	ZA-1	TBD	Sumitomo		
				NA	Calpine Dec Line #1	TBD	Silec		
				NA	Calpine Dec Line #2	TBD	Silec		

Spare Inventory by Cable Type – XLPE (Triplex) & Submarine

Type	Voltage (kV)	Cable Size (kcmil)	Material	Pipe Diameter	Circuit Name	Longest Section (feet)	Cable Manufacturer	Inventory	Grouping
XLPE (Triplex)	115	2500	Cu	NA	San Mateo-Martin #4	TBD	Sumitomo	1 reel	N/A
Submarine	230	1400 sq-mm	Cu	NA	ZA-1 (Submarine Cable)	15,048 (length of the entire section)	Sumitomo	TBD	N/A

Inform ☑ Decision ☐

APPENDIX: ODSP GAP CLOSURE

AS OF APRIL 29, 2022

[redacted] Director, Power Generation Asset Excellence

FERC Audit Report, Feb 2022, Response to Recommendations

The Dam Safety Advisory Board (DSAB) completed an Owner's Dam Safety Program (ODSP) audit as required by FERC every five years.

- The audit concludes with 7 recommendations that shall be addressed and submitted to FERC.

Recommendation	Owner(s)/Lead(s)	Corrective Action Plan Title and CAP#	RAG Status
R1: Strengthen ODSP capability and effectiveness	[redacted] /	*CAP(s) to be created after DSAB review*	
R1.0: Update and enhance ODSP guidance documents to reflect current organization and include defined roles, responsibilities, accountabilities, and training requirements	[redacted]		
R1.1: Strengthen alignment of employees to business goals	[redacted]		
R1.2: Implement periodic briefings of executives by the CDSE	[redacted]		
R1.3: Develop an effective means to track dam safety issues to resolution	[redacted]		
R1.4: Implement additional training opportunities for incumbent employees	[redacted]		
R2: Improve hydro work management program and closure of work items **R3A:** Develop a resource loaded plan to address the large civil maintenance backlog	[redacted] / [redacted]	Hydro Work Management Program Issues **CAP: 122807122**	
R3B: Develop a resource loaded plan to address the FERC regulatory backlog	[redacted] / [redacted]	HC Notification/Task Closure Required **CAP: 122627784**	
R4: Develop strategy for long-term management of automatic data acquisition system (ADAS) equipment and data	[redacted] / [redacted]	*CAP to be created after DSAB review*	
R5: Establish a measure for civil asset maintenance that is critical for dam safety	[redacted] / [redacted]	*CAP to be created after DSAB review*	
R6: Develop a systematic approach for issue identification and tracking for low-hazard dams	[redacted] / Deputies	*CAP to be created after DSAB review*	
R7: Add external members to the next internal CEATI self-assessment team	[redacted] / [redacted]	*CAP to be created after DSAB review*	

Overall Status:

Owner: [redacted] Lead: [redacted]

Strengthen ODSP capability and effectiveness

R1.0: ODSP documents, including all appendices, need updating now to reflect the current organization, even if this is still in transition. Roles, responsibilities and accountabilities, and training requirements of all positions involved with every aspect of the ODSP need to be properly documented.

CAP: **TBC after DSAB review**

Insight

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

KEY MILESTONES

Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Finalize responsible-accountable matrix for dam safety roles	Build on unfinished Dam Safety 2.0 RACI effort	5/27/22		[redacted]	
2	Finalize roles and responsibilities document for key dam safety positions		7/1/22		[redacted]	
3	Update testing and inspection procedures (PG-2763 series and PG-2766P-02)	Aligned with current effort (CAP issues 119218877, 119218879, 119218960, 119218942, 119218962, and 119219008)	7/1/22		[redacted]	
4	Finalize training matrix (by job classification and role)		9/2/22		[redacted]	
5	Update Dam Safety Program Standard (PG-2760S) and develop road map for updates to remaining guidance documents	Updated standard to include responsible-accountable matrix, roles and responsibilities document, and updated training matrix	9/2/22		[redacted]	
6	Update dam safety program guidance documents included in compliance maturity initiative	Potential Dependency: Electric Operations Compliance Maturity effort. Aligned with current efforts (CAP 122377939, 119695302)	12/21/23		[redacted]	
7	Update remaining dam safety program guidance documents, per road map		12/21/23		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Strengthen ODSP capability and effectiveness

R1.1: Employees should be better informed as to how their jobs support the achievement of PG&E's business goals to strengthen organizational alignment.

CAP: **TBC after DSAB review**

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

Insight

KEY MILESTONES

Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Communicate DSAB report on internal communication platforms and AM/OM meetings	Report posted on Power Generation Asset Excellence site and reviewed in AM/OM Sync meetings	2/14/2022	2/14/2022	[redacted]	
2	Include Dam Safety Program goals in annual "Power Generation Plan on a Page"	Confirmed in Power Generation VP and Directs Meeting	2/28/2022	2/28/2022	[redacted]	
3	Include Dam Safety Program goals in Strategic Asset Mgmt Plan Revision	Confirmed in Asset Mgmt Steer Co	3/30/2022	3/30/2022	[redacted]	
4	Include Dam Safety Program Goals in annual performance goals	Confirmed with cascade into 2022 goals and objectives and Q1 review	4/28/2022		[redacted]	
5	Include Dam Safety Program goals in annual Asset Mgmt Plan updates for dams and appurtenant assets	Asset Mgmt Plan feeds long term planning and funding priorities	9/30/2022		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Strengthen ODSP capability and effectiveness

R1.2: Implementation of periodic briefings of executives should be performed by the CDSE as required by PG-2760S.

CAP: **TBC after DSAB review**

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
2	Emergent scheduling conflicts	Prioritize rescheduled meetings to maintain cadence	[redacted]	Ongoing

Insight

KEY MILESTONES

Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Establish quarterly meeting cadence with CDSE and SVP EO and VP Power Gen specific to Dam Safety Program	Invitations sent for three meetings in 2022 (4/22, 6/30, and 9/29)	2/28/22	2/28/22	[redacted]	
2	Conduct at least 3 briefings in 2022 to establish success pattern		12/31/22		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue Complete

Overall Status:

Owner: [redacted] Lead: [redacted]

Strengthen ODSP capability and effectiveness

R1.3: Develop an effective means to track dam safety issues to resolution.

CAP: **TBC after DSAB review**

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

Insight

KEY MILESTONES

Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Identify population of dam safety issues and associated tracking systems	Develop matrix of issues types (existing and potential) and associated tracking systems E.G. SAP WM, DamWatch, Other, None	5/20/22		[redacted]	
2	Confirm SAP Work Management is an appropriate tool for tracking all dam safety issues identified in Action 1	Develop guidance for classifying issues/tasks as recurring (H3) and corrective (H1)	6/3/22		[redacted]	
3	Identify enhancements to SAP WM/DamWatch needed to support tracking all dam safety issues	Dependency 5/26 Compliance and WM workshop #3 E.G. Standardize SAP Status, Type, etc. Field "Nomenclature" used for purposes of tracking issues	7/1/22		[redacted]	
4	Develop and implement SAP WM/DamWatch enhancements	Due Date Dependency IT resource availability and significance of enhancements Evaluate and leverage existing SAP capabilities wherever possible.	9/30/22		[redacted]	
5	Transition all dam safety issues to be tracked in SAP WM/DamWatch	Start in parallel with Action 3	10/28/22		[redacted]	
6	Update H1 dashboard to meet requirements	Build upon DSP DamWatch Dashboard – H1 Ticket Summary	12/15/22		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Strengthen ODSP capability and effectiveness

R1.4: Implement additional training opportunities for incumbent employees.

CAP: **TBC after DSAB review**

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

Insight

Objective is to implement training and development practices in 2022 and sustain them in 2023 for long-term integration as part of the ODSP in 2023 and beyond.

KEY MILESTONES

Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Develop and maintain a list of professional development and training opportunities for dam safety staff	See training spreadsheet "Hydro Training-Conferences 2022.xlsx in Teams folder: Dam Safety Program / General / Training	1/31/22	1/31/22	[redacted]	
2	Review training opportunities during monthly dam safety team meetings		6/1/22		[redacted]	
3	Develop and maintain an inventory of interests and expertise for dam safety staff		6/1/22			
4	Utilize iConnect goal and development plan tools to identify and track training and learning activities. Leaders review and encourage development actions in quarterly reviews. 100% of dam safety staff participate in at least one external professional development each year.		1/31/23		[redacted]	
5	Encourage committee and professional organization participation (USSD/ASDSO/CEATI).		1/31/23		[redacted]	
6	Establish regular dam safety team brown bags to share dam safety knowledge and information from external and internal sources. At least 6 events in 2022 and at least 9 events in 2023.		1/31/24		[redacted]	
7	Based on results of Act # 1-5 efforts, evaluate and update ODSP guidance documents to reflect long-term training and development objectives.		1/31/24		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Improve Hydro Work Management Program and Address Civil Maintenance Backlog

R2: Improve closure of SAP work items by removing completed items from the backlog and more closely monitor backlog performance. This should be done in consultation with the DSEs.

R3A: Develop a resource loaded plan and schedule to address the large civil maintenance [backlog].

CAP: **122807122**

Risks / Mitigations

Mi #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

Insight

Similar to ISO 55000 audit finding. One plan to address the scopes of both findings is required.

KEY MILESTONES

Mi #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Validate and clean up the existing H1 and H3 tags and establish an accurate baseline backlog		10/28/2022		[redacted]	
2	Implement a scheduling program and SAP enhancements to allow prioritization and scheduling of current and future work	2022 funding for the SAP enhancement for recurring notifications secured within the Data Governance workstream of the Asset Data AMP / Budget.	11/18/2022		[redacted]	
3	Migrate all maintenance requirements to SAP		11/18/2022		[redacted]	
4	Design metrics to provide insight to recurring (H3) and corrective work (H1)		12/8/2022		[redacted]	
5	Provide SAP WM training to all O&M personnel, Dam Safety, and Asset Management		12/15/2022		[redacted]	
6	Create Dashboard to Display Metrics		1/20/2023		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Address Regulatory Compliance Backlog

R3B: Develop a resource loaded plan and schedule to address the FERC regulatory compliance backlog.

CAP: **122627784**

Insight

Minor non-conformance: The metrics around the backlog of HC Compliance tasks are not giving the business a clear picture of the status of these tasks and requires assessment and clarification of the current position.

Workstreams

No.	Description	Due Date	Owner	Status
1	Secure Resources	4/14/2022	[redacted]	
2	Conduct Technical Research to Understand Clear Picture	5/26/2022	[redacted]	
3	Execute Data Clean-up	7/28/2022	[redacted]	
4	Install/Update Detective Controls	12/15/2022	[redacted]	

Risks / Mitigations

Act #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

KEY MILESTO

[redacted] Lead: [redacted]

WS	Act #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	1	Immediate Mitigating Actions – Identify and Characterize Overdue Tasks requiring filings		3/31/2022	3/31/22	[redacted]	
1	2	Secure Resources for 'Tiger Team'; Align stakeholder orgs	Team Members Needed for task force include, but are not limited to: O&M, AE (DS), Environmental Management, Safety; Bring in contractor/hiring hall resources	4/14/2022	4/5/22	[redacted]	
2	3	Ensure Dataset in Dashboard is comprehensive to all data in SAP		4/28/2022	4/13/22	[redacted]	
2	4	Strategize Allocation of Tasks & Notifications to Members of Tiger Team for review and develop guidelines for task closure		5/12/2022		[redacted]	
2	5	Standardize SAP Status Field "Nomenclature" used for purposes of task status		5/26/2022		[redacted]	
3	6	Prioritize and Execute Data Clean up of all Hydro Compliance Backlog items		7/28/2022		[redacted]	
4	7	Collect lessons learned – Begin Cause Evaluation, if required (Ref. 122622467)		8/11/2022		[redacted]	
4	8	Evaluate – will implementation of CMS address cause(s)? Other? (Ref. CAP 120552119)	CMS, as defined in PG-1101P-02 and PG-2100P-02	8/25/2022		[redacted]	
4	9	Design Solutions for any unaddressed causes		9/8/2022		[redacted]	
4	10	Define the data requirements that will give clear picture moving forward		10/20/2022		[redacted]	
4	11	Update HC dashboard to meet requirements		12/15/2022		[redacted]	

Overall Status:

Owner: [redacted] Lead: [redacted]

Develop strategy for long-term management of automatic data acquisition system (ADAS) equipment and data

R4: A strategy for the long-term management of the ADAS equipment and data must be developed and documented, including the specific responsibilities and accountabilities for the ownership of data and its interpretation. Automated alarms should be developed as a priority, and monitored internally by PG&E.

CAP: **TBC after DSAB review**

Risks / Mitigations

Mi #	Risk	Mitigation Plan	Owner	Due Date
4	In-flight ADAS project design or FERC/DSOD approval delayed; project execution postponed	Pilot draft standard using existing data acquisition systems	[redacted]	11/30/23

Insight

Governance: Current ADAS contains instruments linked through SCADA and third-party Canary system (Scott Dam). Governance processes are available for instruments within the SCADA system; however, they are not currently available for the Canary system.

Program Progress: Asset management surveillance and monitoring lead to investigate current data management structures and ownerships. Prepare new standard with clear definition of data and equipment ownership, roles and responsibilities for all stakeholders. Engage stakeholders for two in-flight ADAS projects at Lake Almanor and Butt Valley dams to pilot the draft standard. Collect feedback and finalize the standard.

KEY MILESTONES

Mi #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Identify and document current dam safety data and equipment management structure	Identify and document existing dam safety-related data types, sources (collectors), instrumentation and programs (assets), installations, ownership, stakeholders, and data users.	8/31/22		[redacted]	
2	Identify and document current dam safety data and equipment ownership	Identify and document existing data pathways and roles and responsibilities for interpreting and acting on data.	11/30/22		[redacted]	
3	Develop draft standard for ADAS data and equipment management	Standardize and consolidate management structure, with clear definition of roles, responsibilities, and ownership (note automated alarms to be developed as a priority and monitored internally by PG&E).	5/31/23		[redacted]	
4	Pilot draft standard and collect feedback	Pilot draft standards for existing ADAS systems and two in-flight projects	11/30/23		[redacted]	
5	Finalize standard	Incorporate feedback into final standard	5/31/24		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's **no** recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Establish a measure for civil asset maintenance that is critical for dam safety

R5: The SDOC measure should be expanded to include a measure of civil asset maintenance that is critical for dam safety.

CAP: **TBC after DSAB review**

Insight

Note: The DSP does not disagree with the intent of this recommendation but is not certain that the specific SDOC metric is the best means to achieve the objective. Let's discuss.

Risks / Mitigations

WS/Mi #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

KEY MILESTONES

Mi #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Analyze update to SDOC metric * [may determine that SDOC is not the best metric – let's discuss]	Assess based on high-risk subset of water conveyance and access roads. Review with DSAB for insight/advice.	9/30/2022		[redacted]	
2	Review updates to SDOC with PGEN leadership team	Align as PGEN leadership team prior to corporate board submission.	11/4/2022		[redacted]	
3	Propose updates to enterprise leadership for 2023 goal planning	SDOC is a corporate board reviewed and approved safety metric. Review timeline must align with board review timeline for corporate safety metrics.	12/2/2022		[redacted]	
4	Implement revised SDOC metric	2023 Performance Book of Work will reflect revision.	2/20/2023		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's no recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: Deputy CDSEs

Develop a systematic approach for issue identification and tracking for low-hazard dams

R6: The risks associated with smaller, low-hazard dams that are inspected only once annually and are not subject to regulatory oversight warrant a systematic approach for issue identification and tracking.

CAP: TBC after DSAB review

Risks / Mitigations

WS/Mi #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

Insight

Actions to address this recommendation are covered by action plans for R1.3 (tracking dam safety issues to resolution) and R2 (improve closure of SAP work items). Improved work management systems will be separate from regulatory compliance systems, allowing for consistent tracking of work regardless of whether it is subject to regulatory oversight. Deputy CDSEs are responsible for making sure that potential risks and issues at low hazard dams are identified, prioritized, tracked, and managed to resolution using the improved work management tools and processes.

KEY MILESTONES

Mi #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Complete R1.3 actions (tracking dam safety issues to resolution)		12/15/22		[redacted]	
2	Complete R2 actions (improved closure of SAP work items)		1/20/23		[redacted]	
3	DCDSEs confirm that issues identified at low hazard and non-jurisdictional dams are being assigned and tracked to resolution in the work management system of record.		6/30/23		[redacted]	

Green indicates that everything is going to plan Amber indicates a mild risk / issue exists but there's a recovery plan in place Red indicates a significant risk / issue exists and there's no recovery plan in place Blue [redacted]

Overall Status:

Owner: [redacted] Lead: [redacted]

Add external members to the next internal CEATI self-assessment team

R7: Provide some external members on the next CEATI assessment team.

CAP: **TBC after DSAB review**

Insight

The next internal CEATI self-assessment is scheduled for Q3 2023. The 2023 assessment will be a 'fresh' (i.e., not building on the 2021 assessment).

Risks / Mitigations

WS/Mi #	Risk	Mitigation Plan	Owner	Due Date
	N/A			

KEY MILESTONES

Mi #	Milestone	Progress Notes	Due Date	Date Complete	Owner	Status
1	Identify and invite external participants to support PG&E's next CEATI maturity matrix self-assessment.		5/31/23		[redacted]	
2	Complete self-assessment with external participants as part of the assessment team.		12/15/23		[redacted]	

Green indicates that everything is going to plan | Amber indicates a mild risk / issue exists but there's a recovery plan in place | Red indicates a significant risk / issue exists and there's **no** recovery plan in place | Blue [redacted]

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APPENDIX:
INTERNAL AUDIT UPDATES
MAY 2022

[redacted], Sr. Director, Internal Audit

INTERNAL AUDIT – SCHEDULE (1/1)

ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Audit and Control Advisory Work Underway or Planned – May 5, 2022					
	Audit Name	**Scope**	**Type**	**Targeted Completion Date**	**Client Contact**
1	2022 Wildfire Mitigation Plan (WMP) – Target Setting – CONTROL ADVISORY	Provide controls advice over development of the 2022 WMP commitments.	Requested	In progress	COWSERT / SINGH, S / SMITH
2	2022 WMP – Record of Evidence – CONTROL ADVISORY	Provide controls advice over the record of evidence to support the 2022 WMP commitments.	Requested	In progress	COWSERT / SINGH, S / SMITH
3	2022 WMP – Commitment Validation	Validate the completion of 2022 WMP commitments.	Requested	In progress	COWSERT / SINGH, S / SMITH
4	Animal Abatement	Evaluate processes and controls over animal abatement work at Utility substations.	Audit Plan	7/31/2022	GABBARD, D / COWSERT
5	Enhanced Powerline Safety Settings (EPSS) Program – CONTROL ADVISORY	Provide controls advice over processes and controls for EPSS.	Requested	6/30/2022	[redacted] / QUINLAN
6	Electric Geographic Information System (GIS) – Line Mileage	Evaluate processes and controls over the accuracy of mileage data in GIS that feeds into the franchise fee calculation process.	Audit Plan	5/30/2022	[redacted] / COWSERT
7	System Hardening Process Validation – CONTROL ADVISORY	Validate the miles of system hardening work completed.	Requested	In progress	ABABNEH
8	STIP Metric Auditability	Evaluate processes and controls for calculating and supporting Electric-related 2022 STIP metrics (as part of reviewing all STIP metrics).	Audit Plan	7/31/2022	[redacted]

INTERNAL AUDIT – OPEN ISSUES (1/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	Audit Report Number	Audit Name	Subject	Audit Report Date	Months Open	Current Client Commitment Date	Date Reviewed by IA	Status	Client Contact
HIGH RISK AUDIT ISSUES – 2										
1	544130	20-015	Audit of Electric Asset Management, Inspections, and Repairs	1. Transmission Asset Management Program	2/11/2020	26	6/30/2022	7/30/2022		COWSERT
2	544132	20-015	Audit of Electric Asset Management, Inspections, and Repairs	2. Distribution Asset Management Program	2/11/2020	26	6/30/2022	7/30/2022		COWSERT

INTERNAL AUDIT – OPEN ISSUES (2/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	Audit Report Number	Audit Name	Subject	Audit Report Date	Months Open	Current Client Commitment Date	Date Reviewed by IA	Status	Client Contact
MEDIUM RISK AUDIT ISSUES – 17										
1	520121	19-029	Audit of Electric SCADA	7. Distribution SCADA – Inventory and Annual Testing of Field Devices	5/20/2019	36	4/1/2022 In review	5/1/2022		[redacted] / COWSERT / [redacted]
2	544074	20-005	Audit of Non-Tariffed Products and Services	1. Monitoring Joint Pole Credits	2/6/2020	27	6/30/2022	7/30/2022		[redacted] / [redacted]
3	544134	20-015	Audit of Electric Asset Management, Inspections, and Repairs	3. Substation Asset Management Program	2/11/2020	27	6/30/2022	7/30/2022		COWSERT
4	21-006-01	21-006	High Risk Validation – Cancelled Pole Replacements	Cancelled Maintenance	1/28/2021	16	10/1/2022	11/30/2022		[redacted]

INTERNAL AUDIT – OPEN ISSUES (3/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	Audit Report Number	Audit Name	Subject	Audit Report Date	Months Open	Current Client Commitment Date	Date Reviewed by IA	Status	Client Contact
MEDIUM RISK AUDIT ISSUES – Continued										
5	21-021-01	21-021	System Hardening	1. Emergency Rebuild As-Built Job Packages	4/7/2021	13	(Reclassified from high-risk) 11/30/2022	12/31/2022		ABABNEH / [redacted]
6	21-021-02	21-021	System Hardening	2. Emergency Rebuild Mapping	4/7/2021	13	11/30/2022	12/31/2022		ABABNEH / [redacted]
7	21-059-01	21-059	Audit of Idle Line Facilities – Distribution	1. Assigning and Monitoring Idle Facility Investigation Notifications	10/22/2021	7	(Reclassified from high-risk) 6/30/2022	7/30/2022		COWSERT
8	21-059-04	21-059	Audit of Idle Line Facilities – Distribution	4. Inventory List of Electric Distribution Idle Facilities	10/22/2021	7	6/30/2022	7/30/2022		COWSERT
9	21-059-03	21-059	Audit of Idle Line Facilities – Distribution	3. Monitoring and Cancelling Notifications for Idle Facility Removal	10/22/2021	7	(Reclassified from high-risk) 6/30/2022	7/30/2022		COWSERT
10	21-059-05	21-059	Audit of Idle Line Facilities – Distribution	5. SAP Auto-Generation of EC and RW Notifications for Idle Facility Removal	10/22/2021	7	6/30/2022	7/30/2022		COWSERT

INTERNAL AUDIT – OPEN ISSUES (4/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	Audit Report Number	Audit Name	Subject	Audit Report Date	Months Open	Current Client Commitment Date	Date Reviewed by IA	Status	Client Contact
MEDIUM RISK AUDIT ISSUES – Continued										
11	22-012-01	22-012	Audit of Network Maintenance	1. Oil Sampling Analyses	2/22/2022	2	11/30/2022	12/30/2022		COWSERT / DEAL
12	22-012-02	22-012	Audit of Network Maintenance	2. IVARA and SAP Reconciliation Report	2/22/2022	2	11/3/2022	12/30/2022		COWSERT / DEAL
13	22-014-01	22-014	Audit of Foreign Transmission Lines	1. Completeness of Foreign Transmission Line Population – EGI Only	2/22/2022	2	5/16/2022	6/30/2022		COWSERT
14	22-014-02	22-014	Audit of Foreign Transmission Lines	2. GIS Data Management – EGI and NRD	2/22/2022	2	3/31/2023	4/30/2023		COWSERT / AUGUST, A
15	22-014-03	22-014	Audit of Foreign Transmission Lines	3. Governance – EGI and NRD	2/22/2022	2	3/31/2023	4/30/2023		COWSERT / AUGUST, A

INTERNAL AUDIT – OPEN ISSUES (5/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	**Audit Report Number**	**Audit Name**	**Subject**	**Audit Report Date**	**Months Open**	**Current Client Commitment Date**	**Date Reviewed by IA**	**Status**	**Client Contact**
MEDIUM RISK AUDIT ISSUES – Continued										
16	22-014-05	22-014	Audit of Foreign Transmission Lines	5. Risk Analysis of Contracts – EGI and NRD	2/22/2022	2	12/31/2023	1/31/2024		COWSERT / AUGUST, A
17	22-017-01	22-017	Daily Vehicle Inspection Report Audit	1. Compliance and Monitoring	2/25/2022	2	12/31/2022	1/31/2023		DEAL / [redacted] / Transportation Safety

INTERNAL AUDIT – OPEN ISSUES (6/6)

	ELECTRIC OPERATIONS / ELECTRIC ENGINEERING – Open Internal Audit Issues									
	Corrective Action ID	**Audit Report Number**	**Audit Name**	**Subject**	**Audit Report Date**	**Months Open**	**Current Client Commitment Date**	**Date Reviewed by IA**	**Status**	**Client Contact**
MEDIUM RISK AUDIT ISSUES – Continued										
INTEGRATED AUDITS:										
1	520111	19-029	Audit of Electric SCADA	2. Access Authorization and Administration	5/20/2019	36	(Reclassified from high-risk) ~~3/30/2022~~ 12/31/2022 (pending approval)	2/28/2023		[redacted] / [redacted]
2	21-062-03	21-062	Audit of Application Design Adherence – Sherlock Suite	3. User Access Management – IT and Wildfire	10/26/2021	7	11/30/2022	1/31/2023		[redacted] / REGAN J
3	21-062-05	21-062	Audit of Application Design Adherence – Sherlock Suite	5. Change Management – IT and Wildfire	10/26/2021	7	IT: 11/02/2022 Wildfire: 4/25/2022	IT: 1/02/2023 Wildfire: 6/25/2022		[redacted] / REGAN J

POWER GEN INTERNAL AUDIT – OPEN ISSUES (1/2)

POWER GENERATION – Audit and Control Advisory Work Underway or Planned – May 5, 2022					
	Audit Name	**Scope**	**Type**	**Targeted Completion Date**	**Client Contact**
1	Power Generation Substation Management	Evaluate processes and controls over management of Power Generation owned substations, including ownership of assets in shared locations and wildfire risk mitigations.	Audit Plan	7/31/2022	[redacted]

POWER GENERATION – Open Internal Audit Issues										
	Corrective Action ID	**Audit Report Number**	**Audit Name**	**Subject**	**Audit Report Date**	**Months Open**	**Current Client Commitment Date**	**Date Reviewed by IA**	**Status**	**Client Contact**
MEDIUM RISK AUDIT ISSUES – 9										
1	21-012-01	21-012	Audit of Hydro SCADA PLC's	1. Management of PLC's	2/10/2021	15	(Reclassified from high-risk) 6/30/2022	8/30/2022		[redacted]
2	21-012-02	21-012	Audit of Hydro SCADA PLC's	2. PLC Change Management Process	2/10/2021	15	1/15/2022 (completed)	8/31/2022		[redacted]
3	21-012-03	21-012	Audit of Hydro SCADA PLC's	3. Data Communication Protection	2/10/2021	15	6/30/2022	8/30/2022		[redacted]
4	21-036-01	21-036	Audit of Power Generation Employee Safety Program	1. Prevention, Monitoring & Reporting (4 Parts, 4 Owners)	6/28/2021	11	6/23/2022	7/23/2022		[redacted]
5	21-036-02	21-036	Audit of Power Generation Employee Safety Program	2. Qualifications / Training Management	6/28/2021	11	6/23/2022	7/23/2022		[redacted]

POWER GEN INTERNAL AUDIT – OPEN ISSUES (2/2)

	POWER GENERATION – Open Internal Audit Issues									
	Corrective Action ID	**Audit Report Number**	**Audit Name**	**Subject**	**Audit Report Date**	**Months Open**	**Current Client Commitment Date**	**Date Reviewed by IA**	**Status**	**Client Contact**
MEDIUM RISK AUDIT ISSUES – Continued										
6	21-036-03	21-036	Audit of Power Generation Employee Safety Program	3. Guidance Documents	6/28/2021	11	6/23/2022	7/23/2022		[redacted] / [redacted]
7	22-016-01	22-016	Audit of Power Generation Public Safety Power Shut-Off	1. Identifying Assets Impacted by PSPS	2/23/2022	2	2/3/2023	4/3/2023		[redacted]
8	22-016-02	22-016	Audit of Power Generation Public Safety Power Shut-Off	2. Monitoring and Reporting	2/23/2022	2	10/10/2022	12/9/2022		[redacted]
9	22-017-01	22-017	Daily Vehicle Inspection Report Audit	1. Compliance and Monitoring	2/25/2022	2	12/31/2022	1/31/2023		NIMICK / [redacted] / Transportation Safety

APPENDIX:
2022 COMPLIANCE TRAINING UPDATE

[redacted], Director, Electric Compliance Governance & Reporting

2022 Electric Compliance Training Update

As of 4/27/22

Training Accountability Program (TAP)

Completing mandatory training is a compliance obligation for all employees and non-employees. It helps to keep PG&E safe and secure. The following 3 trainings are included in this program and are due May 31 (or 90 days after start date for new hires). Note that the **MyLearning** mobile app is available to both employees and non-employee workers to make training completion easier.

- Records & Information Management CORP-9046 WBT
- Security & Privacy Awareness ISEC-9022 WBT
- Code of Conduct CORP-0372 WBT (employees only)

Overdue Training Consequences

- **Overdue 7 days:** employees and non-employees will lose network access
- **Overdue 14 days:** non-employees will be recommended for off-boarding
- Managers/supervisors will need to facilitate overdue training for those with disabled LAN IDs and submit manual completions to the PG&E Academy

Current Status

- As of 4/27/22, **68%** of TAP trainings assigned to Electric employees are complete, and **67%** of those assigned to Electric non-employees are complete.

Additional information is available at:

- http://pgeweb.utility.pge.com/compliance/Pages/Training-Accountability.aspx
- http://tableau.comp.pge.com/#/views/TrainingTimeliness/TrainingTimelinessTeamView

	% Complete			Count	
	Employees	Non-Employees	All	Completed	Outstanding
CORP-9046WBT: RECORDS & INFORMATION MANAGEMENT	**67%**	**68%**	**67%**	**11624**	**5675**
EE Central Design	68%	58%	62%	671	415
EE Electric Asset & Regulatory	57%	63%	60%	994	658
EE Immediate Office	26%	20%	21%	29	112
EE T&S Engineering & Test	56%	71%	63%	730	428
EE Technology Development	47%	0%	46%	70	81
EO Electric Distribution Operations	72%	59%	70%	1725	751
EO Electric Operations Immediate Office	33%	N/A	33%	1	2
EO Electric Quality Mgmt	74%	84%	78%	112	32
EO Power Generation	66%	46%	64%	591	332
EO Projects & Construction	65%	54%	60%	1144	758
EO T&D System Ops	70%	59%	68%	730	349
EO Transmission Substation M&C	60%	52%	58%	1052	775
OPS Veg Mgmt & System Insp	85%	78%	79%	3775	982
ISEC-9022WBT: 2022 SECURITY & PRIVACY AWARENESS	**67%**	**66%**	**67%**	**11531**	**5784**
EE Central Design	70%	54%	60%	650	436
EE Electric Asset & Regulatory	58%	61%	60%	994	667
EE Immediate Office	26%	22%	23%	32	109
EE T&S Engineering & Test	58%	69%	63%	727	431
EE Technology Development	49%	0%	48%	73	78
EO Electric Distribution Operations	72%	59%	69%	1724	760
EO Electric Operations Immediate Office	33%	NA	33%	1	2
EO Electric Quality Mgmt	77%	82%	79%	114	30
EO Power Generation	68%	42%	65%	603	320
EO Projects & Construction	65%	52%	59%	1129	773
EO T&D System Ops	69%	58%	67%	720	359
EO Transmission Substation M&C	60%	51%	57%	1049	778
OPS Veg Mgmt & System Insp	83%	77%	78%	3715	1041
CORP-0372WBT: 2022 CODE OF CONDUCT TRAINING	**69%**	**N/A**	**69%**	**6182**	**2822**
EE Central Design	72%	N/A	72%	293	113
EE Electric Asset & Regulatory	59%	N/A	59%	417	289
EE Immediate Office	26%	N/A	26%	5	14
EE T&S Engineering & Test	62%	N/A	62%	380	233
EE Technology Development	50%	N/A	50%	75	74
EO Electric Distribution Operations	73%	N/A	73%	1484	541
EO Electric Operations Immediate Office	0%	N/A	0%	0	3
EO Electric Quality Mgmt	77%	N/A	77%	68	20
EO Power Generation	71%	N/A	71%	595	245
EO Projects & Construction	66%	N/A	66%	700	355
EO T&D System Ops	69%	N/A	69%	588	264
EO Transmission Substation M&C	62%	N/A	62%	835	514
OPS Veg Mgmt & System Insp	83%	N/A	83%	742	157
	Employees	**Non-Employees**	**Total**	**Total Completed**	**Total Outstanding**
Total	**68%**	**67%**	**67%**	**29337**	**14281**

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Appendix: Wildfire Update

As of March 31, 2022

[redacted], Director, CWSP PMO

2022 Wildfire Mitigation Plan Commitment Tracking Overview

PG&E defined 51 Targets in the 2022 Wildfire Mitigation Plan (WMP) that are due during or before the end of 2022. See the below high-level status by Plan Area of all 51 Targets.

Plan Area	Completed	On Track	At Risk	Off Track/Missed	Total
A. Risk Assessment and Mapping		2	3		5
B. Situational Awareness and Forecasting		6			6
C. Grid Design and System Hardening	1	13	1		15
D. Asset Management and Inspections		6	3		9
E. Vegetation Management and Inspections		9			9
G. Grid Operations and Protocols		4			4
I. Data Governance		1			1
J. Resource Allocation Methodology		1			1
K. Stakeholder Cooperation & Community Engagement		1			1
Total	**1**	**43**	**7**	**0**	**51**

Status color: Blue = "Completed on Time" - complete pending validation; Green = "On Track" – on track with internal milestones to meet external commitments; Amber = "At Risk" - off track with internal plan / milestones but have line of sight into meeting the full commitment scope by the externally committed due date; Red = "Off Track / Missed" - unable to meet the full commitment scope by the externally committed due date. Recovery is not possible or "Missed" if after due date.

2022 Wildfire Mitigation Plan "Off Track" or "at Risk" Targets Detail

2022 WMP Targets in "Off Track" and "At Risk" status (as of 3/31)	
A.03 PSPS Consequence Model	**2022 Target:** Conduct an assessment of the PSPS Consequence model to inform if it is fit for use to inform PSPS mitigation plans to minimize customer impact. **2022 Progress:** Soliciting stakeholder feedback and usage through meetings and review of results as part of the Undergrounding mileage selection framework. Delay due to resource focus on supporting Undergrounding Tool and Integrated Risk Spend Efficiency for System Hardening team which stems from lack of resources dedicated to workstream; divergence of priorities due to 2 members of the team resigning and 1 on emergency family leave. Management will shift its resource priorities to correct this delay and ensure this target is completed on time. The Recovery Plan date to be back on track with the WMP Target is 5/13/2022.
A.04 Wildfire Consequence Model Enhancements - Ingress/Egress	**2022 Target**: Develop an approach on how to incorporate ingress/egress into the Wildfire Consequence Model **2022 Progress**: Egress model has been delivered by UCLA and the RAVE model from Technosylva. Next step is to identify and assign resources to apply and explore models to identify preferred application to include Egress in the risk models. Discussions with Senior Leadership to identify and make additional qualified resources available are underway. The Recovery Plan date to be back on track with the WMP Target is 5/13/2022.
A.05 Wildfire Consequence Model Enhancements - Resistance to Control	**2022 Target**: Evaluate an approach to incorporate "Resistance to Control" (i.e., TDI) into the Wildfire Consequence Model. Resistance to Control is the relative difficulty of constructing and holding a control line as affected by resistance to line construction and by fire behavior. **2022 Progress**: Contractual arrangements for the resistance to control model outputs from the Technosylva RAVE model were completed. Discussions with Senior Leadership to identify and make additional qualified resources available are underway. The Recovery Plan date to be back on track with the WMP Target is 5/13/2022.
C.14 Remote Grid - Operate New SPS Units	**2022 Target:** Operate 2 new Remote Grid Standalone Power System (SPS) units by December 31, 2022. **2022 Progress:** At conclusion of 30% design, our contractor notified us that the remainder of Engineer/Procure/Construct timelines will be longer than expected due to COVID related delays. Global supply chain issues delaying generator procurement, extended design and contracting durations, and incremental civil scopes identified on 2 projects were the primary causes of the delay. The below actions are being taken to mitigate these delays: (1) Expedite internal approvals for contracts; (2) Civil work has been re-sequenced for earlier start; (3) Executive sponsor reaching out to key supplier to expedite long lead generator procurement; and (4) Contingency planning is in process for early commissioning and interim operations if generator sets are late as forecast.

Following the wildfires in 2017 and 2018, some of the changes included in this document are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

2022 Wildfire Mitigation Plan "Off Track" or "at Risk" Targets Detail

2022 WMP Targets in "Off Track" and "At Risk" status (as of 3/31)	
D.01 Detailed Inspections – Distribution	**2022 Target:** Complete detailed inspections on a minimum of 396,000 distribution poles, which were identified in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any poles discovered after January 1, 2022, with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any poles discovered after January 1, 2022, with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. **2022 Progress:** In Q1, PG&E completed detailed ground inspections on 6,235 distribution poles. The below actions are being taken to mitigate these delays: (1) Expedite internal approvals for contracts; (2) Civil work has been re-sequenced for earlier start; (3) Executive sponsor reaching out to key supplier to expedite long lead generator procurement; and (4) Contingency planning is in process for early commissioning and interim operations if generator sets are late as forecast.
D.02 Detailed Inspection Transmission – Ground	**2022 Target:** Complete detailed ground inspections on a minimum of 39,000 transmission structures in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any assets discovered after January 1, 2022, with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets discovered after January 1, 2022, with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. **2022 Progress:** In Q1, PG&E completed detailed ground inspections on 2,783 transmission structures. Delays with execution were driven by transitioning from three contractors to a single contractor. This resulted in delayed onboarding, required training and new skills assessment required to start work. Contractor has been secured and onboarding training and skills assessment has been completed. The Recovery Plan date to be back on track with the WMP Target is 6/25/2022
D.04 Detailed Inspection Transmission – Aerial	**2022 Target:** Complete detailed aerial inspections on a minimum of 39,000 transmission structures in PG&E's asset registry as of January 1, 2022, in HFTD areas or HFRA, barring External Factors. Any assets discovered after January 1, 2022, with a field installation date on or before 2020 will be inspected within 90 days of when added to the asset registry. Any assets discovered after January 1, 2022, with a field installation date in 2021 or 2022 will not be in scope for inspection as part of this 2022 WMP target. **2022 Progress:** In Q1, PG&E completed aerial inspections on 8,202 transmission structures. Delays with execution were driven by contract reviews as we transitioned from six contractors in 2021 down to three contractors in 2022. The Recovery Plan date to be back on track with the WMP Target is 6/25/2022.

Following the wildfires in 2017 and 2018, some of the changes included in this document are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire OII System Enhancement Initiatives Tracking Overview

The following 20 System Enhancement Initiatives (SEI)/Corrective Actions stemming from the Wildfire OII became effective on 7/1/2020. Implementation plans continue to be developed and refined for some SEIs while other are being actively executed to ensure timely completion of the 20 corrective actions. See the below high-level status of all 20 SEIs.

Wildfire OII Tracking	Completed	On Track	At Risk	Off Track	Total
WFOII SEIs Status Total	**5**	**15**	**0**	**0**	**20**

Status color: Blue = "Complete" - complete pending validation; Green = "On Track" – on track with internal milestones to meet external commitments; Amber= "At Risk" - off track with internal plan / milestones but have line of sight into meeting the full commitment scope by the externally committed due date; Red = "Off Track / Missed" - unable to meet the full commitment scope by the externally committed due date. Recovery is not possible. or "Missed" if after due date"

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EO Key Risk Indicators and Risk Mitigations

As of March 31, 2022

[redacted] Sr. Manager, Risk Management & Safety

[redacted], Manager, EO Performance Management

Note: EO Key Indicators are compiled on the 9th of each month. These updates represent presentation from the previous month due to transition of the RCC schedule to the first week of the month.

ELECTRIC OPERATIONS KEY RISK INDICATORS

AS OF MARCH 31, 2022

#	Risk / Cross-Cutter Name	Key Risk Indicator	Definition	Monthly Actual (RAG)	Monthly Target	YTD Actual (RAG)	YTD Target	Comment
1	Failure of Distribution Overhead Assets	Overhead Equipment Failure Count	Failure count of distr bution overhead Tier 2 and Tier 3 equipment	134	188	417	459	
2	Failure of Distribution Underground Assets	Underground Equipment Failure Count	Failure count of distr bution underground Tier 2 and Tier 3 equipment	6	6	23	22	
3	Failure of Distribution Underground Network Assets	# of Network Failures	Failures including all equipment and cable in service failures. Excludes failures caused by third party.	0	0	1	1	
4	Failure of Substation Assets	Substation Customers Experiencing Sustained Outages (CESO), including MED	Substation CESO is the sum of the number of customers that were impacted by sustained outages attr buted to substation issues, failures or planned substation shutdowns during the year.	12,144	56,758	60,605	133,216	
5	Failure of Transmission Overhead Assets	Average Circuit Outage Frequency (ACOF)	ACOF is a measure of the average number of times an overhead circuit in the PG&E transmission system is unavailable due to an automatic operation of a protective device such as a circuit breaker. ACOF will be a single number reported for "All Transmission Voltages".	0.049	0.079	0.126	0.254	
6	Failure of Transmission Underground Assets	Average Outages per Cable Circuit (AOCC)	AOCC is a measure of the average number of times an underground cable circuit in the PG&E electric transmission system is unavailable due to an automatic operation of a protective device such as a circuit breaker. Similar to the ACOF metric for transmission overhead circuits, an emergency forced outage on a cable circuit is excluded from this metric.	0.000	0.033	0.053	0.099	
7	System Wide Blackout	Blackstart Resource Availability	Measures the availability of our Blackstart resources and the capability to respond to a system-wide blackout.	74.64% (Q4-2021)	95.9% (Quarterly)	100% (JAN Only -New Metric)		Q4 performance is primarily due to McCall Condensers being out for all of Q4 2021.