
PACIFIC GAS AND ELECTRIC COMPANY
QUARTERLY REPORT ON 2021 WILDFIRE MITIGATION PLAN
FOR FOURTH QUARTER 2021
FEBRUARY 1, 2021



CONDITION GUIDANCE-10
DATA ISSUES – GENERAL

Introduction

Pursuant to Ordering Paragraph (OP) 8 of California Public Utilities Commission (Commission or CPUC) Resolution WSD-002,¹ and subsequently updated by Resolution WSD-021,² Pacific Gas and Electric Company (PG&E) submits its Quarterly Report (QR) on Guidance-10 of its ongoing Class B deficiency related to its 2020 Wildfire Mitigation Plan (WMP).

¹ Resolution WSD-002, Guidance Resolution on 2020 Wildfire Mitigation Plans Pursuant to Public Utilities Code Section 8386 (June 11, 2020) at p. 45-46, Ordering Paragraph 8.

² Resolution WSD-021, Resolution Ratifying Action of the Office of Energy Infrastructure Safety on Pacific Gas and Electric Corporation's 2021 Wildfire Mitigation Plan Updated Pursuant to Public Utilities Code Section 8386, p.40 "Upon ratification of this resolution, Energy Safety discontinues the ongoing Quarterly Report established in the 2020 WMP, except for the Quarterly Data Reports pursuant to Guidance-10 from Resolution WSD-002."

Deficiency: Although the availability of data, including GIS data, provides unprecedented insight into utility infrastructure and operations, inconsistencies and gaps in the data present several challenges and hurdles. As it relates to GIS data, electrical corporation submissions often had inconsistent file formats and naming conventions, contained little to no metadata, were incomplete or missing many data attributes, and utilized varying schema.

These deficiencies rendered cross-utility comparisons impossible without substantive, resource, and time-consuming manipulation of the data. Additional data challenges included varying interpretations of Wildfire Mitigation Plan (WMP) Guideline data requirements, leading to inconsistency of data submitted.

Condition: Electrical corporations shall ensure that all future data submissions to the Wildfire Safety Division (WSD) adhere to the forthcoming data taxonomy and schema currently being developed by the WSD. Additionally, each electrical corporation shall file a quarterly report detailing:

- i. Locations where grid hardening, Vegetation Management (VM), and asset inspections were completed over the prior reporting period, clearly identifying each initiative, and supported with GIS data;***
- ii. The type of hardening, VM and asset inspection work done, and the number of circuit miles covered, supported with GIS data;***
- iii. The analysis that led it to target that specific area and hardening, VM or asset inspection initiative; and***
- iv. Hardening, VM, and asset inspection work scheduled for the following reporting period, with the detail in (i) – (iii).***

Response to Subpart i, ii, iv

The data in response to subparts i, ii, and iv has been provided in GDB files and in an accompanying Status Report. A stand-alone FGDB file and Status Report were not uploaded separately for Guidance-10, as the data and information in these files would overlap with what is being submitted for the GIS Data Standard submission. “Prior reporting period” data for subpart i covers the fourth quarter of 2021 (the months of October, November, and December) and “following reporting period data” for subpart iv covers the first quarter of 2022 (the months of January, February, and March). These data submissions follow the Draft OEIS GIS Data Standard to the best of PG&E’s ability. As noted in our Comments on OEIS’ Staff Proposals and Workshops, PG&E’s data management and technology, related business processes, and subject matter expertise in this space continues to mature and allow PG&E to improve its reporting capability. However, PG&E’s data systems have evolved organically over many decades, which has created challenges in accessing and mapping mass data to the OEIS data schema or accessing some data for reporting purposes. Those limitations directly impact our ability to incorporate all identified data fields.

Response to Subpart (iii)

Asset Inspections

PG&E described the Asset Management and Inspections programs in Section 7.3.4 of our 2021 WMP.

Preventive maintenance tasks such as enhanced inspections of overhead assets are a key means for PG&E to proactively identify potential failure modes that could lead to ignition if not resolved timely. Through a combination of ground inspection, intrusive wood pole testing, aerial inspections, infrared (IR) assessments, and patrols, PG&E seeks to identify conditions that require repair or replacement of assets prior to failing. Previously, PG&E utilized a time-driven cycle to prescribe patrol and inspection activities to transmission circuits or distribution plat maps. Since 2019, PG&E has undertaken efforts to develop risk-informed models that prioritize preventive asset patrol and inspection activity cycles aligned with the risk of wildfire ignition, including increasing the frequency of such preventive tasks in High Fire Threat District (HFTD) Tiers 2 and 3. Similarly, the evaluation and finalization of corrective findings for

distribution, transmission, and substation assets was brought together in 2019 under the Centralized Inspection Review Team and continues as a core component of the patrol and inspection program.

For 2020 through end of year 2021, PG&E's detailed inspections of overhead assets exceed the minimum frequency requirements of General Order (GO) 165 in HFTDs and include the following enhanced protocols:

- Distribution: digitized capture of detailed visual inspection via checklists and photographic documentation from a ground vantage point.
- Transmission: digitized capture of detailed visual inspection via checklists and photographic documentation, both from ground position and by aerial vantage, are coupled to complete an enhanced inspection cycle.
- Transmission (500 kilovolt (kV)): this examination also includes structural integrity assessment of tower structures via climbing inspection.

The supplemental (enhanced) substation inspections carried on in addition to the baseline GO 174 inspections include digitized capture of detailed visual inspection via checklists and photographic documentation, both from ground vantage and by aerial means, coupled to complete an enhanced inspection. Supplemental enhanced substation inspections also include an IR assessment of the station equipment in addition to the visual inspection.

Enhanced inspections also include use of digital checklists, documentation of asset features, capture of standard imagery, and centralized inspection review of findings as well as work quality monitoring, these have been applied systemwide for overhead transmission and distribution (T&D) assets as of the 2020 detailed inspection cycles. This applies to ground, climbing, and aerial inspection collection methods in T&D whether in HFTD or otherwise. Corrective findings from patrol inspections, equipment testing, and IR inspections are also subject to centralized inspection review, but those patrol and inspection methods have not yet shifted to use the electronic documentation approach and remain largely paper-based in their documentation.

Although the approach to digital data capture for enhanced overhead inspections in HFTD and non-HFTD areas is the same, the frequency of inspections and specific checklist content may be different. In 2021, PG&E intends to complete enhanced

detailed inspections of overhead electric assets in HFTD areas at the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

Aerial inspections of overhead transmission assets in the following recurrence interval:

- HFTD Tier 3 annually and Zone 1; and
- HFTD Tier 2 every three years.

Climbing inspections of 500kV transmission tower structures in the following recurrence interval:

- HFTD Tier 3 annually and Zone 1; and
- HFTD Tier 2 every three years.

Patrol inspections (patrols) of overhead assets of T&D in the following recurrence interval:

- HFTD Tier 2 on years when enhanced detailed inspections are not scheduled (e.g., two of every three years).

IR inspections of overhead assets of transmission, and substation in the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

IR inspections of overhead assets of distribution in the following recurrence interval:

- HFTD Tier 3 and Zone 1 1/3 annually for three years; and
- HFTD Tier 2 1/3 annually for three years.

Supplemental Ground and Aerial Inspections of Substation assets in the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

Intrusive wood pole inspections of overhead wood poles in the following recurrence interval:

- Within 15 years of wood pole installation date, and every ten years thereafter.

Aside from locations with access constraints, PG&E planned to complete these enhanced inspections in HFTD Tiers 2 and 3 locations before July 31, 2021. However, as described in PG&E's Q2 2021 Quarterly Initiative Update (QIU) update, as of July 31, 2021, a total of 354,131 of 394,936 HFTD electric distribution poles and 20,159 of 24,290 electric transmission inspections (numbers that include ground, climb, and air inspections) had been inspected. However, in Q3, both initiatives were unable to reach their targets by the July 31, 2021 data, as a result of a workplan validation effort, although Distribution Inspections did reach their target numbers by August 18, 2021 and Transmission Inspections by September 17, 2021.

In Q4, an additional 3,590 HFTD electric distribution poles were added to the workplan because of a workplan validation effort. This validation effort stemmed from corrective actions being taken as part of PG&E's *Voluntary Self-Identified Notification: GO 165 and WMP Enhanced Inspections*, dated May 7, 2021 (GO 165 Self-Identification). Consequently, the target number was revised to 480,749 HFTD electric distribution poles which have been inspected by the end of Q4.

Similarly, as part of this validation effort, 16 additional electric transmission structures were added to the workplan in Q4. Thus, the total number of electric transmission structures to be inspected was increased to 26,826, all of which were inspected by the end of Q4.

The target has been updated as part of the workplan validation efforts that arose out of the corrective actions being taken resulting from the Voluntary Self-Identified Notification: GO 165 and WMP Enhanced Inspections, submitted on May 7, 2021. Per our November 1, 2021 change order, we provided a projected end of year target of 477,309 Distribution units and 26,810 Transmission units. As we identified additional enhanced inspections that were required, we promptly completed the enhanced inspections and continued to update Energy Safety. Thus, at our regularly scheduled meeting with Energy Safety on December 15, 2021, we shared a target of 480,494 for Distribution and 26,810 for Transmission inspections to be completed by the end of the year. As of December 31, 2021, PG&E's final end-of-year target slightly exceed these

numbers, with 480,749 Distribution Inspections and 26,826 Transmission Inspections completed.

Grid Hardening

System Hardening – Distribution

PG&E described its System Hardening program in Section 7.3.3.17 of our 2021 WMP. System hardening work is performed in alignment with Utility Bulletin TD-9001B-009 Rev2.

As noted in Section 7.3.3.17 of the 2021 WMP, the highest wildfire risk miles are separated into three categories:

1. The top 20 percent of circuit segments as defined by PG&E's 2021 Wildfire Distribution Risk Model for System Hardening;
2. Fire rebuild miles; and
3. PSPS mitigation miles.

PG&E also considers additional risk factors as part of the System Hardening efforts such as PSPS impacts, egress/ingress routes to support fire department response times and public safety, past fire history and effects on available fuels, current system condition, environmental risks to reconstruction activities, and general accessibility considerations to enhance employee safety.

Over a three-year period from 2021-2023, PG&E has established that at least 80 percent of the miles hardened be highest risk miles (as defined in the three categories above) and at least 10 percent must be undergrounded or result in the removal of assets. PG&E's 2021 WMP commitment was to harden 180 miles, which was completed during Q4 on November 16, 2021. Work continued beyond the commitment, through the month of December and at the end of the year, PG&E had hardened 211 miles in 2021.

Emergency Strategic Fire Rebuild – Covered Conductor Installation

If a distribution line must be rebuilt in response to a fire event — and Remote Grid/Customer Buy Out, line removal, or undergrounding strategies are not feasible — overhead hardening is utilized. Once the overhead hardening alternative is identified as the appropriate solution, we also evaluate relocating the circuit. This is typically the case for distribution primary conductor that runs through rural, heavily wooded, or

inaccessible terrain that could be relocated to a road or more accessible location. For primary distribution overhead conductor in Tier 2/3 HFTD areas where more than four spans require full reconstruction or large sections of intermittent damage are present, overhead hardening is done in place in compliance with TD-9001B-009. In 2020, approximately 194 miles of overhead hardening were completed as part of the Emergency Strategic Fire Rebuild. In 2021, approximately 83 miles of Fire Rebuild hardening was completed (including both overhead and underground hardening).

Capacitor Inspections and Replacement

PG&E described its Capacitor Inspections and Replacement Program in Section 7.3.3.1 of our 2021 WMP. Capacitors are placed on the distribution system based on engineering capacity studies that target low voltage areas where installing capacitors can improve low voltage conditions. Once installed, PG&E's capacitor inspections and replacements are governed by Utility Procedure: TD-2302P-05. This utility procedure classifies maintenance tasks for electric overhead and underground equipment, including capacitor banks, fault indicators, interrupters, reclosers, voltage regulators, Supervisory Control and Data Acquisition (SCADA) and Primary Distribution Alarm and Control controls, sectionalizers, streetlights, and sump pumps. Individually, capacitor banks in the distribution system, both overhead and pad-mounted, are tested and inspected annually. The visual part of the inspection includes verifying conditions on the bushings, switches, capacitor tanks, cut-outs, fuses, control cabinets. Within the control cabinet, PG&E further visually inspects the controller, controller box socket and rack to make sure it is properly grounded, as well as inspecting the potential and Current Transformers.

Annual testing entails recording a clamp-on ammeter reading on the primary jumper on each phase of the bank while the capacitor bank is energized. These values are compared to standard expected ranges based on the tank size and circuit voltage. If recorded values exceed the normal ranges, further inspection is required to determine the possibility of a failed capacitor unit or a bad connection. This comprehensive annual testing validates the proper operation and wildfire safety of capacitors deployed in PG&E's system.

As noted above, the actual location of capacitors is determined based on system conditions. Planning engineers perform capacity reviews generally targeting capacitor for areas with known low voltage conditions such as long rural circuits or areas with high inductive loads due to large air conditioning or industrial power usage.

In 2021, PG&E planned to inspect approximately 11,400 capacitors, approximately 10 percent of which historically require corrective action based on inspection results. By the end of Q4 2021, we completed inspections/testing on the last remaining capacitor resulting in 10,896 capacitors out of a total population of 11,166. The remaining 270 capacitors are not in scope for inspection as they are already planned for replacement or repairs. As capacitors are replaced/repared, they no longer show as not in scope for inspection and are inspected the following calendar year. If more information is needed on a capacitor inspection, a request may be reissued to send out an employee for the information requested.

As of the end of Q4 2021, all 2,065 total tags/correctives identified through inspections and operational find have been closed out and no tags/correctives remain open.

Distribution Sectionalizing

PG&E described its distribution line sectionalizing program in Section 7.3.3.8.1 of our 2021 WMP. PG&E's plan is to enhance its distribution segmentation strategies including: (a) adding automated sectionalizing devices; (b) circuit reconfiguration/pre-PSPS Event switching; and (c) additional system hardening to support PSPS switching. Distribution sectionalization work is performed in compliance with Utility Standard PSPS-1000S.

Distribution sectionalizing device installations have been focused on circuits that traverse into HFTD areas. PG&E plans to incorporate learnings from past events and focus efforts primarily on counties and specific areas that are repeatedly impacted by PSPS. This includes (but is not limited to) Butte, Yuba, Sonoma, Napa, Nevada, and El Dorado counties. In 2020, PG&E installed 603 SCADA commissioned distribution sectionalizing devices. In 2021, PG&E planned to install at least 250 more distribution sectionalizing devices integrating learnings from 2020 PSPS events, 10-year historical look-back of previous severe weather events, and feedback from county leaders and

critical customers. As of the end of December 2021, 269 devices had been commissioned.

As each yearly wildfire PSPS season concludes, PG&E will integrate learnings from actual PSPS events to become even more precise on what areas of circuits to target for shutoff to minimize customer impact and outage duration. With this data and feedback PG&E can continue to install new SCADA automated sectionalizing devices closer to the refined meteorological shutoff boundaries and learn what areas of the community to analyze for even further granular sectionalizing.

Expulsion Fuse Replacement

PG&E described its expulsion fuse replacement program in Section 7.3.3.7 of our 2021 WMP. PG&E's plan is to enhance its wildfire safety and reduce risk associated with hot molten metal spread by replacing non-exempt fuse with exempt fuses.

Non-exempt equipment is equipment that may generate electrical arcs, sparks, or hot material during its normal operation. The replacement of non-exempt equipment with exempt equipment will further reduce fire risk since the exempt equipment is considered "non-expulsion" and does not generate arcs/sparks during normal operation. By using exempt fuses, we can reduce the potential for vegetation ignitions due to molten material spread. HFTD areas are the focal point for the non-exempt fuse replacement program, specifically Tier 2 and 3 HFTD areas.

PG&E forecasted replacing approximately 1,200 fuses/cutouts on poles in Tier 2 and Tier 3 HFTD areas in 2021. PG&E completed 661 replacements in Q4 2021 and a total of 1,429 replacements in 2021.

Transmission Line Sectionalization

PG&E describes its Transmission Line Sectionalization initiative activity in Section 7.3.3.8.2 of the 2021 WMP. PG&E has been installing remote-operated SCADA sectionalizing devices on our transmission system to support the ability to segment the transmission circuits within the HFTD boundary. This will allow operational flexibility to

reduce the scope and impact of PSPS events. Prioritization of new or upgraded transmission sectionalizing devices is based on HFTD location, likelihood of potential de-energization during future PSPS events (based on a study of 10 years of weather data), and potential customer impact. Switch upgrades are typically identified at line junctions and substations, where operational flexibility may be most beneficial.

For 2021, PG&E planned to install 29 additional switches impacting HFTD areas. In July and August PG&E installed the final 10 sectionalizing devices, thus, completing work on all 29 switches prior to the September 1, 2021 deadline and meeting its target. As this initiative completed its target before September 1, 2021, PG&E is not submitting any data related to this initiative in its fourth quarter report.

Distribution Line Motorized Switch Operator Pilot (MSO Switches)

PG&E described its Distribution Line Motorized Switch Operator Pilot (MSO Switches) initiative activity in Section 7.3.3.8.3 of the 2021 WMP. Motorized Switch Operators (MSO) switches were initially installed on PG&E's distribution system as sectionalizing devices with the ability to reduce the scope of PSPS events. Despite these switches being understood to meet CAL FIRE's exempt criteria for not posing an ignition risk during normal operation, PG&E crews identified a risk that some MSO switches were reported to exhibit an arc flash during the opening (de-energizing) operation. Based on this feedback and subsequent testing PG&E is undertaking this sub-initiative to remove or retrofit MSO switches to address this potential risk. This sub-initiative in 2021 sought to determine the best alternatives for removing this equipment going forward.

Until all installed MSOs can be replaced or retrofitted, PG&E has issued guidance document TD-076253-B004 "Limited Use of Inertia SCADA MSO" which sets controls in place to mitigate wildfire risk. This control requirement mandates that any MSOs in the field are to be only operated with a Qualified Electrical Worker present during OPEN and CLOSE operations to handle any onsite issues that might arise. During 2021, PG&E assessed various alternatives to address the identified risk with MSOs. PG&E plans to explore several pilot options that will help inform which are the best alternatives and select the appropriate corrective action for MSOs for the 2022

WMP update. Specifically, PG&E explored corrective actions to prevent any potential arc flash including retrofitting the MSO with new vacuum-break technology and replacement with either new automated Line Reclosers or new automated SCADAMATE-SD switches.

On November 1, 2021, PG&E updated the MSO pilot goal to a quantitative target to replace 48 MSO devices by 12/31/21. As of the end of fourth quarter, 50 MSOs had been replaced with new devices that were constructed and SCADA commissioned.

Surge Arrester Replacement Program

PG&E describes the Surge Arrester Replacements being executed as part of its Surge Arrester Program in Section 7.3.3.17.3 of the 2021 WMP. The Surge Arresters Program replaces existing non-exempt surge arresters with exempt surge arresters, which have less propensity to cause a fire ignition. In addition, while it is performing replacements, PG&E separates transformer and surge arrester grounds at designated locations. This will remove ignition risks in HFTD areas, and an ancillary benefit is to modernize the connections and equipment which may improve reliability. The replacement of non-exempt surge arresters with exempt surge arresters will reduce wildfire fire risk since exempt surge arresters are considered “non-expulsion” and do not generate arcs/sparks during normal operation.

The installation of grounds at some locations poses unique challenges, especially in heavily granite and lava cap areas in the Sierra and Cascade foothills. Large HFTD portions of the service territory where these surge arrestor mitigations are needed are located in this rocky soil. Geotechnical studies have been conducted, PG&E grounding Standards have been adjusted, and innovative excavation techniques have been incorporated to safely install these grounds. Unfortunately, multiple attempts and techniques are required to complete some of these ground installations. In 2021 PG&E planned to replace at least 15,000 surge arresters, and through the end of the fourth quarter PG&E had replaced 15,465 surge arresters.

Vegetation Management and Inspection Programs

PG&E describes the VM and Inspection (VM) programs in Section 7.3.5 of the 2021 WMP. PG&E's Distribution VM program has been designed and implemented to ensure safe and reliable operation of distribution facilities and to prevent foreseeable vegetation outages. In addition, the Distribution VM program is designed to monitor compliance with state and federal laws and regulations including GO 95, Rule 35, California Public Resources Code (PRC) Sections 4292 and 4293, and PG&E's 2021 WMP. PG&E accomplishes these goals through the following programs.

Routine Vegetation Management

The Routine VM program performs scheduled inspections on all overhead primary and secondary distribution facilities to maintain radial clearance between vegetation and conductors by identifying trees that will encroach within the minimum distance requirements required by law or PG&E procedures, dead, dying, and declining trees.

The VM Mid-Cycle Patrol (previously known as the Second Patrol program and also known as a Catastrophic Event Memorandum Account Patrol), performs scheduled mid-cycle patrols approximately six months before or after the routine patrol on all overhead primary and secondary distribution facilities to maintain radial clearance between vegetation and conductors by identifying trees that will encroach within the minimum distance requirements required by law or PG&E procedures and by identifying dead, dying, and declining trees that have the potential to strike the conductors. Second patrols occur primarily within HFTDs.

In 2021, the plan for Routine VM included approximately 1.3 million trees and the Mid-Cycle Patrol plan includes approximately 25,000 trees. As of December 31, 2021, PG&E worked 1,486,330 trees in our Routine VM program, 34,189 trees in our Mid-Cycle program, and 1983 work verified miles completed for EVM. However, these numbers are based on contractor billing and may be subject to change upon completion of QA/QC work by PG&E.

Vegetation Control (Pole Clearing)

PG&E performs removal of vegetation around T&D poles and towers, in accordance with PRC Section 4292, to maintain a firebreak of at least 10 feet in radius (out from the

pole) up to 8 feet up from the ground. These requirements apply in the State Responsibility Areas (SRA) during designated fire season and such designation is a priority in performing this defensible space activity. PRC 4292, which applies to SRA and United States Forest Service lands, determines the geospatial application pole clearing requirements. In the first quarter of 2021, 43,539 poles were cleared. During the second quarter of 2021, 63,063 poles were cleared. During the third quarter of 2021, 90,509 poles were cleared. During the fourth quarter of 2021, 35,405 poles were cleared.

Enhanced Vegetation Management (EVM)

EVM program exceeds compliance requirements and, starting in 2021, is prioritized according to outputs from the Vegetation Risk Model (See Section 4.5.1 of the 2021 WMP), which is a risk-informed model that allows us to prioritize our work at the Circuit Protection Zone (CPZ). CPZs are the smallest non-overlapping sections of the distribution grid that can be de-energized.

The EVM Program is a multi-year program that performs risk-based, scheduled patrols on overhead primary distribution facilities. EVM patrols occur on specific line sections, based on risk, within Tier 2 and Tier 3 of the California Public Utility Commission (CPUC)-designated HFTDs. In HFTD areas, PG&E's Routine VM meets regulations requiring 4 feet radial clearance around overhead distribution lines. The EVM program is much more expansive and aggressive and includes the following:

- **Radial Clearances:** Exceeding the 4-foot minimum clearance requirement by ensuring vegetation requiring work is trimmed to the CPUC recommended 12-foot clearance at time of trim and in some cases, trimming beyond 12 feet depending on tree growth rates, among other factors. Trimming to the CPUC recommended 12-foot clearance ensures compliance with GO 95, Rule 35.
- **Overhang Trimming:** Removing overhanging branches and limbs four feet out from the lines and up to the sky around electric power lines to further reduce the possibility of wildfire ignitions and/or downed wires and outages due to vegetation-conductor contact.
- **Assessing Trees with the Potential to Strike:** Evaluating all trees in HFTDs tall enough to strike electrical lines or equipment and, based on that assessment,

trimming, or removing trees that pose a potential safety risk, including dead and dying trees.

For 2021, PG&E forecasted work on approximately 1,800 circuit miles for the EVM program. As of December 31, 2021, approximately 1,983 miles were work verified in EVM, exceeding the forecasted target.⁵

Data Management

The One VM Tool is on track for the first of four releases for phase 1 in January 2022. Training for the One VM Tool will be split into two segments of functionality releases. Release 1.A is scheduled for mid-January 2022 when a select group of users will be granted access to a "BETA" version. Release 1.B is scheduled for April 2022 to all Defined Scope and Mid-cycle users. Releases 2 and 3 dates are to be determined, later in 2022.

⁵ This number is being reviewed and validated by our VM and Internal Audit departments and may be subject to change based on the results of our validation efforts.

CONDITION GUIDANCE-10
DATA ISSUES – GENERAL

Deficiency: Although the availability of data, including GIS data, provides unprecedented insight into utility infrastructure and operations, inconsistencies and gaps in the data present a number of challenges and hurdles. As it relates to GIS data, electrical corporation submissions often had inconsistent file formats and naming conventions, contained little to no metadata, were incomplete or missing many data attributes and utilized varying schema.

These deficiencies rendered cross utility comparisons impossible without substantive, resource, and time-consuming manipulation of the data. Additional data challenges included varying interpretations of Wildfire Mitigation Plan (WMP) Guideline data requirements, leading to inconsistency of data submitted.

Condition: Electrical corporations shall ensure that all future data submissions to the Wildfire Safety Division (WSD) adhere to the forthcoming data taxonomy and schema currently being developed by the WSD. Additionally, each electrical corporation shall file a quarterly report detailing:

- I. Locations where grid hardening, Vegetation Management (VM), and asset inspections were completed over the prior reporting period, clearly identifying each initiative and supported with GIS data;***
- ii. The type of hardening, VM and asset inspection work done, and the number of circuit miles covered, supported with GIS data;***
- iii. The analysis that led it to target that specific area and hardening, VM or asset inspection initiative; and***
- iv. Hardening, VM, and asset inspection work scheduled for the following reporting period, with the detail in (i) – (iii).***

Response to Subpart i, ii, iv

The data in response to Subparts, i, ii, and iv has been provided in GDB files and an accompanying Status Report. A stand-alone FGDB file and Status Report were not uploaded separately for Guidance-10, as the data and information in these files would overlap with what is being submitted for the GIS Data Standard submission. “Prior reporting period” data for Subpart i covers the first quarter of 2021 (the months of January, February, and March) and “following reporting period data” for Subpart iv covers the first quarter of 2021 (the months of April, May, and June). These data submissions followed the Draft OEIS GIS Data Standard to the best of PG&E’s ability. As noted in our Comments on OEIS’ Staff Proposals and Workshops, PG&E’s data management and technology, related business processes, and subject matter expertise in this space continues to mature and allow PG&E to improve its reporting capability. However, PG&E’s data systems have evolved organically over many decades, which has created challenges in accessing and mapping mass data to the WSD data schema or accessing some data for reporting purposes. Those limitations directly impact our ability to incorporate all identified data fields.

As it relates to the asset inspection data, please note that PG&E’s submission only included inspections that were associated with valid equipment records. Because PG&E’s electric infrastructure is a dynamic collection of assets, equipment is regularly replaced and deactivated, at which time the GIS feature for that asset is removed. Some population of inspections are associated with equipment that has subsequently been removed from the GIS system. Those inspection records have, therefore, been removed from this data submission as well.

Response to Subpart (iii)

Asset Inspections

PG&E described the Asset Management and Inspections programs in Section 7.3.4 of our 2021 WMP.

Preventive maintenance tasks such as enhanced inspections of overhead assets are a key means for PG&E to proactively identify potential failure modes that could lead to ignition if not resolved timely. Through a combination of ground inspection, intrusive wood pole testing, aerial inspections, infrared (IR) assessments, and patrols, PG&E seeks to identify conditions that require repair or replacement of assets prior to failing. Previously, PG&E utilized a time-driven cycle to prescribe patrol and inspection activities to transmission circuits or distribution plat maps. Since 2019, PG&E has undertaken efforts to develop risk-informed models that prioritize preventive asset patrol and inspection activity cycles aligned with the risk of wildfire ignition, including increasing the frequency of such preventive tasks in High Fire Threat District (HFTD) Tiers 2 and 3. Similarly, the evaluation and finalization of corrective findings for distribution, transmission, and substation assets was brought together in 2019 under the Centralized Inspection Review Team and continues as a core component of the patrol and inspection program.

For 2020 through 2022, PG&E's detailed inspections of overhead assets exceed the minimum frequency requirements of General Order (GO) 165 in HFTDs and include the following enhanced protocols:

- Distribution: digitized capture of detailed visual inspection via checklists and photographic documentation from a ground vantage point.
- Transmission: digitized capture of detailed visual inspection via checklists and photographic documentation, both from ground position and by aerial vantage, are coupled to complete an enhanced inspection cycle.
- Transmission (500 kilovolt (kV)): this examination also includes structural integrity assessment of tower structures via climbing inspection.

The supplemental (enhanced) substation inspections carried on in addition to the baseline GO 174 inspections include digitized capture of detailed visual inspection via checklists and photographic documentation, both from ground vantage and by aerial

means, coupled to complete an enhanced inspection. Supplemental enhanced substation inspections also include an IR assessment of the station equipment in addition to the visual inspection.

Enhanced inspections also include use of digital checklists, documentation of asset features, capture of standard imagery, and centralized inspection review of findings as well as work quality monitoring, these have been applied systemwide for overhead transmission and distribution (T&D) assets as of the 2020 detailed inspection cycles. This applies to ground, climbing, and aerial inspection collection methods in T&D whether in HFTD or otherwise. Corrective findings from patrol inspections, equipment testing, and IR inspections are also subject to centralized inspection review, but those patrol and inspection methods have not yet shifted to use the electronic documentation approach and remain largely paper-based in their documentation.

Although the approach to digital data capture for enhanced overhead inspections in HFTD and non-HFTD areas is the same, the frequency of inspections and specific checklist content may be different. In 2021, PG&E intends to complete enhanced detailed inspections of overhead electric assets in HFTD areas at the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

Aerial inspections of overhead transmission assets in the following recurrence interval:

- HFTD Tier 3 annually and Zone 1; and
- HFTD Tier 2 every three years.

Climbing inspections of 500kV transmission tower structures in the following recurrence interval:

- HFTD Tier 3 annually and Zone 1; and
- HFTD Tier 2 every three years.

Patrol inspections (patrols) of overhead assets of T&D in the following recurrence interval:

- HFTD Tier 2 on years when enhanced detailed inspections are not scheduled (e.g., two of every three years).

IR inspections of overhead assets of transmission, and substation in the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

IR inspections of overhead assets of distribution in the following recurrence interval:

- HFTD Tier 3 and Zone 1 1/3 annually for three years; and
- HFTD Tier 2 1/3 annually for three years.

Supplemental Ground and Aerial Inspections of Substation assets in the following recurrence interval:

- HFTD Tier 3 and Zone 1 annually; and
- HFTD Tier 2 every three years.

Intrusive wood pole inspections of overhead wood poles in the following recurrence interval:

- Within 15 years of wood pole installation date, and every ten years thereafter.

Aside from locations with access constraints, PG&E planned to complete these enhanced inspections in HFTD Tiers 2 and 3 locations before July 31, 2021. However, as described in PG&E's Q2 2021 Quarterly Initiative Update (QIU) update, as of July 31, 2021, a total of 354,131 of 394,936 HFTD electric distribution poles and 20,159 of 24,290 electric transmission inspections (numbers that include ground, climb, and air inspections) had been inspected. However, in Q3, both commitments were unable to reach its target by the July 31, 2021 date, as a result of a workplan validation effort, although Distribution Inspections did reach their target numbers by August 18, 2021 and Transmission Inspections by September 17, 2021.

In Q3, an additional 82,250 HFTD electric distribution poles were added to the workplan as a result of a workplan validation effort. This validation effort stemmed from corrective actions being taken as part of PG&E's *Voluntary Self-Identified Notification: GO 165 and WMP Enhanced Inspections*, dated May 7, 2021 (GO 165 Self-Identification). Consequently, the target number was revised to 477,186 HFTD electric distribution poles, 477,159 of which have been inspected by the end of Q3.

Similarly, as part of this validation effort, 2,520 additional electric transmission structures were added to the workplan in Q3. Thus, the total number of electric transmission structures to be inspected was increased to 26,810, all of which were inspected by the end of Q3.

From the QIU: "The target has been updated as part workplan validation efforts that arose out of the corrective actions being taken resulting from the Voluntary Self-Identified Notification: GO 165 and WMP Enhanced Inspections, submitted May 7, 2021. At the request of Energy Safety on October 21, 2021: 1) PG&E is reflecting quantitative targets in the Q3 QIU submission to match table 5.3-1 of the 2021 WMP revised on June 3, 2021. 2) PG&E is submitting a change order on 11/1 to formally update targets based on the workplan known as of September 30, 2021." As such we will have an update in Q4 to reflect this.

Grid Hardening

System Hardening – Distribution

PG&E described the System Hardening Program in Section 7.3.3.17 of our 2021 WMP. System hardening work is performed in alignment with Utility Bulletin TD-9001B-009 Rev2.

For 2021, PG&E has switched over from REAX to Technosylva as our Wildfire Consequence Modelling tool. The Wildfire Consequence Model was incorporated into PG&E's 2021 Wildfire Distribution Risk Model (see further explanation in Section 4.5.1 of the 2021 WMP). This change and other associated improvements in our modeling, data, and understanding of fire risk, has led to a shift in thinking about where to target system hardening projects and resources. PG&E's 2021 Wildfire Distribution Risk Model resulted in a significant pivot for PG&E in the targeting of work to continue to harden the highest wildfire risk miles. For the 2021 work plan, the System Hardening Program has added projects, and has paused or deferred other projects, based on the new risk model.

As noted in Section 7.3.3.17 of the 2021 WMP, the highest wildfire risk miles are separated into three categories:

1. The top 20 percent of circuit segments as defined by PG&E's 2021 Wildfire Distribution Risk Model for System Hardening
2. Fire rebuild miles
3. PSPS mitigation miles

PG&E also considers additional risk factors as part of the System Hardening efforts such as PSPS impacts, egress/ingress routes to support fire department response times and public safety, past fire history and effects on available fuels, current system condition, environmental risks to reconstruction activities, and general accessibility considerations to enhance employee safety.

PG&E is targeting 180 miles for system hardening in 2021. Over a three-year period from 2021-2023, PG&E has established that at least 80 percent of the miles hardened be highest risk miles (as defined in the three categories above) and at least 10 percent must be undergrounded or result in the removal of assets. While the 2021 target of 180 miles does represent a drop from the 2020 mileage target, this is a result

of the previously referenced improvement in risk modeling and the associated pivot in targeting. This target for 2021 is still aggressive because the cycle time for a system hardening project generally exceeds 12 months. Per PG&E's 3Q 2021 QIU update, approximately 124.7 miles of hardening have been completed through the end of Q3, with the remaining 55.3 miles in active construction.

Emergency Strategic Fire Rebuild – Covered Conductor Installation

If a distribution line must be rebuilt in response to a fire event; and Remote Grid/Customer Buy Out, line removal, or undergrounding strategies are not feasible; overhead hardening is utilized. Once the overhead hardening alternative is identified as the appropriate solution, we also evaluate relocating the circuit. This is typically the case for distribution primary conductor that runs through rural, heavily wooded, or inaccessible terrain that could be relocated to a road or more accessible location. For primary distribution overhead conductor in Tier 2/3 HFTD areas where more than four spans require full reconstruction or large sections of intermittent damage are present, overhead hardening is done in place in compliance with TD-9001B-009. In 2020, approximately 194 miles of overhead hardening were completed as part of the Emergency Strategic Fire Rebuild and through Q3 of 2021 approximately 30 miles of Fire Rebuild hardening was completed (including both overhead and underground hardening).

Capacitor Inspections and Replacement

PG&E described its Capacitor Inspections and Replacement Program in Section 7.3.3.1 of our 2021 WMP. Capacitors are placed on the distribution system based on engineering capacity studies that target low voltage areas where installing capacitors can improve low voltage conditions. Once installed, PG&E's capacitor inspections and replacements are governed by Utility Procedure: TD-2302P-05. This utility procedure classifies maintenance tasks for electric overhead and underground equipment, including capacitor banks, fault indicators, interrupters, reclosers, voltage regulators, Supervisory Control and Data Acquisition (SCADA) and Primary Distribution Alarm and Control controls, sectionalizers, streetlights, and sump pumps. Individually, capacitor banks in the distribution system, both overhead and pad-mounted, are tested and inspected annually. The visual part of the inspection includes verifying conditions on

the bushings, switches, capacitor tanks, cut-outs, fuses, control cabinets. Within the control cabinet, PG&E further visually inspects the controller, controller box socket and rack to make sure it is properly grounded, as well as inspecting the potential and Current Transformers.

Annual testing entails recording a clamp-on ammeter reading on the primary jumper on each phase of the bank while the capacitor bank is energized. These values are compared to standard expected ranges based on the tank size and circuit voltage. If recorded values exceed the normal ranges, further inspection is required to determine the possibility of a failed capacitor unit or a bad connection. This comprehensive annual testing validates the proper operation and wildfire safety of capacitors deployed in PG&E's system.

As noted above, the actual location of capacitors is determined based on system conditions. Planning engineers perform capacity reviews generally targeting capacitor for areas with known low voltage conditions such as long rural circuits or areas with high inductive loads due to large air conditioning or industrial power usage.

In 2021, PG&E plans to inspect approximately 11,400 capacitors, approximately 10 percent of which historically require corrective action based on inspection results. By the end of Q3 2021, we completed inspections/testing on 10,895 capacitors out of a total population of 11,166. There are 270 capacitors are not in scope for inspection as they are already planned for replacement or repairs. This leaves 1 remaining required capacitor inspection that has not been completed due to access issues from a homeless encampment in Oakland. We are currently working with the City of Oakland to resolve this access issue. As capacitors are replaced/repared, they no longer show as not in scope for inspection and are inspected the following calendar year. If more information is needed on a capacitor inspection, a request may be reissued to send out an employee for the information requested.

As of the end of Q3 2021, of the total 2,064 tags/correctives identified through inspections and operational find, 1,323 were closed out and 741 tags/correctives are open. Of the 741 tags still open, 233 are high priority HFTD tags that involve repairs or replacements and are planned to be completed by year end. 447 tags are Lower Priority Non-HFTD tags are in the current Work Plan for completion by year end; however may get offset by higher priority work. The remaining 61 are planned for

completion prior to June 1, 2022. PG&E plans to continue this annual inspection and testing approach going forward.

Distribution Sectionalizing

PG&E described its distribution line sectionalizing program in Section 7.3.3.8.1 of our 2021 WMP. PG&E's plan is to enhance its distribution segmentation strategies including: (a) adding automated sectionalizing devices; (b) circuit reconfiguration/pre-PSPS Event switching; and (c) additional system hardening to support PSPS switching. Distribution sectionalization work is performed in compliance with Utility Standard PSPS-1000S.

Distribution sectionalizing device installations have been focused on circuits that traverse into HFTD areas. PG&E plans to incorporate learnings from past events and focus efforts primarily on counties and specific areas that are repeatedly impacted by PSPS. This includes (but is not limited to) Butte, Yuba, Sonoma, Napa, Nevada, and El Dorado counties. In 2020, PG&E installed 603 SCADA commissioned distribution sectionalizing devices. In 2021, PG&E plans to install at least 250 more distribution sectionalizing devices integrating learnings from 2020 PSPS events, 10-year historical look-back of previous severe weather events, and feedback from county leaders and critical customers. As of the end of September 2021, 259 devices had been commissioned.

As each yearly wildfire PSPS season concludes, PG&E will integrate learnings from actual PSPS events and feedback from county leaders and critical customers to become even more precise on what areas of circuits to target for shutoff to minimize customer impact and outage duration. With this data and feedback PG&E can continue to install new SCADA automated sectionalizing devices closer to the refined meteorological shutoff boundaries and learn what areas of the community to analyze for even further granular sectionalizing.

Expulsion Fuse Replacement

PG&E described its expulsion fuse replacement program in Section 7.3.3.7 of our 2021 WMP. PG&E's plan is to enhance its wildfire safety and reduce risk associated with hot molten metal spread by replacing non-exempt fuse with exempt fuses.

Non-exempt equipment is equipment that may generate electrical arcs, sparks, or hot material during its normal operation. The replacement of non-exempt equipment with exempt equipment will further reduce fire risk since the exempt equipment is considered "non-expulsion" and does not generate arcs/sparks during normal operation. By using exempt fuses, we can reduce the potential for vegetation ignitions due to molten material spread. HFTD areas are the focal point for the non-exempt fuse replacement program, specifically Tier 2 and 3 HFTD areas.

PG&E forecasts replacing approximately 1,200 fuses/cutouts, and other non-exempt equipment identified on poles in Tier 2 and Tier 3 HFTD areas in 2021. Of the 1,200 fuse/cutouts and other non-exempt equipment identified earlier PG&E completed 655 replacements in Q3, 2021. YTD PG&E has completed 751 replacements.

Transmission Line Sectionalization

PG&E describes its Transmission Line Sectionalization initiative activity in Section 7.3.3.8.2 of the 2021 WMP. PG&E has been installing remote-operated SCADA sectionalizing devices on our transmission system to support the ability to segment the transmission circuits within the HFTD boundary. This will allow operational flexibility to reduce the scope and impact of PSPS events. Prioritization of new or upgraded transmission sectionalizing devices is based on HFTD location, likelihood of potential de-energization during future PSPS events (based on a study of 10 years of weather data), and potential customer impact. Switch upgrades are typically identified at line junctions and substations, where operational flexibility may be most beneficial.

For 2021, PG&E is planning on installing 29 additional switches impacting HFTD areas. In July and August PG&E installed the final 10 sectionalizing devices completing work on all 29 switches prior to the September 1, 2021 deadline, meeting its previous commitment.

As this commitment specified completing all work before September 1st and PG&E has met this commitment, PG&E does not plan to submit any data related to this commitment in its 4th quarter report.

Distribution Line Motorized Switch Operator Pilot (MSO Switches)

PG&E described its Distribution Line Motorized Switch Operator Pilot (MSO Switches) initiative activity in Section 7.3.3.8.3 of the 2021 WMP. Motorized Switch Operators (MSO) switches were initially installed on PG&E's distribution system as sectionalizing devices with the ability to reduce the scope of PSPS events. Despite these switches being understood to meet CAL FIRE's exempt criteria for not posing an ignition risk during normal operation, PG&E crews identified a risk that some MSO switches were reported to exhibit an arc flash during the opening (de-energizing) operation. Based on this feedback and subsequent testing PG&E is undertaking this sub-initiative to remove or retrofit MSO switches to address this potential risk. After some concerns regarding MSO switches were identified in the field, PG&E undertook an evaluation of this equipment. During testing of an MSO switch in PG&E's lab environment to replicate the reported field conditions, the MSO switch exhibited an arc flash during its opening operation. PG&E immediately halted further installations of MSO switches. After further testing, PG&E determined that the current version of MSO switches would no longer be installed and is taking the remedial steps described below. This sub-initiative seeks to determine the best alternative for removing this equipment going forward.

Until all installed MSOs can be replaced or retrofitted, PG&E has issued guidance document TD-076253-B004 "Limited Use of Inertia SCADA MSO" which sets controls in place to mitigate wildfire risk. This control requirement mandates that any MSOs in the field are to be only operated with a Qualified Electrical Worker present during OPEN and CLOSE operations to handle any onsite issues that might arise. During 2021, PG&E will be assessing various alternatives to address the identified risk with MSOs. PG&E plans to explore several pilot options that will help inform which are the best alternatives and select the appropriate corrective action for MSOs for the next WMP update. Specifically, PG&E will explore corrective actions to prevent any potential arc flash including retrofitting the MSO with new vacuum-break technology or

replacement with either new automated Line Reclosers or new automated SCADAMATE-SD switches.

In 2021 PG&E planned to replace 50 MSO switches, and YTD through September, 48 devices have been constructed and SCADA commissioned.

Vegetation Management and Inspection Programs

PG&E describes the VM and Inspection (VM) programs in Section 7.3.5 of the 2021 WMP. PG&E's Distribution VM program has been designed and implemented to ensure safe and reliable operation of distribution facilities and to prevent foreseeable vegetation outages. In addition, the Distribution VM program is designed to monitor compliance with state and federal laws and regulations including GO 95, Rule 35, California Public Resources Code (PRC) Sections 4292 and 4293, and PG&E's 2021 WMP. PG&E accomplishes these goals through the following programs.

Routine Vegetation Management

The Routine VM program performs scheduled inspections on all overhead primary and secondary distribution facilities to maintain radial clearance between vegetation and conductors by identifying trees that will encroach within the minimum distance requirements required by law or PG&E procedures, dead, dying, and declining trees.

The VM Mid-Cycle Patrol (previously known as the Second Patrol program and also known as a Catastrophic Event Memorandum Account Patrol), performs scheduled mid-cycle patrols approximately six months before or after the routine patrol on all overhead primary and secondary distribution facilities to maintain radial clearance between vegetation and conductors by identifying trees that will encroach within the minimum distance requirements required by law or PG&E procedures and by identifying dead, dying, and declining trees that have the potential to strike the conductors. Second patrols occur primarily within HFTDs.

In 2021, the plan for Routine VM includes approximately 1.3 million trees and the Mid-Cycle Patrol plan includes approximately 25,000 trees. In the first quarter of 2021, 457,045 trees were worked in Routine VM, including 2020 carry over, and 17,623 Mid-Cycle trees were worked. These numbers are higher than previously reported due to latency with reporting in the system. In the second quarter of 2021, 361,212 trees were worked in Routine VM and 19,295 Mid-Cycle trees were worked. In the third

quarter of 2021, 408,627 ³trees were worked in Routine VM and 7,260 Mid-Cycle trees were worked.

Vegetation Control (Pole Clearing)

PG&E performs removal of vegetation around T&D poles and towers, in accordance with PRC Section 4292, to maintain a firebreak of at least 10 feet in radius (out from the pole) up to 8 feet up from the ground. These requirements apply in the State Responsibility Areas (SRA) during designated fire season and such designation is a priority in performing this defensible space activity. PRC 4292, which applies to SRA and United States Forest Service lands, determines the geospatial application pole clearing requirements. The 2021 plan includes approximately 101,000 poles, but we may clear the same poles multiple times throughout the year. During the second quarter of 2021, 63,063 poles were cleared. During the third quarter of 2021, 90,509 poles were cleared.

Enhanced Vegetation Management (EVM)

EVM program exceeds compliance requirements and, starting in 2021, is prioritized according to outputs from the Vegetation Risk Model (See Section 4.5.1 of the 2021 WMP), which is a risk-informed model that allows us to prioritize our work at the Circuit Protection Zone (CPZ). CPZs are the smallest non-overlapping sections of the distribution grid that can be de-energized.

The EVM Program is a multi-year program that performs risk-based, scheduled patrols on overhead primary distribution facilities. EVM patrols occur on specific line sections, based on risk, within Tier 2 and Tier 3 of the California Public Utility Commission (CPUC)-designated HFTDs. In HFTD areas, PG&E's Routine VM meets regulations requiring 4 feet radial clearance around overhead distribution lines. The EVM program is much more expansive and aggressive and includes the following:

- Radial Clearances: Exceeding the 4-foot minimum clearance requirement by ensuring vegetation requiring work is trimmed to the CPUC recommended 12-foot clearance at time of trim and in some cases, trimming beyond 12 feet

³ Data sourced from Vegetation Management Database (VMD) and subject to contractor validation and correction. This may result in changes in the numbers shown.

depending on tree growth rates, among other factors. Trimming to the CPUC recommended 12-foot clearance ensures compliance with GO 95, Rule 35.

- **Overhang Trimming:** Removing overhanging branches and limbs four feet out from the lines and up to the sky around electric power lines to further reduce the possibility of wildfire ignitions and/or downed wires and outages due to vegetation-conductor contact.
- **Assessing Trees with the Potential to Strike:** Evaluating all trees in HFTDs tall enough to strike electrical lines or equipment and, based on that assessment, trimming, or removing trees that pose a potential safety risk, including dead and dying trees.

At this time, PG&E is forecasting to work on approximately 1,800 circuit miles for the EVM program. As of the second quarter of 2021, approximately 595 miles were work verified in EVM. However, this number is being reviewed and validated by our VM and Internal Audit departments and may be subject to change. As of the third quarter of 2021, approximately 1282 miles were work verified in EVM. However, this number is being reviewed and validated by our VM and Internal Audit departments and may be subject to change.

Data Management

PG&E has completed review of the top two vendor selections and has made a decision to move forward with Salesforce. Salesforce has also provided PG&E with a Statement of Work that has been approved. The One VM Tool Deployment Scope has been revised and presented to the Federal Monitor. Plan/analyze phase for phase 1 has been completed and the project is now in the build/test phase for phase 1 of the project. The first of three releases for phase 1 is planned for January 2022.