PACIFIC GAS AND ELECTRIC COMPANY

2022 WILDFIRE MITIGATION PLAN UPDATE

SECTION 4.6

ATTACHMENT 2

PACIFIC GAS AND ELECTRIC COMPANY
2022 WILDFIRE MITIGATION PLAN
SECTION 4.6, ATTACHMENT 2

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PACIFIC GAS AND ELECTRIC COMPANY
2022 WILDFIRE MITIGATION PLAN

LIST OF FIGURES

Table PG&E-4.6-2 Attachment

In this attachment, we are providing more detailed information regarding the Additional Issues in Table PG&E-4.6-2 that remain open and have ongoing activities.

Additional Issue 4.1 (Introductory Sections of the WMP)

Issue 4.1.B

Issue: (Requirement 11) According to the Wildfire Mitigation Plan (WMP) Guidelines, Pacific Gas and Electric Company (PG&E or the Company or the Utility) must provide a "list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks." PG&E did not provide this list and instead included a footnote that referenced a list. This list was later provided via a data request (see Appendix 10.2).

- *Remedy: Provide a table with a prioritized list of wildfire risks and drivers and the rationale for prioritization.*

RESPONSE:

In Section 4.2 of this document, PG&E has included a list of wildfire drivers, ranked by wildfire risk score (Multi-Attribute Value Function). Specifically, that list is provided as Table PG&E-4.2-2 in Section 4.2. These risk scores are calculated using the 2022 Enterprise Risk Model, as described in Section 4.5.1(a).

Additional Issue 4.4 (Inputs to the Plan and Directional Vision for WMP

Issue 4.4.A

Issue: *PG&E does not have a sufficient methodology for establishing and committing to long-term plans in wildfire mitigation despite being able to in all other areas of planning and operations within their business.*

- *Remedy:* *PG&E must develop a robust methodology for planning out 10 years (or longer) within its WMP to reduce long-term risk and buy down the costs of mitigation efforts.*

RESPONSE:

In Section 5.2, we have described our planning efforts across the different wildfire maturity model categories. PG&E believes that undergrounding facilities in high fire-risk areas is the best long-term solution for keeping customers and communities safe. The benefits of undergrounding also include wildfire risk reduction, a potential decrease in the need for PSPS outages, improved reliability, a reduction of emergency activations during winter storms, less vegetation management work in areas with undergrounded facilities in the future, and beautification of hometowns.

PG&E still considers overhead hardening an effective solution in mitigating catastrophic wildfires, but recognizes undergrounding facilities provides more substantial risk reduction benefits. In places where undergrounding is not an appropriate or feasible solution, PG&E will continue to explore alternative mitigations, including the use of overhead hardening, Vegetation Management (VM), and other combination of solutions.

Longer term, we will be assessing and addressing the multiple needs facing the electric system on a given circuit or segment. Consideration of these current and future needs will deliver the greatest value in risk reduction and other customer benefits for every customer dollar invested.

Additional Remedy 5.1 (Risk Assessment and Mapping)

Issue 5.1.B

Issue: In the Maturity Model, PG&E self-reported a low score in risk modeling automation, with slower growth than its peer utilities.[1] PG&E overhauled its modeling efforts between the 2020 and 2021 WMP submissions. However, PG&E fails to demonstrate growth at a rate comparable to its peers in its risk modeling automation
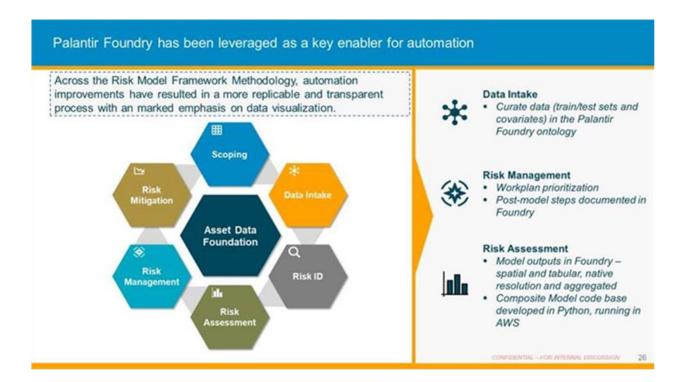
- *Remedy (#1): PG&E must explain why it does not have the same level of automation for risk modeling as its peers, including an explanation of any constraints on progress; and.*

- *Remedy (#2): PG&E must supply a workplan and schedule for enhancing its automation capabilities in its risk modeling.*

RESPONSE:

- **Remedy #1**: Since we provided responses to the 2021 WMP Maturity Survey, PG&E improved the automation of our risk modeling utilizing the Palantir Foundry platform. Usage of Palantir Foundry software has assisted in creating a modeling environment that is replicable, automated, and auditable. Figure PG&E-4.6-1 below provides an overview of how PG&E has been able to use the Palantir Foundry platform to enhance the system automation. In the 2022 Maturity Survey, the self-reported scores for automation reflect these improvements.

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[1] Within the responses to the Maturity Survey, for capabilities 1 and 2, PG&E rated itself as not automated for its climate scenario modeling for both current and end of 2023 and ranked its ignition risk automation as currently not automated, expecting to move to partially automated (<50 percent) in 2023. In comparison, Southern California Edison Company (SCE) rated itself as partially automated for climate scenario modeling for both current and end of 2023 and expects to move from partially automated to mostly automated (>50 percent) for ignition risk. San Diego Gas & Electric Company (SDG&E) rated itself as mostly automated for climate scenario modeling for both current and end of 2023 and expects to move from partially automated to mostly automated for ignition risk.

- **Remedy #2**: As indicated in the response to Remedy #1 above, PG&E has implemented a workplan to improve the automation of our risk modeling capabilities. As indicated in the model development schedule shown below in FIGURE-PG&E-5.1.B-X will continue to automate the new features that are planned in future years as our risk models evolve.

FIGURE PG&E-5.1.B-X:
MODEL DEVELOPMENT SCHEDULE

Issue 5.1.C

Issue: PG&E's new model does not include egress as an input (in contrast to its previous wildfire risk model, which did include egress as an input). PG&E instead relies on subject matter expertise to account for egress when determining how to prioritize system hardening projects.

- *Remedy: PG&E must provide an update on its development of a methodology to accurately measure and account for egress or explain how it accounts for egress in determining which circuits segments to prioritize for mitigation.*

RESPONSE:

PG&E has continued to explore development of improved egress models with the University of California Los Angeles (UCLA) B. John Garrick Institute for Risk Sciences. As of the end of 2021, a pilot model that produces a probability of a safe evacuation of a community has been developed. This pilot model has subsequently been calibrated on the evacuation of the town of Paradise as a result of the Camp Fire. We are also reviewing and evaluating the Risk Associated with Value Exposure (RAVE) module from Technosylva that has components for estimating egress considering location and community factors.

The Egress Model approaches the simulation to predict the time for a community to safely evacuate by simulating the available time to safely evacuate, the speed of a fire to reach the community, and the required time to evacuate the community. The statistical difference between these two distributions represents the probability of the community evacuating the area of the fire before its arrival. The available safe egress time can be produced with any fire simulation tools such as the Technosylva fire simulation software. The required safe egress time is produced with a Bayesian network model that uses demographic information to estimate the ability of a community

to receive notice of a fire or of an evacuation notice and find access to transportation using a human behavior model. Next, a traffic model is employed to simulate the time for the community to utilize roads to reach a pre-designated safe location.

The next step in the model development is to continue to calibrate the UCLA model while also applying the Technosylva RAVE model to different communities in the PG&E service territory. Combined with input from the Office of Energy Infrastructure Safety (Energy Safety or OEIS) risk modeling workshop, PG&E aims to determine which approach best adds the impacts of egress to the Wildfire Consequence Model.

In fire science, the issue of modeling egress is nascent and would be a good place for continued collaboration and coordination with California Department of Forestry and Fire Protection and other state level groups/agencies to move this forward.

Additional Remedy 5.2 (Situational Awareness and Forecasting)

Issue 5.2.A

Issue: PG&E does not have a proactive plan for installing fault indicators, which are typically placed by either troublemen[2] during restorations or by an engineering team after the fact to aid in future faults. These fault indicators typically aid in in electric service reliability, as they can be leveraged to concentrate focus to a much smaller portion of the electric circuit when trying to pinpoint a system failure/fault. This can also lead to a faster response to a location if an ignition exists. The lack of fault indicators can lead to longer duration of outages and/or make faults, damaged assets, or ignitions more difficult to locate.

- *Remedy: PG&E must (1) develop a proactive plan to evaluate the benefit of installing fault indicators post-events; or (2) demonstrate that fault detection is sufficiently covered, including reducing time to restoration of service, by other existing initiatives.*

RESPONSE:

PG&E does not currently leverage fault indicators, which are only used in a reactive, ad hoc fashion. Proactive technology that PG&E uses to assist with proactive detection are discussed in Section 7.3.2.2.5. In addition, fault indicators do not contribute to reducing the impact of PSPS or Enhanced Powerline Safety Setting events as all lines need to be manually inspected regardless of fault indicators before restoration can take place.

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2 "Troublemen" are the PG&E responders sent to investigate the cause for outages.

Additional Remedy 5.3 (Grid Design and System Hardening)

Issue 5.3.B

Issue: *PG&E does not provide details on its program to remove unneeded capacitors and other voltage regulating equipment. It also did not provide details for investigating adding Supervisory Control and Data Acquisition (SCADA)-enabled controllers to all capacitors and removing or using switches on fixed bank capacitors. PG&E also does not include a timeline for implementation of its these programs and investigations.*

- *Remedy*: *PG&E must (1) provide an update on the status, scope, and timeline for its unneeded capacitor program analysis, (2) provide an estimated number of capacitor removals based on its analysis, if available, (3) provide an update on the status, scope, and timeline for adding SCADA-enabled controllers to capacitors, (4) provide an update on the status, scope, and timeline for removing or using switches on fixed bank capacitors, and (5) explain how adding SCADA-enabled controllers to capacitors and removing or using switches on fixed bank capacitors will reduce ignition risk.*

RESPONSE:

1) PG&E's capacitor banks are inspected and tested annually per Utility Bulletin TD-2302B-006. Any capacitor bank that is not required or not needed is placed off-line and de-energized. Seasonal engineering studies determine the need for either placing a capacitor bank online or placing it off-line. During the annual inspection and testing process, if there is an issue with a capacitor bank, an analysis is done by Distribution Planning to determine operationally if the capacitor bank should be repaired or removed if not needed.

2) PG&E is not able to provide an estimated number of capacitor bank removals since this analysis has not been performed.

3) There is no specific timeline for adding SCADA-enabled controllers to capacitor banks.

4) PG&E is not able to provide an estimated number of capacitor banks which may involve conversion from a fixed bank to a switched bank. Also, as provided in response number 1 above, engineering analysis determines what type and size of capacitor bank is needed and the location to be installed. As such, there is no specific target or timeline for removal for using switches on fixed capacitor banks.

5) Adding SCADA enable controllers does not specifically reduce risk. SCADA functionally allows remote operating flexibility when system conditions require remotely placing a capacitor bank online for voltage support. Using switches on fixed banks also does not specifically reduce ignition risk. Using switches allows the capacitor bank to be placed online via controller as opposed to field personal placing the capacitor bank online. Additionally, switches/controls allow for greater customization enabling VAR (Volt-Amp Reactive) support automatically based on system needs.

Additional Remedy 5.4 (Asset Management and Inspections)

Issue 5.4.A

Issue: In order to address PG&E's higher incidence of equipment failure in comparison to other utilities, PG&E's Ignition Investigation and Asset Failure Analysis team has started to benchmark with counterparts within the other utilities and plans to continue to do so in 2021.[3] PG&E outlines other updates to its programs to address equipment failure rates, such as enhancing its failure analysis program and increasing accuracy on ignition cause. While these changes appear beneficial, in order to adequately address deficiencies found in 2020, PG&E must continue to develop these programs and demonstrate its progress in its 2022 WMP Update.

- *Remedy*: PG&E must (1) provide any findings and associated corrective actions as a result of its failure analysis program development, (2) provide an update on any findings relating to equipment failure rates in comparison to other utilities, including explanations on modifications made to PG&E's asset inspections and maintenance programs as a result of such findings, and (3) explain why projected ignition rates based on equipment failure or damage remains flat for some equipment types.

RESPONSE:

- **Remedy #1: Findings and Associated Corrective Actions:** In 2021, PG&E implemented an expedited process to investigate ignitions in HFTD areas that are California Public Utilities Commission (CPUC or Commission) reportable (*i.e.*, travels 1+ liner meter, burns something other than PG&E assets, we know about it).[4] The process is a cross-functional collaboration between several teams:

  – Electric Incident Investigations collects and Quality Controls (QC) failure information and conducts preliminary evaluation.

  – VM performs a deeper dive into extent of condition of ignition incidents caused due to Vegetation.

  – Equipment Ignition Analysis and Applied Technology Solutions performs a deeper dive into extent of condition of ignition incidents caused due to Equipment Failure.

  This approach provides for a focused investigation of highest risk incident, a deep dive analysis to understand the analysis, completion in a timely manner so risk models and workplans are informed in a more real-time manner, and associated corrective actions are tracked to completion to reduce wildfire risk on our system.

  Below, is a sample of two such investigations and corresponding corrective actions.

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3 PG&E's Supplemental Filing Addressing Remedial Compliance Plan and First Quarterly Report Action Items, February 26, 2021, p. 35.

4 See Decision (D.) 14-02-015 (defining CPUC reportable ignitions).

Contamination Tracking Ignitions

CONTEXT: A trend of increased contamination-tracking crossarm ignitions was identified. Analysis has shown that ignitions are disproportionately occurring on poles of vintage 1960 or older and occur when both contamination and moisture are present on the equipment. Seven high-risk geographic zones have been identified with approximately 3,000 high risk poles in HFTDs. Of these 1,283 are older than 1960 vintage.

ACTIONS: Deployed patrols in 12 circuits in Oakland and San Leandro with multiple tracking events. Identified 16 locations with damages due to tracking that had not yet resulted in an outage. Generated four A-tags and two B-tags to mitigate imminent failure risk.

Asset Strategy is working with Field Operations to help target highest risk areas for insulator washing and to target highest risk areas for proactive insulator/cross-arm replacement

Wire to Wire Slapping

CONTEXT: Potential equipment failure ignitions caused by conductor-to-conductor contact. The team has identified an opportunity to leverage Light Detection and Ranging (LIDAR) data to model spans at a high risk for wire slap during high winds.

ACTIONS: Developed a model to identify 178 circuits with spans at high-risk for wire-to-wire contact. Validating the model using actual incidents tracked in ignition and outage datasets and working with Asset Strategy, Standards, Field Operations, and other key stakeholders to create corrective action strategy to proactively reduce slapping risk from the system.

- **Remedy #2: Benchmarking with Other Utilities:** PG&E continues benchmarking effort with other utilities. However, there are no additional findings to report out.

- **Remedy #3: Projected Ignition Rates:** PG&E is developing programs to mitigate ignitions caused due to ignition components in HFTD areas. However, given the high volume of some ignition components, PG&E is developing a multi-year plan that targets highest risk locations first (highest risk locations may sometimes not align with locations that have highest ignition rates). Therefore, since highest risk locations will be targeted first, ignition rates remain flat for some equipment types that are determined to have lower risk.

Issue 5.4.B

Issue: PG&E experienced increased corrective notifications[5] for both distribution and transmission facilities. It is unclear if the increases are due to PG&E's enhanced

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5 "Corrective notifications" are PG&E's work orders when an issue is found in-field that requires replacement or repair.

inspection protocols enabling PG&E to identify critical infrastructure issues that it previously did not identify or if the increases are due to the ongoing deterioration of PG&E's assets. PG&E must provide further details on the increase in corrective notifications for both distribution and transmission to demonstrate the adequacy of its enhanced inspections.

- *Remedy: PG&E must (1) provide statistics (such as asset type, asset age, potential ignition risk, etc.) on the types of corrective notifications created as part of its distribution and transmission inspections, including 2020 and 2021 notifications, and track such statistics moving forward, (2) provide details on the types of corrective notifications that the enhanced inspections generate that previous inspection practices would have overlooked, (3) explain how PG&E has adjusted its inspection and maintenance practices as a result of the additional corrective notifications, (4) discuss how PG&E assesses trends in issues identified by corrective notifications, any trends it has recognized, and the associated actions it has taken in relation to these trends, and (5) discuss PG&E's predictions for future corrective notification trends, including whether PG&E expects a decrease in corrective notifications in the future.*

RESPONSE:

- **Remedy # 1 — Statistics on Corrective Notifications:**

   Statistics on corrective notifications from transmission inspections can be found in the attachment titled 2022-02-25_PGE_2022_WMP-Update_R0_Section 4.6_Remedy 5.4.B_Atch01 However, asset and ignition risk data for some previously completed tags are not included in the attachment. Asset attributes and risk are dynamic based on risk model maturity, environmental conditions, and asset condition at the time of the modeling, making it difficult to assign such historical data to assets that have since been repaired or replaced. Risk values are calculated using data from September 23, 2021 and are provided for pending tags as of December 3, 2021 and tags completed after September 23, 2021. Asset attribute data is taken from a December 2021 snapshot.

   Statistics on corrective notifications from distribution inspections can be found in the attachments titled 2022-02-25_PGE_2022_WMP-Update_R0_Section 4.6_Remedy 5.4.B_Atch02 and 2022-02-25_PGE_2022_WMP-Update_R0_Section 4.6_Remedy 5.4.B_Atch03. Corrective notifications generated through the enhanced inspections program are assigned a priority based on the potential safety impact. PG&E uses the following priorities:

   A: Conditions that require immediate action;

   B: Conditions that generally need to be addressed within three months from the date a condition is identified;

   E: Conditions that need to be addressed within twelve months from the date the condition is identified or within six months for conditions creating a fire risk located in Tier 3 HFTD areas; and

F: Conditions that need to be addressed within five years from the date the condition is identified.

- **Remedy # 2 — Details on Corrective Notifications:**

Transmission – Since 2018, PG&E has significantly enhanced its inspection efforts. PG&E's enhanced inspections differ from its prior routine inspections and thus generally generate more notifications that would not have been generated by previous inspection methods. Some of the differences between enhanced inspections and routine inspections are described below.

Under enhanced inspections, every inspected transmission asset is reviewed by both a detailed ground and an aerial (drone, helicopter or aerial lift) inspection. PG&E's former inspection program did not use this dual vantage inspection methodology (e.g., no drone technology in prior years).

A Centralized Inspection Review Team (CIRT) comprising individuals with relevant engineering and field expertise reviews inspection findings to determine the final priority of identified conditions. PG&E's former inspection program did not utilize CIRT teams.

Enhanced inspections are based on a Failure Modes and Effects Analysis (FMEA) that PG&E conducted shortly after the Camp Fire in November 2018. The FMEA identifies potential points of failure on transmission assets that could cause a fire ignition. In contrast, inspections conducted prior were not informed by the findings of a FMEA.

Enhanced inspections differ from prior inspections in that inspectors use mobile technology and electronic checklists to document inspection findings electronically. In contrast with previous inspections, the enhanced inspection process requires inspectors to document and record findings for every component on an inspected structure, regardless of whether the components are determined to require repair, which provides additional information on asset condition and increases the verifiability of inspections.

As the description above makes clear, there are numerous possible reasons why conditions would be identified for the first time during an enhanced inspection. By way of example, the condition may have arisen or become more visible since the last inspection or patrol, or the enhanced inspection methods may have provided a better vantage point for detecting the condition (e.g., wood pole rot as seen from the very top of a pole).

Distribution – Since 2019, distribution assets have been inspected more rigorously than in previous years through PG&E's Wildfire Safety Inspection Program (WSIP) based on a FMEA approach. Under this enhanced inspection approach which includes mobile technology and electronic checklists to document inspection findings, there has been a significant increase in the number of corrective notifications.

Given the high volume of identified tags since 2019, PG&E utilized a risk-informed prioritization approach to address the highest risk issues on PG&E's facilities. The

largest volume of identified corrective actions are the E and F tags, which includes findings such as chipped or broken insulators, pole repairs for woodpecker holes, loose cotter keys (E tags), missing markers, signage, or foundation mastic application (F tags). PG&E has prioritized execution of E and F tags based on ignition risk circuit prioritization and plans to continue to make repairs based on this prioritization. Any notification that contains a "time dependent" element and cannot be completed by the due date will receive a Field Safety Reassessment (FSR).

- **Remedy #3 — Adjustments Resulting from Corrective Notifications**

  PG&E annually updates its inspection questionnaires, and feedback from the prior year's inspection, maintenance and performance can help inform future questions as well as changes to existing questions. Additionally, maintenance and inspection results may help inform future refinement to other guidance such as condition prioritization and job aids.

  Starting in June 2021, PG&E began assigning risk points to Distribution corrective notifications to prioritize execution based on highest risk points. We have addressed 62% of total risk points using the 2021 WDRM v2.

- **Remedy #4 — Trends in Corrective Notifications:**

  For transmission inspections, general find rates per work type have been tracked to provide an understanding where to provide future year resources. Completed notifications are also used directly in asset health modeling to update asset condition scores which reflect in improved probability of failure scores.

  For distribution inspections, PG&E is currently in the first cycle of enhanced inspections and find rates continue to trend high. Starting in 2023, beginning of the second cycle of enhanced inspections, PG&E anticipates a decrease in find rates with the continual work down of back log corrective action tags, replacement of system hardening miles, and system undergrounding efforts.

- **Remedy #5 — Predictions for Future Trends:**

  Current trends indicate that assets that have received a previous enhanced inspection have lower find rates than assets receiving their first enhanced inspection. However, subsequent enhanced inspections beyond the second have not yet been found to yield further reductions in find rate.

Issue 5.4.C

Issue: PG&E does not currently use drones for detailed inspections of distribution assets despite its use of drones for transmission and substation inspections as well as distribution patrols. SCE and SDG&E both use drones to augment their distribution inspections and have reported some benefits, such as lower noise for customers.[6]

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[6] SCE 2021 WMP Update, p. 242.

- ***Remedy***: *PG&E must either (1) pilot use of drones or other aerial inspections as part of its inspections of its distribution assets and include a cost-benefit analysis in its evaluation of the success of the pilot program, or (2) explain why its current detailed inspections of its distribution assets are adequate without the enhancement of aerial inspections, including a cost-benefit comparison of PG&E's existing program of using aerial inspections to enhance distribution patrols to detailed inspections, including findings per mile.*

RESPONSE:

- **Remedy #1**: PG&E has conducted two aerial pilots for distribution equipment with promising results. A helicopter pilot was conducted in Q4 2020 of pre-selected Tier 3 structures where inspections were limited to images of the top two-thirds of the structure. A drone pilot was launched in Q4 2021 based on a PSPS event.

  An expanded distribution aerial pilot will take place in 2022 to define the initial Distribution Aerial Inspections program to launch in 2023. The scope of the expanded pilot will include a cost/benefit analysis, an implementation plan, and address findings from previous pilots including:

  1) Piloting both helicopter and drone inspections;

  2) Running the pilot in parallel to randomly selected structures being inspected via the traditional enhanced inspection method;

  3) Developing the selection process for identifying structures well suited for aerial inspections;

  4) Defining the inspection survey and inspector curriculum to include image capture guidance and imagery review for asset reliability and fire ignition risk;

  5) Testing the creation, storage, and retrieval of digital aerial inspection records;

  6) Testing asset registry data accuracy including structure identification tags;

  7) Evaluating the effectiveness of the traditional enhanced inspection method;

  8) Developing a process to promptly create corrective maintenance tags; and

  9) Developing the aerial inspection QC process.

Issue 5.4.D

Issue: *In its Maturity Model, PG&E's self-assessment shows that it currently updates condition assessments in its equipment inventory database on an annual basis, and shows that PG&E does not anticipate progressing to more frequent updates by the start of 2023.*[7] *However, regarding updates to asset information in its distribution risk model, PG&E states in its 2021 WMP Update: "[t]he frequency of updates in planning models to*

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7 PG&E's responses to the Utility Survey, p. 21.

reflect the completion of risk mitigation work will occur on a quarterly basis beginning in 2021."[8] *It is unclear if these statements are contradictory, or if PG&E plans to update its distribution risk model more frequently than its equipment inventory database. Regardless, PG&E appears to have the capacity to update its equipment inventory database more frequently that it currently shows in its Maturity Model.*

- *Remedy: PG&E must (a) explain the discrepancy of asset information updates between its Maturity Model assessment and the text within the WMP, and (b) develop a plan to increase the frequency in which condition assessments are updated in its equipment inventory database before the start of 2023 or explain why it is not possible for PG&E to do so.*

RESPONSE:

(a) PG&E responded to the Maturity Model Survey self-assessment question "D.I.b - How frequently is the condition assessment updated?" as "annual," since Distribution asset inspection cycle in performed annually (each year for Tier 3 assets), every three years for Tier 2 and High Fire Risk Area (HFRA) assets, and every five years for Tier 1 assets in accordance with General Order 165. The "equipment inventory database" referred to in Issue 5.4.D is dynamic and updated continually as a result of the various condition assessments methods, as well as construction and maintenance occurring to the system.

PG&E's statement in its 2021 WMP Update under Action PGE-19 (Class A): "[t]he frequency of updates in planning models to reflect the completion of risk mitigation work will occur on a quarterly basis beginning in 2021" does not contradict the Survey response to question "D.I.b - How frequently is the condition assessment updated?" as "annual," since there would be changes to the "equipment inventory database" based on the continual updates to this database throughout the year described above.

(b) No plan is required because condition assessment frequencies vary depending on the type of condition assessment being deployed, and the basis for the condition assessment. As described above in part (a), certain asset condition assessments are updated more frequently than annually.

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8 PG&E 2021 WMP Update, p. 143.

Additional Remedy 5.5 (VM and Inspections)

Issue 5.5.A

Issue: PG&E describes creating defensible space around substations "beyond PRC 4291 defensible space recommended zones."[9] PG&E does not provide justification for increased clearances at substations.

- *Remedy (#1): Define the extent of the expanded substation clearance and the activities that occur beyond Public Resources Code (PRC) 4291 Defensible Space recommended zones (e.g., removal of flash fuels, limbing trees, felling hazard trees, etc.)*

- *Remedy (#2): Justify the decision to increase clearances at substations beyond PRC 4291 defensible space recommended zones.*

RESPONSE:

- **Remedies #1 and #2:** Additional fuel risks may be identified on PG&E Substation parcels that exist outside of recommended defensible space zones and/or may impede emergency access to energized equipment. In addition, on larger PG&E owned Substation parcels, the recommended Defensible Space zones may fall short of the property boundary. In a continued effort to reduce risk of rapid spread and improve access without impediment, fuel reduction beyond the recommended Defensible Space boundaries will be evaluated. Specifically, in 2022, planned inspections will include an assessment of the whole Substation parcel for fuel risks in addition to the recommended Defensible Space zones. Prescribed work outside of the recommended Defensible Space zones but on PG&E Substation property will be planned and conducted separately from routine Defensible Space maintenance activities and meets or exceeds "Reduced Fuel Zone" criteria.

Issue 5.5.B

Issue: PG&E indicates there were an unspecified number of "carry-over" trees trimmed in 2020.[10] Work was scheduled and began on these trees in 2019 but the work was not 100 percent completed and verified until 2020.

- *Remedy (#1): Detail PG&E's efforts to reduce the number of "carry-over" trees so repeat visits due to barriers (e.g., permitting, access) are limited and trees are trimmed in a more timely and efficient manner.*

- *Remedy (#2): Provide a table that indicates the number of "carry-over" trees by region and Priority Level Finding.*

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9 PG&E 2021 WMP Update, p. 679.

10 PG&E 2021 WMP Update Revision – Clean, p. 694.

RESPONSE:

- **Remedy #1:**

  "Carryover trees" represent the year-end inventory of work identified through current year inspections that is yet to be completed. This inventory fluctuates throughout the year driven by factors including, but not limited to, resource availability and productivity, the incidence of identified tree work, and weather conditions.

  In 2021, PG&E implemented contracts with performance-based payment criteria within its Routine Distribution program and has increased available tree crew resources for both this and the Enhanced Vegetation Management (EVM) program by over 3,009 personnel (121 percent) since the start of the year. As a result, PG&E has improved tree work schedule performance on its Routine Distribution program year to date through October 2021.[1]

  In addition to efforts aimed at reducing the overall volume of carryover tree work at year end, PG&E maintains initiatives that target the completion of higher risk tree work, including:

  – Priority tree work continues to be tracked against procedural timelines i.e., next day for Priority 1 and 20 business days for Priority 2. In addition, PG&E has recently tightened operational focus around the completion of constrained Priority 2 units; and

  – Mid-Cycle, Tree Mortality tree work within or outside HFTD areas, respectively, is now tracked against 180 and 365-day timelines, subject to constraints.

- **Remedy #2:**

	Non-Priority	Priority 2 (P2)	Grand Total
CEMA	**17,256**	**-**	**17,256**
Bay Region	541	-	541
Central Coast Region	1,708	-	1,708
Central Valley Region	1,441	-	1,441
North Coast Region	1,823	-	1,823
North Valley Region	7,238	-	7,238
Sierra Region	4,505	-	4,505
Routine	**234,848**	**1,363**	**236,211**
Bay Region	27,143	274	27,417
Central Coast Region	38,217	496	38,713
Central Valley Region	27,931	139	28,070
North Coast Region	39,296	28	39,324
North Valley Region	44,996	115	45,111
Sierra Region	57,266	311	57,577

	Non-Priority	Priority 2 (P2)	Grand Total
CEMA	**17,256**	**-**	**17,256**
Bay Region	541	-	541
Central Coast Region	1,708	-	1,708
Central Valley Region	1,441	-	1,441
North Coast Region	1,823	-	1,823
North Valley Region	7,238	-	7,238
Sierra Region	4,505	-	4,505
Routine	**234,848**	**1,363**	**236,211**
Bay Region	27,143	274	27,417
Central Coast Region	38,217	496	38,713
Central Valley Region	27,931	139	28,070
North Coast Region	39,296	28	39,324
North Valley Region	44,996	115	45,111
Sierra Region	57,266	311	57,577

Issue 5.5.C

Issue: PG&E's audit target for 2021 quality verification (QV) is the same as 2020; this is despite PG&E having exceeded its target by 500 audits in 2020. Additionally, PG&E states that "For 2021, PG&E anticipates more than tripling our work verification workforce by adding more than 200 quality inspectors to increase our ability to verify that vegetation management was completed to meet or exceed state and federal standards." With a tripled workforce, PG&E should be able increase the target number of audits.

- *Remedy*: PG&E must consider increasing its QV audit goal for 2021 and beyond.

RESPONSE:

PG&E understands this issue to be implying that since we have increased our work verification (WV) workforce, PG&E should also be increasing our QV audit goal. However, WV and QV work is managed within separate departments and resources for planned work are not shared. WV has increased staffing by more than 200 internal and contractor quality inspectors to ensure VM can achieve the goal of performing 100 percent WV inspections on EVM work. The WV process does not have a bearing on QV and the resources needed to complete QV audits. PG&E does establish internal targets for the number of QV audits performed each year based on resource availability.

Issue 5.5.D

Issue*: PG&E does not detail how it "proactively communicates and partners with impacted customers, landowners, government agencies and community organizations regarding the planned work."154 Rather it lists "various forms of communication."**11** In subsection 4 "Progress on initiative and plans for next year," PG&E does not detail how it will work with the community, rather it details its internal environmental review process, and cites seeking court orders and working with agencies and legislature to address constraints to their activities*

- ***Remedy (#1):**** Provide a flow chart or decision tree**12** on communication forms for customers and partner agencies for routine VM, EVM, and emergency work.*

- ***Remedy (#2):**** Explain the capabilities of ProjectWise,**13** and whether it will be used to communicate with customers, governments, and agencies.*

RESPONSE:

- **Remedy #1:** In Q4 2021, PG&E began its effort to standardize and enhance customer and agency outreach. This enhanced customer outreach process uses standardized T-minus timing to contact customers and agencies during five key touchpoints surrounding VM work: prior to inspections, during pre-inspections, prior to tree work, during tree work, and post tree work. PG&E plans to implement the full flow of this new process to EVM, Routine, and Catastrophic Event Memorandum Account programs by Q1 of 2022. PG&E will have also kicked off a new workflow to better coordinate with landowners and internal/external stakeholders on escalations and refusals. The full workflow of this process will go into effect Q1 of 2022. Please see attachment "2022-02-25_PGE_2022_WMP-Update_R0_Section 4.6_Remedy 5.5D_Atch01.pdf" for flow charts related to communication forms.

- **Remedy #2**: Project-Wise is a cloud-based program that allows us to share and track documents with external parties. It records the time/date stamp of all document activity, including if and when a recipient has opened a sent document. PG&E utilizes Project-Wise to track external communications with its opted in counties and other government agencies. The Regional Water QC Board has opted in to receive the VM work plan look-ahead report on a monthly basis. In addition, 20 counties in our service territory have opted-in to receive both the VM work plan look-ahead and the system hardening look-ahead report. PG&E utilizes Project-Wise to send and track these reports.

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11 PG&E 2021 WMP Update Revision – Clean, p. 690.

12 For an example of a decision tree visit https://hbr.org/1964/07/decision-trees-for-decision-making.

13 PG&E 2021 WMP Update Revision – Clean, p. 691.

Issue 5.5.F

Issue: In response to Revision Notice critical issue RN-PG&E-06, PG&E explained that audits (i.e., its Quality Assurance, QV, and WV programs) "track retention of initial VM training retention,"**14** "reinforce expectations of quality, wildfire risk mitigation, and safety,"**15** and "identify deficiencies."**16** In the same response, PG&E admits that it "does not have a continuing education, or 'refresher' curriculum for VM." Energy Safety contends that PG&E has been reactively training its VM crews using deficiencies found during audits rather than requiring proactive continuing education; this reactive vs proactive approach is illustrated by the disparity between PG&E's reported 2020-2022 WMP cycle spend on 7.3.5.13, Quality Assurance/QC of vegetation inspections, and 7.3.5.14, Recruiting and training of vegetation management personnel, which are $32,506,607 and $39,372, respectively. Continuing education and audits are not mutually exclusive and should work in tandem to avoid and remedy VM error. PG&E does state that it is "currently in the process of creating a refresher course that will be updated yearly" which will be "ready for use in 2022."**17**

- *Remedy:* PG&E must report on the progress of developing and implementing its new refresher curriculum in Section 7.3.5.14 (or equivalent). This includes detailing the "issues across various scopes of work identified in the previous year"163 and the "changes to [its] VM programs or changes to safety or work.

RESPONSE:

The refresher curriculum is still in the development process. Additional details regarding curriculum development and project scope will be established in 2022 and are discussed further in Section 7.3.5.14.

Issue 5.5.G

Issue: In Revision Notice critical issue RN-PG&E-06, PG&E is required to provide VM training pass/fail rates.165 In its response, PG&E states that its Structured Learning Path (SLP) software allows individuals to re-take the knowledge checks as many times as needed in order to pass, and as a result, PG&E does not track pass/fail rates.**18** As Cal Advocates points out, "since PG&E allows individuals to re-take the knowledge checks as many times as needed, it is possible for an individual to pass through rote memorization after multiple failed attempts, without necessarily comprehending the material. Additionally, if PG&E does not track the number of attempts individuals take to pass, it is impossible to track statistical anomalies that may indicate a problem."**19**

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14 PG&E 2021 WMP Update Revision – Clean, p. 731.

15 PG&E 2021 WMP Update Revision – Clean, p. 733.

16 PG&E 2021 WMP Update Revision – Clean, p. 733.

17 PG&E 2021 WMP Update Revision – Clean, p. 722.

18 PG&E 2021 WMP Update Revision – Clean, p. 730.

19 Comments of the Public Advocates Office on PG&E June 3, 2021 Revision of its 2021 WMP Update, June 10, 2021, p. 22.

PG&E had planned for VM personnel to take a proctored exam at the conclusion of the SLP which would limit participants to only three attempts to pass.; however, this exam was not implemented due to the Coronavirus (COVID-19) pandemic.[20]

- *Remedy (#1): PG&E must begin tracking passing metrics including, but not limited to, the number of attempts taken to pass the SLP knowledge checks in order to track statistical anomalies that may indicate a problem.*

- *Remedy (#2): PG&E should consider implementing its proctored exam with limited pass attempts at the conclusion of the SLP as soon as possible.*

RESPONSE:

- **Remedy #1:** In 2022, PG&E will be implementing knowledge assessments. With the planned implementation of knowledge assessments for specific courses such as VEGM-0110, VEGM-0410, VEGM-0411, and VEGM-0450, it will place an enforcement of 3 attempts to pass the required PG&E training courses before the employee or contractor will have a 30-day waiting period before being allowed to retake the training course.

- **Remedy #2**: Currently, PG&E has a proctored exam for VEGM-0450 (EVM Field Assessment). In addition to VEGM-0450, VEGM-0110 (Skill Assessment for PI Basics) is slated to be proctored once COVID-19 restrictions are lifted. PG&E will continue to evaluate the need for additional proctored exams throughout 2022.

Issue 5.5.H

Issue: In response to revision notice critical issue RN-PG&E-06, PG&E states it "currently tracks the ISA certification of VM team members as part of the onboarding process" and that it has been providing the ISA's Tree Risk Assessment Qualification[21] training to current ISA Certified Arborists.[22] PG&E's response indicates that PG&E does not track ISA certification after onboarding for renewals or initial certification of existing employees. Additionally, there is no indication that PG&E invests in, encourages, monitors, or tracks employee or contractor's progress towards initial certification after onboarding. ISA training and certification is one pathway towards creating a more qualified workforce; PG&E is missing an opportunity to improve the skills of its workers and prove to Energy Safety, agencies, governments, and public that it is invested in improving the skills and qualifications of its workers.

- *Remedy: PG&E must describe how it is it is promoting and ensuring the continued professional growth of its VM personnel.*

RESPONSE:

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20 PG&E 2021 WMP Update Revision – Clean, p. 730.

21 https://www.isa-arbor.com/Credentials/ISA-Tree-Risk-Assessment-Qualification.

22 PG&E 2021 WMP Update Revision – Clean, pp. 731-732.

PG&E has completed and implemented a 5-week tree worker training program at seven California Community colleges that will be focused on developing and supporting individuals who are looking to make a transition to the utility tree worker industry. PG&E has also completed the digitization of tree training courses.

Additional Remedy 5.6 (Grid Operations and Operating Protocols, Including PSPS)

Issue 5.6.A

Issue: PG&E states that it may potentially increase its fixed-wing fleet in the next two years, therefore decreasing the need to contract aircraft operators for inspection work. However, PG&E does not provide details on its evaluation of this program.

- *Remedy: PG&E must (1) explain how it is evaluating the need to increase its fixed-wing fleet, including providing a cost-benefit analysis comparing increasing its fixed-wing fleet to contracting aircraft operators for inspection work, (2) provide details on the intended increase for PG&E's fixed-wing fleet, including how PG&E has determined or will determine the additional number of fixed-wing crafts to purchase, and (3) discuss how it anticipates an increase in its fixed-wing fleet would impact helicopter inspections.*

RESPONSE:

1) PG&E has evaluated the use of the company-owned, fixed-wing fleet and has determined that the existing complement of two is currently sufficient for WMP related activities. This is predicated upon the use of fixed wing aircraft being typically limited to long linear style assets only (i.e., electric and gas transmission features) against the versatility of using rotary aircraft (helicopters) for both electric T&D inspections. Additionally, Unmanned Aerial Vehicles (i.e., drones) are being piloted including BVLOS (beyond visual line of sight) making them a potentially more cost-effective and safer long-term alternative rather than additional fixed wing aircraft.

2) As noted in response (1) above, there are no current plans to increase the company owned fixed wing aircraft fleet for WMP related activities.

3) As noted in response (1) above, there is no impact to the existing WMP helicopter inspection usage due to the current plan of the company-owned fixed wing aircraft fleet remaining static.

Additional Remedy 5.7 (Data Governance)

Issue 5.7.A

Issue: *PG&E's spatial QDR data submissions have shortcomings that must be remedied. PG&E lacks internal QC on its data submissions. Data are sometimes incomplete or unexplained.*

- ***Remedy:** PG&E must submit correct locations, complete age data, and primary keys.*

RESPONSE:

PG&E has continuously improved the quantity and quality of data submitted as part of the Quarterly Data Report (QDR) since the implementation of the Geographic Information System (GIS) Data Standard in Q3 2020. PG&E is committed to making continued progress to resolve the identified deficiencies. Enhancement improvements require more involved operational and technological changes, and a significant investment of resources and time to collect, curate, and organize the Data Standard submissions. Given the estimated level of effort and timeline required to meet the standard, regular collaboration with Energy Safety is needed to align on expectations, prioritize improvement efforts, jointly understand technical feasibility issues, and shape modifications to the schema. PG&E looks forward to participating in upcoming technical workshop with Energy Safety and the other utilities to address the above items and other feedback regarding the GIS Data Standard, as described in further detail through PG&E's Comment on GIS Data Standard V2.1, V2.2, and our presentation from the October 21, 2021 Energy Safety and Investor Owned Utility (IOU) Technical Workshop.[23]

Data Completeness – PG&E's existing data and system architecture were developed over decades to address specific operational uses and lack integration capability and a cohesive data schema. This presents significant challenges to accessing and aligning data to meet Energy Safety's Spatial QDR schema. The various data requested exist across disparate systems and in the current state require significant time and resources to manually align data sets to the data schemas provided by Energy Safety and then to extract the data. For data not currently collected or not architected per Energy Safety's required schema, PG&E is currently exploring the feasibility and resource requirements to collect, transform, and ultimately submit these data. These assessments are accomplished through workshops with cross-functional teams (Asset Owners, Subject Matter Experts, Technical/System Experts) to define the technical feasibility and prioritize future improvements. In addition, PG&E is pursuing the build out of data object types through our enterprise data management platform (Palantir Foundry), as further described in Section 7.3.7.1. Over time, as data object types are integrated into Foundry, they will take on an organized data schema, enabling greater access to structured data that incorporates inputs from formerly disparate source systems.

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23 See PG&E Comments on GIS Data Standard V2.1 (Aug. 31, 2021) and V2.2 (December 27, 2021). https://efiling.energysafety.ca.gov/Lists/DocketLog .aspx?docketnumber=2021-GIS-DRS.

Data Explanations – PG&E continues to build on our metadata (information to describe the data submitted) and Status Report inputs for each Feature Class or Related Table included in our submission. For instance, in our Q2 2021 submission, PG&E increased the specificity of our Status Report and developed a Metadata baseline entry. In our Q3 2021 submission, PG&E aligned language in its Status Report regarding definitions and expanded on data explanations. In addition, PG&E added primary data sources for which datasets were derived. In 2022, PG&E plans to build out data explanations through workshops with subject matter experts to document information related to estimated timeframe, procurement actions, and other information which can be leveraged to prioritize pursuit of data gaps.

Data Quality – PG&E continues to assess and implement methods to systematically improve data quality as it relates to the Spatial QDR submission. For example, in our Q3 2021 submission, PG&E adopted new domain values that were introduced in V2.1 of the GIS Data Standard schema, requiring revisions to existing data automations (code) used to transform PG&E internal source system data into Energy Safety's updated data schema. To help ensure that domain values in our file geodatabase (FGDB) submission align with the domain values prescribed through Energy Safety's data schema, we developed a Domain Quality Checker Tool via our Data Management Platform. This tool automates the comparison of PG&E's data outputs with the domain structures prescribed by Energy Safety. Issues identified are flagged for manual review and correction. Of note, the GIS Data Standard V2.1 introduced significant changes and was subject to errors across Energy Safety guidance documentation, resulting in significant re-work for our Q3 2021 submission.[24,25,26,27] Re-work of datasets due to errors across guidance documentation distracts from other reporting priorities such as quality check processes or integration of net new data.

Quarterly submission cycles and associated timelines do not provide sufficient time to perform a comprehensive quality check of the data and associated Status Report included in our submission. PG&E's Q2 2021 submission included over 15 million records—reviewing each record individually for quality purposes is not feasible nor practicable given the scale of this quarterly submission.

Location and Age Data – PG&E is implementing various data quality initiatives to support improvement of asset location and age data; these are multi-year efforts and

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24 PG&E's analysis of the original PDF guidelines for V2.1 of the GIS Data Standards indicates over 100 new or removed fields in the feature classes and related tables were not captured in redline via the tables directly.

25 An example of misalignment across guidance documents can be found in the 3.4.2 Wire Down Event (Feature Class) where the PDF document requests "WireDownID" (Unique ID for the wire down event. Primary key for the Wire Down Event feature class attribute table), whereas the FGDB input for "WireDownID" only allows domain value of "UtilityID" (PG&E).

26 Another example of misalignment across guidance documents can be found in PDF document, Feature Class 3.3.6.2 (PSPS Event Damage Point), which contains fields for FuelBed and FuelBedDescription and which are not included in the FGDB.

27 A third example of misalignment across guidance documents can be found in Feature Class 3.3.6.2 (PSPS Event Damage Point) where the FGDB contains a field for "AssetID" (a net new field in V2.1) which is not present in the PDF document.

will help address data gaps for select fields over time. For instance, PG&E is conducting research and recording the age and installation date of certain critical transmission tower components.**28** This is an ongoing, multi-year effort for which monthly progress updates are provided. In addition, PG&E is leveraging its LiDAR data collection to perform conflation activities, performing a set of procedures for digitizing features that extract elevations from a LiDAR surface. These procedures improve the spatial accuracy of electrical structures. The conflation activities in 2021 included manual processes for distribution conflation of HFTD Tier 2, Tier 3, and HFRA, including 98 percent (575,233) of primary distribution support structures and 90 percent (69,470) of secondary distribution support structures, with the remaining structures planned for 2022. 2022 planned conflation activities also include the following: (i) Pilot of automated conflation processes for remaining non-HFTD distribution support structures; (ii) manual conflation of transmission structures; (iii) manual conflation of substation structures. Location or age data resultant from data quality efforts can be reflected in PG&E's Spatial QDR submissions after it is collected, processed, and input into a source system (e.g., GIS or SAP).

As highlighted through PG&E's Q3 2021 Status Report under various 'InstallationDate' field level explanations, "Currently, for the majority of programs, when assets are replaced, this information is captured and stored in a centralized system of record. For certain assets, installation date, and other data attributes, were originally captured via paper format and later converted to electronic format. This introduced the potential for errors or other data gaps. For assets not recently replaced, gaps remain present primarily because specific paper records are: (1) not easily located; or (2) certain data points were not required to be collected when the asset was installed. Until these assets are replaced or otherwise dated, PG&E will have gaps for this data field…" Errors can also occur when incorporating latitudinal and longitudinal (lat/long) coordinates due to human error in data capture or technical challenges in capturing this data in remote conditions that lack network connectivity. Finally, certain reported data fields do not have a single installation date, as required by OEIS' schema. For example, Feature Class 3.1.6 Substation, includes facilities that are comprised of hundreds or more asset types. Deriving a single installation date to represent these facilities is not possible as assets are installed and replaced at various intervals based on operational needs.

Primary Key Data – PG&E understands Energy Safety's objective to create one-to-many relationships via primary keys. However, establishing this relationship is challenged due to both schema requirements and PG&E's data architecture, which was built for operational purposes. For example, PG&E's vegetation data is structured at the individual tree level. Therefore, when reporting on the inspections work, the log ID (VmiLogID) is the same as the unique ID of the job activity (VmiID), representing a one-to-one relationship. PG&E could theoretically create a different primary key for the 'VmiLogID' with the goal of generating a one-to-many relationship for the Spatial QDR, such as grouping all inspections together by date, division, county, etc.; however, doing so would not allow PG&E to complete most required fields with a single input as

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28 PG&E Q3 2021 Spatial Quarterly Data Report submission – Status Report in 'Availability Explanations' and 'Data Procurement Actions' for several 'InstallationDate' field explanations (e.g., 3.2.1 Transmission Line).

required by Energy Safety's schema, since multiple inputs would necessarily apply. To illustrate, if all work were grouped by division, then multiple inputs would be needed to describe fields such as 'InspectionStartDate', and 'InspectionEndDate', but the GIS Data Standard schema only allows one input. This same limitation applies to other primary key identification methods when a one-to-many relationship is required.

Some of Energy Safety's primary key guidance requires interpretation and best judgement is applied in fulfilling the requirements. For example, in the 3.3 PSPS Event feature datasets, 'DamageEventID' is described as an "ID value for an individual PSPS event. Event ID values for damage points should match event ID values in corresponding PSPS event GIS data." This field is then immediately followed by the 'EventID' field, defined as "A unique standardized identification name of the unique event. Foreign key enabling connection to the PSPS Event Log related table." Both fields appear to ask for the same datapoint, the matching event ID in the PSPS Event feature classes. PG&E could theoretically copy the IDs applied across each of these fields, though this does not provide additional correlation capability when compared to applying the ID to a single field. Instead, PG&E has implemented logic to create a meaningful relationship between these datasets for the Q4 2021 submission. Specifically, for the PSPS Event tables, we are using multiple data types to create primary key inputs, including Date, Circuit ID, and Isolation Device ID. These inputs can be correlated with the primary key inputs leveraged for the PSPS Damage Event ID tables, which also include Date and Circuit ID. Determination of this methodology was the result of multiple working sessions with subject matter experts and technical leads to compare PG&E's data architecture and associations with OEIS' schema. PG&E plans to implement similar working sessions in subsequent quarters to progress closure of feasible data gaps for Primary Key inputs.

In the detailed PSPS asset related damage feature classes, an additional unique ID is requested for each feature class (i.e., PspsCdID, PspsSsdID, PspsOadID). Because each record PG&E provides represents one damage found, the 'DamageEventID' primary key found on the 3.3.6.2 PSPS Event Damage Point feature class, can also be used as a primary key on the other 3 related datasets (i.e., conductor, support structure, and other damages). Rather than duplicating the 'DamageEventID' values to PspsCdID, and PspsSsdID, PspsOadID, PG&E nulled these fields through its Q3 2021 submission as 'DamageEventID' is already on each of those datasets.

PG&E has requested clarification on the specific deficiencies Energy Safety identified in relation to primary keys. Primary key creation often requires significant interpretation and is subject to change based on PG&E's data architecture and Energy Safety's schema requirements. PG&E requests feedback on Energy Safety's prioritization of primary keys to allow a phased approach for addressing identified issues. PG&E looks forward to further collaboration with Energy Safety and the other IOUs through the upcoming technical workshops related to the GIS Data Standard to align on primary key priorities and potential technical limitations to help drive consistent implementation of primary key identifiers.

Additional Remedy 5.8 (Resource Allocation Methodology)

Issue 5.8.A

Issue: In its 2021 WMP Update, PG&E continues to use noncommittal and equivocating language to describe future improvements to resource allocation methodology. Per Guidance-8, part iii of Section 5.4.4 of Resolution WSD-002, "Continued use of equivocating language may result in denial of future WMPs."[29] Regarding PG&E's future improvements to PG&E's risk spend efficiency analysis, PG&E states, "RSE calculations are continually being refined by better data for effectiveness and scope calculations, coupled with better input from the SME as the use of data for RSE calculations is better understood with time."[30] The phrases "continually being refined", "better data", "better input", and "better understood" are not measurable, quantifiable, or verifiable by Energy Safety. The usage of these phrases indicts a lack of commitment for PG&E to improve its resource allocation methodology.

- *Remedy*: PG&E must eliminate the usage of equivocating language in order to provide measurable, quantifiable, and verifiable benchmarks.

RESPONSE:

PG&E will eliminate the use of equivocating language and provide measurable, quantifiable, and verifiable benchmarks associated to our resource allocation methodology. In addition, PG&E is committed to improving our resource allocation methodology and demonstrates that commitment throughout the 2022 WMP. As an example of this commitment, PG&E has undertaken a significant expansion of Risk Spend Efficiency (RSE)-related work. First, in our 2023 General Rate Case (GRC) filing, PG&E has expanded the number and scope of RSEs presented. Second, in the second half of 2021, PG&E engaged in an RSE verification process that will strengthen our quantitatively focused allocation methodologies to make them more measurable, quantifiable, and verifiable. That RSE verification process includes: (1) validation of current approaches of effectiveness, exposure, and benefit length; (2) benchmarking this approach with other utilities; and (3) assessment of confidence for each RSE. Third, PG&E is using RSEs in decision-making for the 2022 capital allocation workplan.

Issue 5.8.B

Issue: For capability 41a of the 2021 Maturity Survey, PG&E selected "Utility does not base capital allocation on RSE" for 2021 and starting 2023, the "Utility will consider estimates of RSE for capital allocation". Compared to its peers, SCE and SDG&E are at least considering estimates of RSE when allocating capital resources.

- *Remedy*: PG&E must: 1) explain why it does not currently consider RSE estimates for capital resource allocation, and 2) provide a detailed pathway to begin the

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29 "Condition (Guidance-8, Class C): In its 2021 WMP update, each electrical corporation shall: [...] iii) Dispense with empty rhetoric and not use terms that are ambiguous, misleading, or otherwise have the result of diluting.

30 PG&E's 2021 WMP Update Revised – Clean, p. 813-814.

consideration of RSE estimates for capital resource allocation in its 2022 WMP Update.

RESPONSE:

Since the time of the 2021 Maturity Survey, PG&E has considered RSEs for capital allocation, specifically for System Hardening decisions. In the 2022 Maturity Survey response, in Question H.V.a, PG&E selected "Utility will consider estimates of RSE for capital allocation" for our response. RSEs are currently a part of the capital allocation process. For instance, RSEs are a key element in PG&E's Mitigation Decision Tree for System Hardening. Please see p. 94 of PG&E's Progress Report.

Additional Remedy 5.9 (Emergency Planning and Preparedness)

Issue 5.9.A

Issue: PG&E states that after a wildfire event the utility reviews and evaluates communications to customers and the public. This feedback is then used to improve customer and public communications and outreach efforts for the following year. However, PG&E fails to explain the type of information collected about wildfire outreach efforts, how it is collected, and how it is used to inform future outreach efforts (or prioritize improvements)

- *Remedy: PG&E needs to develop a transparent methodology to track customer feedback, identify priorities and incorporate those into future plans.*

RESPONSE:

PG&E evaluates our outreach and communication effectiveness before and after each wildfire season. PG&E engages with agencies, community-based organizations, critical facilities, and customers in multiple fora that foster open and transparent communication and encourage key stakeholders to provide candid feedback before and after wildfire season. In 2021, we commenced surveying impacted customers after PSPS events. Section 7.3.10.1 provides additional details on evaluation mechanisms that PG&E employs when engaging with each of these stakeholder groups. Below is additional information regarding our methods to assess outreach effectiveness as well as details on specific opinion surveys that we conduct throughout the year.

Methods to Assess Outreach Effectiveness

PG&E evaluates outreach effectiveness around wildfire safety, PSPS preparedness, and PSPS performance through both qualitative and quantitative research. Quantitative research involves representative surveys of a specific population (customers, Community Based Organizations (CBO), etc.) that may measure statistically significant progress over time. These include measures of message awareness and recall, message understanding, and reported changes in behavior.

Non-survey quantitative measures include web-traffic, click-through rates of advertisements and conversion rates/actions taken by customers as a result (e.g., attendance of a webinar, updates made to contact information, or adoption of various customer programs).

Qualitative research includes input from small groups of customers. It is traditionally associated with focus groups and in-depth interviews but is also conducted virtually with participants recruited using list samples or from online panels. PG&E conducts a variety of qualitative studies throughout the year to identify solutions and potential program offerings to improve future customer experience and outreach.

Quantitative Research

- Opinion Surveys – PG&E conducts surveys online or via phone that are representative of specific populations and are able to measure statistically significant changes over time. These include the following:

1) Tri-annual surveys with residential customers that capture awareness and recall, understanding of, and satisfaction with PG&E's customer communications and to measure statistically significant changes over time.

2) Survey of CBO/partners to assess the effectiveness of outreach targeted to non-English speaking populations and other groups of vulnerable and hard-to-reach customers.

3) Post-PSPS event surveys conducted immediately after each PSPS event to assess PSPS performance during that specific event.

- Transactional Surveys – PG&E hosts website surveys that allow customers to provide direct feedback on the site page and topic. PG&E's e-mail newsletters also provide customers the option to score the value of the content and to provide direct comments.

  PG&E also quantitatively tracks customer engagement at different periods of time throughout wildfire season to understand customer behavior in the following ways:

  – Web Traffic – Traffic to relevant pages on PG&E's website, such as wildfire alerts, updates to contact information, wildfire safety pages, safety action center, statewide PSPS program. Website traffic is currently measured by assessing number of unique visitors, visits, and page views.[31]

  – Click-through rates of advertisements – Click-through rate of advertisements is an industry accepted standard that measures the number of people visiting a webpage who access a hyperlink to an advertisement (e.g., wildfire safety). To note, advertisement click-through rates measure the immediate response to an advertisement but not necessarily the overall response. Customers may see the advertisement, absorb the messaging, and choose to act later.

  – Conversion rates/actions taken by customers as a result: Conversion rates of customers are the measurable actions taken by customers based on the outreach (e.g., updating contact information, attending an open house, enrolling in Medical Baseline (MBL) Program).

Qualitative Research

- Customer Feedback – PG&E regularly reviews customer sentiment received directly by account managers, via the Contact Center, the website, and other social outlets during and after events.

- After engagement surveys – Provided to agencies, critical facilities, large businesses, and other stakeholders that have participated in engagement efforts to

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31 Unique visitors are the number of individuals that visit the specific webpage. These unique visitors may make multiple visits to the webpage. Page views account for all webpages served by the website (pge.com) whereby a unique visitor goes to multiple pages on the website.

ask for feedback on effectiveness of the engagement and solicit ideas for engagement improvement and future topics for engagements and trainings.

- <u>After engagement internal evaluations</u> – After each type of engagement (e.g., listening sessions and regional working groups), PG&E evaluates feedback from stakeholders received on the effectiveness of the meeting and determines where improvements can be made before the next engagement effort. In this way, PG&E seeks to continuously improve in terms of the value of engagements to our stakeholder partners.

- <u>Advisory committees and councils</u> – The advisory committees and councils described in the section above (*Strategies and Actions Taken to Identify and Contact Key Community Stakeholders*) are designed to help PG&E improve our actions to help communities prepare for emergencies, including PSPS, and to provide input on our wildfire mitigation activities generally. Part of this scope will include committee and council evaluations on effectiveness of communications, covering stakeholder engagement throughout the year, as well as in emergency stakeholder notifications. PG&E will take committee and council feedback into account when designing future engagements and communication plans.

- <u>Feedback from local PG&E representatives</u> – Local PG&E representatives—Public Safety Specialists, Local Public Affairs, Tribal Representatives, and CRMs—seek feedback on communication effectiveness from agencies, community stakeholders and customers throughout the year, both in formal engagements and during informal conversations. These local PG&E representatives share this valuable feedback internally and it is then used to evaluate effectiveness of communications and to identify specific actions that PG&E can take to improve.

Specific Opinion Surveys

PG&E conducts multiple surveys with the general public and with those directly impacted by PSPS. The surveys assess PG&E's performance with educating and informing the general public about wildfire safety and PSPS prior to any PSPS and in notifying them during PSPS events. Findings from these surveys are reported both the CPUC and to multiple audiences internally. The principal surveys conducted by PG&E Customer Experience & Insights team include the following:

Wildfire Safety-PSPS Outreach Effectiveness Surveys (General Public)

The survey is fielded three times each year:

- Baseline (fielded in Q1 or Q2, prior to the start of wildfire safety outreach);

- Pre-Season (Aug/Sept, just prior to the start of the height of wildfire season); and

- Post-Season (Nov/Dec, soon after the peak wildfire season).

The survey is used to measure:

- Awareness of that year's outreach effort;

- Communication channels recalled/preferred;

- Awareness of PSPS;

- Awareness and use of available resources;

- Actions taken as a result of PSPS; and

- Satisfaction with PG&E's management of PSPS and its efforts to limit the spread of wildfires.

The survey is fielded to a random sample of PG&E's residential customers. It consists of at least 2,000 completed interviews with roughly half completed online and half completed by telephone. The final sample is weighted by age and geography to be representative of PG&E's residential customer base. Per Decision (D.) 20-03-004, the 2020 surveys were developed jointly with PG&E, Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E), and results from the survey are reported to the Commission. Results are also reported to multiple audiences internally.

Beginning in 2021, the online survey is offered in the following 16 languages:

English	Farsi	Khmer	Russian
Spanish	Hindi	Korean	Tagalog
Chinese	Hmong	Portuguese	Thai
Arabic	Japanese	Punjabi	Vietnamese

The phone portion of the survey also accommodates these languages when non-English speakers are encountered.

The survey is large enough to allow for analysis at multiple levels, including:

- Designated Market Area;

- Recallers and Non-Recallers of the outreach;

- HFTDs;

- Customers with Access and Functional Needs (AFN), including:

  – Non-English speakers;

  – Low-income, including customers on CARE/FERA;

  – Those enrolled in PG&E's MBL program;

  – Those reliant on medical equipment;

  – People with Disabilities;

- Seniors; and

- Vulnerable customers.

Wildfire Safety-PSPS Survey of CBO/Partners

The survey is conducted among Community-Based Organizations, multi-media partners, and governmental and non-governmental organizations who partner with PG&E to educate and inform hard-to-reach and vulnerable populations. These include organizations that represent, among others:

- Low-income populations;

- The elderly;

- The disabled;

- Non-English-speaking populations; and

- Other AFN populations.

The survey is used to assess the effectiveness of its outreach to vulnerable and hard-to-reach populations from the perspective of the organizations who work most closely with these groups. These groups are historically difficult to obtain on traditional surveys for a variety of reasons, including:

- Language barriers;

- Cognitive barriers;

- Cultural barriers; and

- Access barriers (no phone and/or no Internet).

The survey uses CBO/Partners as a surrogate for these populations and is intended to complement the general population survey. The survey assesses:

- Effectiveness of the PG&E outreach among their constituents;

- Clarity and accuracy of the non-English translated materials;

- Special needs not currently being addressed; and

- Suggestions for improvement.

The survey is sent to the entire universe of CBO/Partner contacts and is conducted entirely online.

PSPS Post-Event Surveys

Beginning in 2021, PG&E began conducting online surveys among impacted customers immediately following a PSPS event. Three such surveys were conducted in 2021 following:

- August 17, 2021 Event;

- September 20, 2021 Event; and

- October 11 and October 14, 2021 Events (combined).

In order to avoid survey fatigue, the later surveys excluded anyone who responded to an earlier survey; therefore, no one would have responded to more than one survey.

The survey is used to get an immediate read on PG&E's handling of the just-completed PSPS event, including:

- PG&E handling of the event;

- Satisfaction with notification clarity and accuracy;

- How they were impacted;

- Timeliness of restoration;

- Emotional response (angry, frustrated, prepared, protected, etc.);

- Level of improvement compared to past events;

- Awareness and use of resources; and

- Suggestions for improvement.

The results of the surveys were reported to multiple internal audiences, including PG&E leadership.

Program Refinements Based on Research and Feedback

The insights gathered from this customer research are shared with the PSPS program and communications teams for awareness, improvement, and prioritization for future planning. Based on feedback from agencies, community-based organizations, critical facilities, and customers on the 2020 PSPS events, PG&E focused our efforts in 2021 on key initiatives to inform and enhance outreach efforts (or prioritize improvements). This includes, but is not limited to:

- PSPS In-Event Notifications

  - Improving the verbiage and translations of customer notifications. These notifications include improved content tested for usability and accessibility with simple and straightforward messaging on relevant event information (e.g., location of impact(s), estimated time of shutoff, and restoration). All text, e-mail notifications, and automated calls are now at parity with English notifications.

- Providing proactive notifications and impacted zip code information to paratransit agencies that may serve all the known transit- or paratransit-dependent persons that may need access to a Community Resource during PSPS events.

- PSPS In-Event Resources

  - Posting a comprehensive, accessible, and searchable list of all potential Community Resource Centers (CRC) locations on our webpage. During PSPS events, PG&E continued to post a searchable list of specific CRC locations and the resources available at each CRC, type of CRC (e.g., indoor, outdoor), COVID-19 policies, and operating hours on PG&E's Emergency Website (pgealerst.alerts.pge.com). Details for CRCs were made available as soon as sites were confirmed (up to two days before de-energization for some locations).

  - Launching PSPS Address Alerts for non-PG&E account holders so that any individual served by PG&E or with interest in a location served by PG&E can sign up for PSPS event notifications in any of 16 languages delivered via phone call or SMS text. Address Alerts replaced the previously available option of Zip Code Alerts.

- AFN Customers and Communities Support

  - Executing a partnership agreement with the California Network of 211s to provide AFN customers with a single source of information and connection to available resources in their communities. This agreement provides PSPS education, outreach, and emergency planning in advance of a PSPS event and connects customers with AFN to critical resources like transportation, food, hotel accommodations, portable battery backups, and other social services during and after PSPS events. This brings a consistent statewide solution for SPSP response to the AFN community served by an IOU.

  - Establishing new partnerships with HealthCare Partners and re-engaged with the CA Rural Indian Health Board with other IOUs to promote the MBL Program through educational webinars for partners and distribution of applications and collateral.

  - Partnering with the California Foundation for Independent Living Centers and other CBOs to conduct outreach and provide resources for individuals reliant on power for medical or independent living needs.

- PSPS Preparedness

  - Testing our Preparedness Brochures with customers to validate that the information is relevant for them and that they support receiving the communication. As a result of our customer research, PG&E developed five versions of the Preparedness Brochure to target and support customer groups.

For additional improvements made to customer, agency, and external communications see Section 8.2.5. PG&E will continue to apply best practices and leverage lessons learned from our 2021 customer outreach experience. Going forward, we support a

collaborative, data driven process to define the most effective and appropriate outreach and in language translation requirements.

Issue 5.9.B

Issue*: PG&E indicates it uses the After Action Review (AAR) process to identify key lessons learned from each Emergency Operations Center (EOC) and develop protocols learned from wildfire response. While PG&E explains how it formalizes the AAR process, it is difficult to determine the how effective the process has been in improving protocols.*

- ***Remedy****: PG&E must describe what lessons it learned through its AAR process and how the corrective action improvements were implemented following this process.*

RESPONSE:

The standardized AAR process is key in providing PG&E greater alignment from the Lines of Businesses (LOB) by identifying training gaps, potential improvement processes, and inserting continuous improvement/corrective action items into new or current work streams. The 2020 AAR's resulted in four corrective action items that PG&E LOB's incorporated into the Corrective Action Program (CAP) to reduce risk are detailed below. The CAP process allows the submitted issues to be evaluated, assessed for risk, and resulting corrective and preventive actions, are tracked to resolution.

1) CAP Issue #: 121681235 Issue Description – There is a need to shorten scoping configuration and power flow review between EDEC and ETEC.

    - Resolution – Staffing was adjusted and EDEC and ETEC now have adequate staffing to ensure support for PSPS.

    - Completion Date – 8/13/2021.

    - Lesson Learned – Ensure we have adequate staffing for EDEC and ETEC for future PSPS support.

2) CAP Issue # 121681392 Issue Description – A lack of confidence in data integrity is adding to the complexity of decision making.

    - Resolution – Utility bulletin, TD-8123M-B001, "Priority A Notification Management for Electric Operations" was published in August 2020. To best roll these changes out to the T-Line M&C organization, T-Line M&C Compliance created a job aid detailing how T-Line will specifically manage priority A notifications, including providing details of the completed actions to immediately mitigate the identified hazard, and sent it out to the M&C execution teams in November 2020. To further reinforce priority A notification management, Transmission Line M&C Compliance created a training presentation and held a training session with Supervisors and Superintendents in June 2021. T-Line M&C Compliance is conducting regular quality reviews of priority A notifications and providing guidance to M&C teams on improving the quality of the

information recorded on priority A notifications. The T-Line M&C Compliance team has performed several actions, detailed above, to address priority A notification management and are regularly performing quality reviews and adding necessary detail, if needed.

- <u>Completion Date</u> – 07/15/2021.

- <u>Lesson Learned</u> – The data quality in the notifications were insufficient in details resulting in increased training sessions needed to conduct quality reviews of notifications.

3) <u>CAP Issue # 121681396 Issue Description</u> – There is an inconsistent application of Automated Roaster Call Out System (ARCOS) coding for T200 and T300 distribution resources.

- <u>Resolution</u> – The process for ARCOS coding utilizing badges was updated in the training and communicated during the ARCOS user forum and the PSPS refresher prior to the PSPS season.

- <u>Completion Date</u> – 7/12/2021.

- <u>Lesson Learned</u> – Due to the inconsistency of how employees were coding in ARCOS, the training and communications were updated and presented to employees to standardize the use of ARCOS.

4) <u>CAP Issue # 121681392 Issue Description</u> – Information contained in the Company Emergency Response Plan PSPS Annex indicates the Human Resources Branch Director is responsible for employee guidance for incident or event related impacts to Company facilities. This created a potential messaging conflict during the event with the EOC Facilities Unit Leader, who was operating under the understanding that they were responsible for provided guidance to employees on facility impacts.

- <u>Resolution</u> – Currently in progress with a due date of March 31, 2022.

Issue 5.9.C

Issue*: PG&E shows a decrease in its Emergency Planning and Preparedness spend, despite significant increases in self-reported maturity.*

- ***Remedy****: PG&E must describe how it plans to accomplish its projected maturity in Emergency Planning and Preparedness initiatives when spend has decreased.*

RESPONSE:

The Emergency Planning and Preparedness spend – identified in Section 1.3 of the utility's 2021 Action Statement on page 107 – did not show a decrease in spend. The table shows PG&E's 2020 actual total as $4.05k, while the 2021 and 2022 planned total are identified as increasing to $4.68k and $4.86k respectively. Thus, in PG&E's Table 12 of the QDR for Third Quarter of 2021, the Emergency Planning and Preparedness programs actual and projected spend are shown to be increasing between 2020 and 2022. The actual capital and operating expenses in 2020 are

approximately $23k, and the projected expenses in 2021 and 2022 are approximately $26k and $27k respectively. PG&E continues to evaluate our spend as it relates to the Emergency Planning and Preparedness initiatives so as to continue maturing its programs and increasing spend, as necessary.

Additional Remedy 6 PSPS, Including Directional Vision for PSPS)

Issue 6.A

Issue: PG&E's projections for customer outage hours uses an 11-year average of simulated historical PSPS events. In the lookback simulation, the PSPS duration each customer experienced is calculated as the weather duration plus restoration time, which results in the lookback simulation using maximum event hours for customers, regardless of the hours actually experienced by customers. This methodology does not provide an accurate projection of PSPS customer hours and creates an estimate that is difficult to compare to past events.

- *Remedy: PG&E must refine its PSPS projection methodology. Projections must be comparable to recorded data from past events. To the extent practicable, projections should factor the actual duration experienced from past PSPS events.*

RESPONSE:

PG&E has refined its PSPS projection methodology. The updated projection methodology uses a 4-year average of simulated historical PSPS events. In the lookback simulation, the PSPS duration is calculated as the simulated duration experienced by each customer from past PSPS events plus restoration time.