Pacific Gas and Electric Company

Jay Leyno
Director
Community Wildfire Safety Program

Mailing Address: P.O. Box 7442
San Francisco, CA 94120
Telephone: (925) 239-3126
Email: Jay.Leyno@pge.com

August 22, 2022 **BY ENERGY SAFETY E-FILING**

Caroline Thomas Jacobs, Director
Office of Energy Infrastructure Safety
California Natural Resources Agency
715 P Street, 20th Floor
Sacramento, CA 95814

Re: **Reply Comments of Pacific Gas and Electric Company on the Revised 2022 Wildfire Mitigation Plan**
Docket: 2022-WMPs

Dear Director Thomas Jacobs:

Please find enclosed Pacific Gas and Electric Company's reply comments on our Revised 2022 Wildfire Mitigation Plan. If you have any questions, please do not hesitate to contact me.

Very truly yours,

/s/ Jay Leyno

Jay Leyno

REPLY COMMENTS ON THE REVISED 2022 WILDFIRE MITIGATION PLAN OF PACIFIC GAS AND ELECTRIC COMPANY

CHARLES MIDDLEKAUFF
JOEL CRANE
KENNETH LEE
Pacific Gas and Electric Company
77 Beale Street, B30A
San Francisco, CA 94105
Telephone: 650-766-9147
E-Mail: Charles.Middlekauff@pge.com

AARON SHAPIRO
Shapiro Law
1375 Sacramento Street, Unit A
San Francisco, CA 94110
Telephone: (415) 754-8181
E-Mail: aaron@apshapirolaw.com

Attorneys for
PACIFIC GAS AND ELECTRIC COMPANY

August 22, 2022

TABLE OF CONTENTS

Page

TABLE OF CONTENTS
(continued)

Page

I. INTRODUCTION

On February 25, 2022, Pacific Gas and Electric Company (PG&E) submitted our 2022 Wildfire Mitigation Plan Update (WMP) pursuant to the Office of Energy Infrastructure Safety's (Energy Safety) 2022 WMP Guidelines and California Public Utilities Code Section 8386. Since that time, Energy Safety and various stakeholders have conducted an extensive review of our 2022 WMP, including hundreds of data requests, detailed questions during workshops and meetings, and hundreds of pages of comments. On May 26, 2022, Energy Safety issued a Revision Notice identifying thirteen critical issues in PG&E's 2022 WMP requiring additional information.[1]

As instructed, we responded to seven critical issues on June 27th, four critical issues on July 11th, and two critical issues on July 26th. The critical issue responses included over 100 pages of additional information plus new attachments with further wildfire mitigation plan materials. We incorporated each critical issue response into a Revised 2022 WMP, along with errata previously provided and other changes necessitated by the critical issue responses. The Revised 2022 WMP is now nearly 1,200 pages, not including the tables and attachments, and it provides a comprehensive overview of our wildfire mitigation activities that fully complies with the statutory requirements for wildfire mitigation plans.

Only three parties submitted comments on our responses to the Revision Notice—Mussey Grade Road Alliance (MGRA), Green Power Institute (GPI), and the Public Advocates Office (Cal Advocates). In its comments on four critical issues, MGRA primarily recommends improvements to PG&E's risk modeling to inform mitigation prioritization and further evaluation of our Enhanced Powerline Safety Settings (EPSS) program.

[1] *Revision Notice for Pacific Gas and Electric Company's 2022 Wildfire Mitigation Plan Update*, issued May 26, 2022 (Revision Notice).

GPI comments on eight critical issue responses and recommends that PG&E provide additional Target %/Top Wildfire Risk % data and information about fire rebuild undergrounding work in future WMP submissions. GPI also questions the stability of PG&E's risk models, discusses the speed at which PG&E is working down our maintenance tag backlog, and proposes greater transparency in ignition reporting and projections. Finally, GPI requests additional details about our proposed pilot vegetation management program for inspections.

Cal Advocates' comments address five critical issue responses, including its recommendation that PG&E improve our Enhanced Ignition Analysis to better identify root causes of ignitions and incorporate lessons learned into the 2023 WMP. Cal Advocates also suggests that PG&E submit quarterly reports for our 10,000-mile undergrounding program and asks for information to support our estimate of 99% risk reduction from undergrounding powerlines. Cal Advocates argues that we need to accelerate our work on backlogged maintenance tags and recommends that Energy Safety monitor General Order (GO) 95 maintenance compliance. Finally, Cal Advocates states that PG&E should re-inspect areas that may not have been inspected by certain vendors.

We welcome the feedback from MGRA, GPI, and Cal Advocates as we work to prevent wildfires in California. In the limited time available to prepare this reply, we have attempted to respond to all the primary concerns raised by these stakeholders. As shown below, we believe that the Revised 2022 WMP, including all thirteen critical issue responses, more than satisfies the statutory requirements and should be approved by Energy Safety.

II. LESSONS LEARNED FROM CATASTROPHIC FIRES (RN-PG&E-22-01)

Critical Issue RN-PG&E-22-01 focuses on the causes of wildfires greater than 500 acres that an external party determined were caused by PG&E equipment and the lessons learned from these fires. In our response, we identified ten wildfires that satisfied the Critical Issue criteria and, for each wildfire, provided information regarding the date of

the ignition, cause(s) of the wildfire based on available information, lessons learned, measures taken to mitigate the cause(s) where applicable, and the integration of lessons learned into our wildfire strategy. Cal Advocates and MGRA provided comments on Critical Issue RN-PG&E-22-01.

A. Cal Advocates

Cal Advocates raises four issues concerning our response to Critical Issue RN-PG&E-22-01. First, Cal Advocates claims that the information provided for three of the ten fires was insufficient or demonstrated shortcomings in our analysis. Second, Cal Advocates recommends that PG&E be required to improve our root cause analysis process. Third, Cal Advocates proposes that the remedies identified in Critical Issue RN-PG&E-22-01 be incorporated into future WMP guidelines. Finally, Cal Advocates recommends that root cause analysis be treated as a safety culture issue. These four issues are addressed below.

1. The Information in Response to Critical Issue RN-PG&E-22-01 Was Fully Responsive to the Request

Cal Advocates' initial concern is that PG&E did not perform a comprehensive root cause analysis of every fire included in the response to RN-PG&E-22-01.[2] However, Critical Issue RN-PG&E-22-01 did not require a root cause analysis of every wildfire identified. Instead, this critical issue requested that PG&E identify the cause(s) of each wildfire, associated lessons learned, and the measures PG&E has undertaken to mitigate the causes of past wildfires and integrate lessons learned into its wildfire mitigation strategy. Thus, Cal Advocates' assertion that a root cause analysis should have been performed for each identified fire is beyond the scope of Critical Issue RN-PG&E-22-01. Further, as explained below in Section II.A.2, in early 2021 we established an Enhanced Ignition Analysis (EIA) team and implemented a robust process for evaluating ignitions

[2] Cal Advocates Comments, pp. 4-5.

going forward. Thus, to the extent Cal Advocates has concerns about wildfire evaluations performed in the past, this issue will be addressed by EIA going forward.

In addition to its general comments regarding root cause analyses, Cal Advocates also comments on three specific fires – the Railroad, Lonoak, and Zogg Fires. With regard to the Railroad Fire, Cal Advocates notes that the cause of this ignition was a tree contractor dropping a dead tree into an energized line.[3] Cal Advocates expresses concern that over a five-year period from 2017 through 2022, five more ignitions have occurred as a result of individuals accidentally dropping vegetation into PG&E distribution lines. For context, over the five-year period from 2017 through August 12, 2022, referred to by Cal Advocates, PG&E had a total of 2,837 California Public Utilities Commission (CPUC)-reportable ignitions. The five ignitions identified by Cal Advocates were 0.17% of the overall ignitions during this time. Moreover, during this time, PG&E's vegetation management contract partners trimmed and/or performed work on thousands of miles of trees in High Fire Threat District (HFTD) areas.

Of the five ignitions referred to by Cal Advocates, four were less than 0.25 acres in size and one was between 0.26 acres and 10 acres. Although these ignitions did not result in substantial wildfires, PG&E takes each ignition seriously and thus, as Cal Advocates recognizes, we have significantly improved tree worker training and qualifications to ensure that similar incidents do not happen in the future.[4] In addition, we have created and implemented work procedure manuals that address the safe operation of tree rigging equipment for vegetation management. We expect that our training programs and work procedures will significantly reduce or eliminate the likelihood of similar events occurring in the future.

[3] Cal Advocates Comments, p. 5.

[4] PG&E 2022 Revised WMP, Sections 5.4.2 and 7.3.5.14 (detailing vegetation management worker training).

For the Lonoak Fire, Cal Advocates does not raise any substantive issues regarding the cause of the fire or lessons learned from it. Instead, Cal Advocates notes that in discovery PG&E corrected a statement made in our Revision Notice response regarding an evaluation of certain types of electrical wire and vibration dampers.[5] While it is true that we needed to correct an inadvertent error made in our Revision Notice response, Cal Advocates omits from its comments the fact that once the error had been identified, we promptly addressed it. More importantly, in our discovery response we provided information regarding a failure analysis that we had conducted which concluded that an evaluation of vibration damper impacts was not required:

> The final failure analysis report (Report #: 413.62-19.55) submitted by the Applied Technology Services (ATS) team indicated the conductor was weakened by damage from a prior arcing event, and by extensive pitting corrosion in the aluminum strands. A copy of the report is included as WMP-Discovery2022_DR_CalAdvocates_025-Q04Atch01.
>
> The analysis indicated that there was pitting corrosion in the vicinity of the 2ACSR and Alcoa Stockbridge damper connection. But, based on the analysis there was no conclusion determining that damper was the primary driver of the pitting corrosion. Therefore, based on the final report, PG&E did not determine that Alcoa Stockbridge dampers present a wildfire risk, and hence have not conducted any extent of risk evaluation between 2 ACSR and Alcoa Stockbridge dampers. The previous statement on page 8 of 2022-06-07_PGE_22_RNR_R1 that an evaluation was performed was made in error.[6]

Based on our failure analysis report, there was no need to conduct an evaluation of certain types of electrical wire and vibration dampers. In our discovery response, we provided the failure analysis report to Cal Advocates. Notably, Cal Advocates does not

[5] Cal Advocates Comments, p. 6.

[6] PG&E response to Cal Advocates Data Request Set #25, Q 4 (emphasis added).

raise any substantive issues regarding the failure analysis report that was provided to it during discovery.

Finally, with regard to the Zogg Fire, Cal Advocates recognizes that based on lessons learned from this fire, we modified our Public Safety Power Shutoff (PSPS) procedures to mitigate future potential events.[7] However, Cal Advocates goes on to assert that PG&E should have also considered, as a result of the Zogg Fire, modifying our recloser settings, similar to what we have now done through our EPSS program. Cal Advocates points to comments that it filed on March 20, 2021, regarding the utilities' 2021 WMPs in which Cal Advocates proposed:

> Based on a preliminary analysis, Cal Advocates recommends a maximum de-energization delay time of two seconds at twice the maximum predicted load on distribution lines during National Weather Service issued Red Flag Warnings, and within a specified number of miles of an active de-energization event (this distance should be developed through input from the utilities, stakeholders, and independent subject matter experts).[8]

There are several problems with Cal Advocates' statements regarding the Zogg Fire. First, Cal Advocates asserts that "fast-trip recloser settings" were a "crucial root cause of the Zogg Fire."[9] However, Cal Advocates offers no evidence to support this assertion and in its own comments acknowledge that the lack of fast-trip recloser settings only "potentially" contributed to the ignition.[10]

Second, Cal Advocates asserts that the Dixie and Fly Fires may have been avoided if its recommendations for fast-trip recloser settings had been adopted.[11] However, Cal Advocates' proposal for recloser settings only addressed Red Flag Warning (RFW) days

---

[7] Cal Advocates Comments, p. 7.

[8] *Comments of the Public Advocates Office on the 2021 Wildfire Mitigation Plan Updates of the Large Investor-Owned Utilities*, March 29, 2021, p. 38 (footnotes omitted and emphasis added).

[9] Cal Advocates Comments, p. 7.

[10] Cal Advocates Comments, p. 8.

[11] Cal Advocates Comments, p. 8.

and the Dixie and Fly Fires occurred on a non-RFW day. Thus, Cal Advocates' proposal would not have prevented these fires.

2. PG&E's EIA Team Appropriately Utilizes Different Types of Evaluations Based on the Circumstances

Cal Advocates maintains that a root cause analysis, as compared to other types of analyses, is "critical" to understanding the cause of and preventing future wildfires.[12] While PG&E believes that a root cause analysis is an important tool to understanding the causes of wildfires and mitigating future ignitions, root cause analyses are not possible or appropriate in all situations.

PG&E has developed a robust cause evaluation process that designates evaluation level based on risk-level. Cause evaluations can range from workgroup evaluations (which identify corrective or preventive actions intended to avoid recurrence), problem solving sessions, apparent cause evaluations, and root cause evaluations. The level of cause evaluation is determined by the risk associated with an incident or event. To use Cal Advocates' analogy[13], while a serious bicycle accident that involves a head injury may warrant an extensive evaluation such as a root cause analysis, an accident involving a bike which is parked falling over and breaking a reflector clearly does not warrant the same level of analysis. PG&E's approach to cause evaluations appropriately considers the risks associated with an incident or event.

Our EIA team also considers available evidence when determining the appropriate type of analysis for a specific event. As a preliminary matter, we appreciate Cal Advocates' recognition that the creation of our EIA team is a "promising step toward more detailed investigations into the causes of wildfires."[14] We agree. The EIA team, which is described in detail in our response to Critical Issue No. RN-PG&E-22-06,

[12] Cal Advocates Comments, pp. 8-9.

[13] Cal Advocates Comments, p. 9.

[14] Cal Advocates Comments, p. 9.

Remedy #2, employs approximately 20 highly skilled individuals and utilizes a variety of tools to understand ignition events more fully.

EIA employs apparent and root-cause analysis tools (including Hazard Barrier Analysis, Failure Mode and Effects Analysis, and Fault Tree Analysis) to evaluate ignition events and scales these tools as the available objective data allows. For example, a root cause analysis requires sufficient factual and provable evidence to reach a determination on cause. Most of PG&E's ignition events have no direct eyewitnesses, occur in remote areas, and produce little objective physical evidence to support a full root cause evaluation. In addition, the EIA team prioritizes the causal chain within PG&E's scope of control as that is where we feel we can add the most value. For example, if a tree with no previously identifiable defects fails due to internal fungal rot and strikes PG&E facilities, resulting in an ignition, the ignition analysis team prioritizes reviewing the barriers within company control to prevent future occurrences, not why the tree succumbed to fungal rot. PG&E's approach to determining the appropriate investigative tools and scope of the investigation considers the risks and scale of specific incidents and events, rather than utilizing a one size fits all approach.

3. The Remedies in Critical Issue RN-PG&E-22-01 Should Be Included in Future WMP Guidelines

Cal Advocates suggests that the information requested in Critical Issue RN-PG&E-22-01 be included in future WMP guidelines for completion by all electrical corporations in their respective WMPs.[15] PG&E supports this proposal. We found that presenting this information in the format requested by Energy Safety was very helpful and it highlighted both areas where we have made improvements and areas where continued improvement is needed. We would suggest, however, that in future WMP guidelines Energy Safety use similar scope limitations as it used for Critical Issue RN-

[15] Cal Advocates Comments, pp. 9-10.

PG&E-22-01 (*e.g.*, fire size, defined time periods, and external party determination) as doing so helps focus the response on the most impactful recent wildfires.

4. Issues Regarding Safety Culture Assessments Are Outside the Scope of the Revision Notice Comments

Finally, Cal Advocates proposes that root cause analyses be a topic "in all future safety culture assessments for all utilities."[16] This is an issue beyond to scope of the Revision Notice. Cal Advocates' suggestion would impact other utilities, who may or may not agree with this proposal. To the extent Cal Advocates believes this is an important issue for future safety assessments, this recommendation should be raised in proceedings involving the safety culture assessments—and not here—so that all impacted parties have a chance to review and comment on Cal Advocates' proposal.

B. MGRA

MGRA refers to RN-PG&E-22-01, but its comments deal almost exclusively with risk modeling, rather than whether PG&E appropriately identified the causes of, and lessons learned from, large wildfires that have occurred since 2017. MGRA raises concerns regarding the cause of the Kincade Fire, which it attributes to low cycle fatigue and wind speeds.[17] Our response to Critical Issue RN-PG&E-22-01 explained that the cause of the Kincade Fire, based on available information, was "[o]ne of the open jumpers on a transmission tower located along the Sonoma and Lake County border broke due to wear induced by wind and caused an ignition near the base of the tower."[18] In response to this cause, we identified lessons learned regarding both the issue of idle facilities and "equipment failure resulting from weather conditions."[19] Our response explains that as a mitigation resulting from the lessons learned, we are removing idle

[16] Cal Advocates Comments, p. 10.

[17] MGRA Comments, p. 4.

[18] PG&E Revision Notice Response, submitted June 27, 2022, p. 8.

[19] *Id*.

facilities, reviewing jumpers, developing risk modeling that focuses on the potential for and probability of asset failure in relation to specific threats and hazards, and enhancing our asset inspections and maintenance.[20] Thus, our response to Critical Issue RN-PG&E-22-01 was responsive and explained how we are implementing changes as a result of the Kincade Fire.

Other than commenting on the Kincade Fire, the majority of MGRA's comments focus on its assertions that PG&E's models do not appropriately account for wind speed and that PG&E's risk models "mis-weight" certain drivers.[21] These are issues that PG&E addressed in detail in its *Reply Comments on the 2022 Wildfire Mitigation Plan*[22] and are outside the scope of Critical Issue RN-PG&E-22-01. However, for completeness, we are providing a response below to MGRA's concerns.

With regard to electric transmission risk modeling, as we explained in our response to the Critical issue, we have developed the Wildfire Transmission Risk Model (WTRM) to assess risk based on the probability of equipment or an asset failure. Most of MGRA's concerns, however, appear to concern electric distribution risk modeling, rather than transmission modeling. For example, MGRA expresses concern that PG&E has failed to adequately account for extreme wind effects in its wildfire mitigation modeling, and that this has led to a mis-allocation of risk based on a misunderstanding of the structure, inputs, outputs, and performance metrics of our Wildfire Distribution Risk Model (WDRM) v3. The purpose of the WDRM v3 is to assign relative risk to different assets/locations over planning time horizons. The WDRM's primary function is to differentiate risk spatially and its performance is measured against how well it predicts the locations of outages and ignitions compared to historic occurrences. MGRA has not

[20] PG&E Revision Notice Response, submitted June 27, 2022, p. 9.

[21] MGRA Comments, pp. 3-9.

[22] *Replay Comments on the 2022 Wildfire Mitigation Plan of Pacific Gas and Electric Company*, submitted April 18, 2022, pp. 8-13.

engaged with or commented on any of the actual performance metrics used to assess the quality of those predictions. Those metrics have improved year-over-year and are especially strong for the vegetation-caused subsets of events. We agree that wind drives a significant fraction of vegetation outages and ignitions and we observe that the inclusions of wind covariates, especially related to extreme and threshold crossing conditions – exactly the conditions MGRA asserts have been ignored - improve the predictive performance of the vegetation-related (and other) models.

MGRA asserts that the WDRM v3 does not make use of time-specific event data.[23] This is not the case. The probability of ignition is trained on the location and characteristics (with an emphasis on environmental conditions) of every outage and ignition between 2016 and 2020. The WDRM v3 makes location/time specific predictions using day-of weather conditions and these are marginalized across all historical days (*i.e.*, weighted by the count of outages on each day) to determine fire-season annual ignition probabilities. This means the days with conditions, like extreme wind, that lead to elevated outages are counted with far greater emphasis than "regular" days, exactly as MGRA suggests.

On the consequence side of the modeling, MGRA asserts that planning models use "worst case" weather days to assess consequences.[24] The critique here is that assuming worst case weather leads to simulated consequences that are conditional on that weather, even if the underlying event causes are not, potentially inflating the consequence assigned to events occurring under more benign conditions. Although we point out that the simulated conditions are drawn from approximately 20 days per year and are far more wide-ranging than just "worst case" conditions, we agree this is an area of improvement. In response, we developed criteria that account for the weather-sensitive Utility Fire

[23] MGRA Comments, p. 3.

[24] MGRA Comments, p. 3.

Potential Index (FPI) model rating (R) scores across all days and locations when determining the "destructive potential" of ignitions, and we calibrated destructive potential against historical fire outcomes rather than simulations. The result is that locations that tend to host conditions that produce elevated R-scores are assigned high expected consequence values. In other words, we agree with MGRA and have implemented in our modeling assigning higher consequence values to locations that are prone to fire conditions due to elevated frequency of days with destructive fire conditions.

Some of MGRA's concerns are based on its analysis of fires greater than 500 acres between 2016 and 2020.[25] Unfortunately, that sample is too small to draw meaningful statistical conclusions or to make generalizations. A sample that small is not capable of providing statistical support for claims like "ignitions from vegetation contacts are slightly overrepresented while ignitions from external agents are underrepresented"[26] or "[the v3 WDRM has an] outsized contribution from external agent ignitions (vehicle collisions, animals, balloons, and 3rd party contact) that is not represented in catastrophic fire histories"[27] and those claims are therefore speculative.

However, there is a good basis to believe that vegetated locations will be associated with both vegetation-caused events and fires because vegetation is the fuel for wildfires. In addition, we know that vegetation-caused events are more likely than typical to lead to wires down, and that wires down tend to be more likely than typical to cause ignitions due to their tendency to be higher current/duration faults. The other pre-requisites for dangerous wildfires are low fuel moisture and wind. While MGRA focuses primarily on wind factors, the realized outcomes and statistical relationships tell a more nuanced story:

[25] MGRA Comments, p. 7.

[26] MGRA Comments, p. 6.

[27] MGRA Comments, p. 3.

- **Wind alone is not a sufficient to cause a dangerous fire** – The other ingredients of vegetation and low fuel moisture must be present as well. There are high winds along the coasts or associated with rains that are only rarely associated with low fuel moisture and are anti-correlated with fire spread. There are chronically windy locations that lack vegetation or where the vegetation is small and stout and unlikely to cause outages. These factors complicate the statistical relationship between wind, ignitions, and fire behavior.

- **Dangerous fires can start and persist without extreme wind** – An incomplete and informal list of dangerous wildfires know to the modeling team that were not associated with extreme wind events is long and includes the largest in state history: Dixie, Caldor, Rim, Ferguson, Mendocino complex, McKinney, 2020 lightning siege, Butte, Creek, etc. These fires were eventually spread by winds, but they were not started due to them. Their ability to persist in the environment until winds drove them or in some cases to propel themselves with self-generated winds, strongly suggests that fires in heavy fuels with low fuel moisture can evade control until winds arrive to drive them and that ignitions of all causes can be extremely dangerous in such locations. These examples highlight the value of looking to historical fire outcomes and consequences (as the WDRM v3 modeling team did) alongside and as a source of calibration for simulated early fire behavior.

- **Extreme wind is rare –** By definition, extreme wind is unusual. MGRA includes a copy of a PG&E figure illustrating the shift in the mix of ignition causes under high winds compared to not under high winds.[28] There is no doubt that on high wind days there are more vegetation and equipment caused outages due to the structural loads winds place on trees an equipment. As a result, there are elevated outage rates on high wind days. However, the following observations are also true:
    - The fraction of outages that lead to ignitions is not typically elevated on windy days. In fact, it tends to be a bit below the fraction from not windy days.
    - The number of outages and ignitions from windy days is far smaller than the number from all other days.
    - Windy-day fires are well represented in the set of historically destructive fires but the trend driving the dramatic growth in dangerous fire have been record low fuel moistures driven by climate change and record drought.
    - The presence of vegetation and low fuel moisture are more spatially consistent and therefore stronger differentiators of *where* wildfire risk can be expected to be elevated.

[28] MGRA Comments, p. 6.

None of the above should be construed as claiming that there is no room for future improvement or that MGRA's concerns do not require further consideration. We share MGRA's desire to see that the long tail of risk is properly characterized. We have expended a great deal of time and effort to reflect those interests in the structure of the WDRM v3 model and in the assessment of its performance. Critiques of model performance should ideally be cast in the form of testable/quantifiable metrics rather than generalized statements. The standard for the adoption of model results should be that it improves over what would otherwise be done, not that it has achieved perfection.

Finally, MGRA expresses concerns regarding changes in risk ranking in WDRM v2 and WDRM v3.[29] The change that MGRA cites between WDRM v2 and WDRM v3 rankings has been examined extensively by the modeling team. The complete list of sources of the change includes:

- Modeling many more causes of events, in this case the probability models in WDRM v3 were trained on outages, ignitions, and PSPS damages, a significant improvement over only ignitions used in WDRM v2;
- The shift from modeling lower sample size ignitions to larger sample size outages (recommended/requested by stakeholders as part of the pervious years WMP and WDRM v2 model review);
- An explicit model of the relationship between outages and ignitions using event-level conditions;
- WDRM v3 probability models were upgraded from purely conductor failure and vegetation contact in WDRM v2 to include additional failure modes related to support structures (*e.g.*, poles) and transformers, as well as contact from third parties such as vehicle, bird, and animal;
- Improved spatial covariates related to both electrical infrastructure and vegetation data, including LiDAR and higher resolution tree data, PG&E internal 2km weather data, and more varied and sophisticated wind data treatments;

[29] MGRA Comments, pp. 9-13.

- Independent model fits for independent causes (allowing specific model structure and covariate development for more specific causal pathways);
- Updates to the fuel layer from a 2020 snapshot-in-time used in WDRM v2 to a 2030 forecast fuels growth used in WDRM v3, which effectively fills in the fire scar disturbances from recent fires. Specific examples were the North Complex Fire, CZU Lighting Fire, and Camp Fire; and,
- Improvements in how consequence is differentiated spatially, including Visible Infrared Imaging Radiometer Suite (VIIRS) calibration and the inclusions of FPI R-scores from all days, not just "worst days" to align our Wildfire Risk Models with those used for PSPS and EPSS operational decision making.

The net outcome of these changes is improved "out of sample" prediction (WDRM v3 outperforms WDRM v2) and the ability to resolve and differentiate risks from more specific/narrow causal pathways, such as branch vs. trunk failures (precisely so that specific causal pathways, like those involving wind drivers can be more closely examined). Many of these changes were directly responsive to thoughtful comments from MGRA and other intervenors and external advisors on the previous work.

The goal of the WDRM is to improve outcomes in aggregate – concentrating risk in the top ranks so that working on related circuits is a better use of resources than could be made without them, but specific ranks will inevitably turn out to be uncertain as each year brings new conditions and data. It is a misunderstanding of the modeling effort to assume that rank stability is a good metric of model quality, and it would be a loss for all involved to fail to apply the model results to the prioritization of urgently needed mitigation efforts.

III. WORK BEING COMPLETED IN TOP-RISK AREAS (RN-PG&E-22-02)

Critical Issue RN-PGE-22-02 focuses on PG&E's reporting on the amount of mitigation work taking place in top wildfire risk areas. In our response, we updated Table 5.3-1(A) with top-risk percentages based solely on wildfire risk model outputs, where applicable. We also provided information describing the correlation between

Public Safety Power Shutoff (PSPS) locations, as determined by our operational models, and the highest wildfire risk locations from our planning models.

GPI raised two issues concerning our response to Critical Issue RN-PG&E-22-02. First, GPI asks for additional Target%/Top Wildfire Risk% data for wildfire mitigation initiatives that were not prioritized, or are not typically measured, by reference to a wildfire risk model. Second, GPI questions the prioritization of PG&E's non-exempt fuse removal program. These two issues are addressed below.

A. The Target%/Top Wildfire Risk% Information Provided Was Fully Responsive to Energy Safety's Request

GPI notes that PG&E did not provide Target %/Top Wildfire Risk % figures for some grid design and system hardening, asset inspection, and vegetation management targets in Table 5.3-1(A) in response to this critical issue. GPI argues that these wildfire risk figures would be helpful even when work prioritization is not entirely based on wildfire risk (*e.g.*, work prioritized by the PSPS lookback, compliance obligations, or other planning tools) along with explanations for work taking place in lower risk areas.[30]

PG&E's decision to exclude certain Target%/Top Wildfire Risk% figures came in direct response to the Revision Notice instructions. In our original 2022 WMP filing, we provided additional details into our work prioritization by explaining which targets were created using (1) a risk-informed approach based on PG&E's WMP definition of "top risk" areas, (2) the PSPS lookback, or (3) HFTD/HFRA location.[31] In response, Energy Safety asked that we update of Table 5.3-1(A) with top-risk percentages based "*solely* on risk model output…without conflating the percentages of top-risk circuits with other criteria."[32] After confirming the intent of this request with Energy Safety, we updated Table 5.3-1(A) to clearly identify the targets involving work that was prioritized, or is

[30] GPI Comments, pp. 2-3.

[31] PG&E 2022 WMP submitted on February 25, 2022, pp. 255-286.

[32] Revision Notice, pp. 6-7 (emphasis added).

appropriately measured, by wildfire risk scores. We excluded references to prioritization using other methods in response to Energy Safety's request for clarity. Therefore, this is not a defect in our Revision Notice response.

PG&E is not opposed to providing Target%/Top Wildfire Risk% estimates in future WMPs, but it should only be requested when wildfire risk is an appropriate measure. As explained in response to Critical Issue RN-PG&E-22-02, PG&E's work designed to mitigate against future PSPS events (e.g. sectionalizing, microgrids etc.) is typically based on operational models, which measure the highest, short-term wildfire risks.[33] Accordingly, evaluating those mitigations through the lens of wildfire risk planning models, which estimate long-term wildfire risk, may lead to confusion. In addition, some wildfire mitigation initiatives relate to general compliance obligations that are less self-directed (*e.g.*, defensible space inspections). Inasmuch as this work is driven primarily by statute or other regulations, assessing the work by the percentage that takes place in top wildfire risk areas is less useful.

If Energy Safety requests Target%/Top Wildfire Risk% information in future WMP guidelines, PG&E will provide the requested information. We will also provide context for why we may have chosen to prioritize certain projects that may fall outside of the highest wildfire risk areas within the HFTD/ High Fire Risk Area (HFRA).

B. PG&E's Has Appropriately Prioritized the Removal of Non-Exempt Fuses In 2022

Next, GPI questions PG&E's decision to prioritize the removal of non-exempt fuses requiring simpler engineering studies in 2022, claiming that we are prioritizing volume work over risk reduction.[34] We disagree with this characterization of our plan. As noted by GPI, we currently anticipate replacing all known, non-exempt fuses on

[33] PG&E Revised 2022 WMP, p. 309.

[34] GPI Comments, p. 3.

distribution poles in the HFTD or HFRA within the next five years. Thus, we are actively working to eliminate all risks associated with this type of equipment.

The protection and coordination studies required to replace non-exempt fuses in higher risk locations requires significant experience and understanding of circuit characteristics and protection schemes. It would not have been feasible to train additional contract engineering resources fast enough to perform the more complex non-exempt fuse replacement studies in parallel with our widespread implementation of EPSS. Thus, engineering resources focused on EPSS work in early 2022 before the additional contract resources could start performing the engineering analysis for non-exempt fuse replacement in additional, higher risk locations.

As described in the Revised 2022 WMP, the EPSS program has been effective at preventing CPUC-reportable ignitions and keeping customers safe. EPSS can also mitigate against the risks posed by non-exempt fuses on power poles by shutting off power before the fuses have the chance to operate and emit sparks.[35] Thus, prioritizing the removal of non-exempt fuses requiring simpler engineering studies this year was not about volume over risk reduction. On the contrary, we invested engineering resources into a mitigation to reduce reportable ignitions and protect against the risks posed by non-exempt equipment (*i.e.*, EPSS) while simultaneously removing a high volume of expulsion fuses with the resources available.

Now that EPSS has been successfully implemented across the HFTD/HFRA portions of our system, we anticipate dedicating more resources to non-exempt fuse removal analysis in late 2022 and early 2023. These resources will help us perform more work in higher risk locations in 2023 as we strive to remove all known, non-exempt fuses from the HFTD/HFRA.

[35] See generally PG&E Revised 2022 WMP, Section 7.3.6.8.

IV. FOCUSING GRID HARDENING ON THE HIGHEST-RISK AREAS (RN-PG&E-22-03)

In Critical Issue RN-PG&E-22-03, Energy Safety asked PG&E for additional information to demonstrate that we are prioritizing undergrounding work in the highest risk areas. In response, we showed that we are substantially increasing the percentage of underground miles in the top 20% of risk-ranked circuit segments for the years 2022-2026. Energy Safety also asked PG&E to explain the importance of other undergrounding work taking place outside of the top 20% of risk-ranked circuits. We explained the importance of undergrounding fire rebuild miles, as well as miles identified by Public Safety Specialists (PSS) and miles meant to mitigate against future PSPS events. Cal Advocates, MGRA, and GPI raised concerns about PG&E's response to this Revision Notice issue. Their comments are addressed below.

A. Cal Advocates

Cal Advocates argues that our response to this Critical Issue still does not demonstrate that we are sufficiently focused on undergrounding in high-risk locations and mischaracterizes some of the undergrounding data we previously provided. Cal Advocates also claims that external factors are foreseeable and should not affect planned undergrounding work. Finally, Cal Advocates makes some reporting suggestions for future WMP submissions relating to undergrounding work. We respond to these comments below.

1. PG&E Is Focused on Efficiently Undergrounding Overhead Powerlines in the Highest Risk Areas.

Cal Advocates argues that PG&E has not sufficiently focused our undergrounding on high-risk locations and that the added transparency in our Revision Notice response magnifies this issue.[36] We strongly disagree with these assertions. We are now two thirds of the way through 2022. As a result, we were able to provide greater insight into

[36] Cal Advocates Comments, pp. 10-11.

our 2022 and future undergrounding workplans (2023 and 2024-2026) in response to this Critical Issue. Cal Advocates correctly notes that most of the miles in our 2022 undergrounding plan are not within the top 20% of risk-ranked circuits. However, we are substantially increasing the percentage of miles in the top 20% of risk-ranked circuit segments between 2023 and 2026. In fact, from 2022-2026, the number of miles of undergrounding in the top 20% of risk-ranked circuit segments is estimated to be 88%, before additional PSPS, PSS identified, and/or fire rebuild miles are added.[37]

As described in our response to Critical Issue RN-PG&E-22-03, we are focusing our undergrounding plans on the highest risk circuits, while also recognizing opportunities for efficiency in the work. The 2022–2023 undergrounding portfolio that we developed reflects work in flight at the time of our 10,000-mile underground program announcement, including work in fire rebuild areas along with other underground work. More specifically:

> PG&E developed a new System Hardening Approval process by which it evaluates which circuit segments to target for mitigation and determines the optimal mitigation measure for each of the selected circuit segments. PG&E updated its system hardening plan to target: (1) the top 20 percent of its risk buydown curve, as determined by its 2021 Wildfire Distribution Risk Model (WDRM v2); (2) fire rebuild; (3) PSPS mitigation; and (4) miles identified by a [PSS].[38]

The 2022-2023 undergrounding workplan is part of a longer term, holistic strategy to ramp up our undergrounding program, developing a portfolio of projects early on that are executable and will result in enhancing our execution and construction expertise.

Although we are only performing approximately 29% of our undergrounding work in the top 20% risk-ranked circuits this year, in 2023 approximately 63% of planned

[37] PG&E Revised 2022 WMP, p. 568.

[38] PG&E Revised 2022 WMP, p. 566.

miles fall within the top 20% of risk-ranked circuits.[39] Given the long lead times associated with undergrounding projects, it is not feasible to switch our near-term undergrounding plans to focus only on the top 10% of risk-ranked circuits, as suggested by Cal Advocates, nor do we believe that is the best course of action. Attempting to make that change at this time would result in fewer miles being worked in the near term at higher costs.

In response to Critical Issue RN-PG&E-22-03, we have revised our 2024-2026 undergrounding workplan to include more than 3,000 miles. Just under 98% of those miles fall within the top 20% of risk-ranked circuits.[40] PG&E has sufficiently responded to Energy Safety's request that we focus undergrounding on higher risk circuits going forward.

2. Cal Advocates Mischaracterizes the Amount of Undergrounding Identified for High-Risk Areas in Our Original Filing

Cal Advocates incorrectly suggests that PG&E originally stated that 80% of our undergrounding work would occur in the top 20% of risk-ranked circuits in 2022, and that the goal has now been reduced to 29%.[41] In our original Table 5.3-1(A), we estimated that 80% of our undergrounding work would take place in "top-risk" areas, which included: (1) Top 20% of Associated Risk Score; (2) PSPS Impacted Locations; (3) Locations where risk has materialized; and (4) PSS-identified locations.[42] Thus, the 80% figure combined these types of miles within the "Top Risk" category. In the Revision Notice, Energy Safety asked PG&E to disaggregate our data and to provide the percentage of work being performed in the top 20% of risk-ranked circuits only. This is the information we provided in our response.

[39] PG&E Revised 2022 WMP, p. 570.

[40] PG&E Revised 2022 WMP, p. 570.

[41] Cal Advocates Comments, p. 11.

[42] PG&E 2022 WMP submitted on February 25, 2022, p. 285.

Cal Advocates also notes that the percentage of undergrounding mileage being completed in the top 20% of risk-ranked circuits this year is substantially lower than the percentage of undergrounding mileage identified among the top 20% of risk-ranked circuits in the system hardening workplan submitted in response to Remedy 21-14 as part of our original WMP filing.[43] However, this does not reflect a defect in our undergrounding plan. Not all undergrounding takes place as part of the system hardening program. The percentage of total undergrounding mileage being completed in the top 20% of risk-ranked circuits will be lower than the percentage of undergrounding mileage included in the top 20% of risk-ranked circuits in our system hardening workplan because we include Butte County Rebuild miles in our undergrounding initiative target in Section 7.3.3.16.[44] Those miles do not fall within the top 20% of risk ranked circuits.

3. Not All External Factors are Foreseeable

PG&E disagrees that all external factors impacting the miles that can be undergrounded are "foreseeable" and that a failure to overcome these factors in any given year represents an "ineffective use of resources" as suggested by Cal Advocates.[45] As a utility, we recognize that external factors may affect our workplans, as stated throughout our WMP filings. However, the direct impact of each of these factors cannot be known until they are encountered. For example, we cannot predict all customer and landowner refusals. In addition, weather conditions and active wildfires are highly volatile and cannot be planed for in advance of a project. To suggest the impact of external factors reflects a lack of preparation is to deny the realities of working in the natural environment to protect and serve customers with different needs. In general, any project included in the 2022 undergrounding workplan that does not get built because of delays resulting

[43] Cal Advocates Comments, p. 11.

[44] PG&E Revised 2022 WMP, p 557.

[45] Cal Advocates Comments, p. 11.

from one or more external factors will be completed in subsequent years once the external factors are resolved.[46]

4. Future Undergrounding Reporting

Cal Advocates suggests that PG&E should be required to file quarterly data reporting on our initiative to underground 10,000 miles, beginning in the 4th quarter of 2022.[47] Cal Advocates also reiterates a prior recommendation that Energy Safety should develop criteria to trigger a reevaluation of PG&E's undergrounding initiative.[48] PG&E has no objection to the first suggestion because we already provide quarterly reporting on our progress toward our undergrounding target set forth in Section 7.3.3.16 of the 2022 WMP. If, in the future, Energy Safety decides further detail is needed in the utilities' quarterly reporting regarding undergrounding, PG&E asks that reporting requirements be standardized for all utilities well in advance of the reporting dates.

PG&E disagrees with the recommendation that Energy Safety perform an additional evaluation of our undergrounding initiative outside of the WMP process. We announced our 10,000-mile undergrounding plan in July of last year. In late 2021, we began drafting the 2022 WMP in preparation for its submission on February 25, 2022. Since the submission, the parties have conducted an extensive review of our 2022 WMP, including hundreds of data requests, detailed questions during workshops, and hundreds of pages of comments, many of which have dealt with our undergrounding program. Energy Safety then requested additional information about undergrounding in several Revision Notice items, including Critical Issue RN-PG&E-22-03.[49] Stakeholders have had more than enough time to evaluate our undergrounding plan. Any further discussion relating to undergrounding may take place as part of the 2023 WMP process.

---

[46] PG&E Response to Cal Advocates Set #27, Q2(a).

[47] Cal Advocates Comments, p. 10.

[48] Cal Advocates Comments, p. 12.

[49] See Revision Notice critical issues 22-02, 22-03, 22-04, and 22-13.

B. MGRA

MGRA doubts the accuracy of PG&E's WDRM risk rankings and argues that "expensive hardening efforts should be limited until utilities can make further headway in validating their risk models against historical loss data and properly incorporate known physical effects and contingent probabilities."[50] While PG&E recognizes the need to continually improve risk modeling, we respectfully disagree with this position. Utility risk modeling has improved dramatically since the first WMPs were filed in 2019. This improvement has resulted, in part, from input by stakeholders at WMP-related workshops relating to risk modeling.

In 2020 and 2021 California had its 5th and 2nd driest water years, respectively, in the last century.[51] Given this type of climate change, the time to act to prevent catastrophic wildfire is now. We believe that our suite of mitigations can do this effectively. Immediate wildfire threats on high-fire risk days are managed by our PSPS protocols as a matter of last resort.[52] The EPSS program prevents many ignitions from occurring in high-risk areas throughout wildfire season as we continue to work down ignition risks through additional programs like vegetation management and system hardening. Finally, we are making long-term investments in system risk reduction by undergrounding our lines in the highest risk areas.[53]

C. GPI

GPI questions whether fire rebuild miles are appropriate for future undergrounding plans when higher risk work is an option. GPI also proposes that a separate fire rebuild section be included in future WMP submissions. These comments are addressed below.

---

[50] MGRA Comments, p. 13.

[51] PG&E Revised 2022 WMP, p. 2.

[52] See Section 8 of the Revised 2022 WMP.

[53] See Section 7.3.3.16 of the Revised 2022 WMP.

1. Undergrounding Fire Rebuild Miles Is Important

GPI questions whether fire rebuild miles should be prioritized in our undergrounding plan, arguing that there may be other areas that are more susceptible to high wildfire risk in the near term. GPI also posits that the question of whether fire rebuild miles should "supplant" progress on undergrounding other miles in higher-risk locations is important for all utilities going forward.[54]

PG&E believes that fire rebuild miles are an important part of our undergrounding plan. Utilities have an obligation to restore service to customers after facilities have been destroyed in a fire. Accordingly, facility replacement will take place after a fire regardless of the current wildfire mitigation plan. After a fire, PG&E monitors the impacts to the distribution system and proactively evaluates possible line segmentation strategies and hardening opportunities. PG&E follows a fire rebuild decision tree as part of the rebuild process.[55] First, we identify any idle, or redundant, lines for potential removal. Second, we identify isolated customers, or small groups of customers, served by greater than 0.5 miles of powerlines. These customers are considered for remote grid opportunities, where generation may be supported. Once those mitigations are exhausted, we determine whether significant repairs are needed. If they are, our next hardening alternative in terms of risk reduction effectiveness is undergrounding, which depends on the availability of temporary generation and constructable paths. If undergrounding is not feasible, overhead hardening is evaluated for the rebuild.

When undergrounding is selected as our post-fire mitigation strategy, we move forward with confidence because undergrounding reduces ignition risk by approximately 99% in that location, and wildfires have a tendency to be repeated in areas when certain types of vegetation regrow and are subjected to the growth/dry/regrow cycles.[56] If we

[54] GPI Comments, pp. 4-5.

[55] Revised 2022 WMP, p. 586.

[56] PG&E Revised 2022 WMP, p. 568.

were to install overhead hardened lines in post-fire areas appropriate for undergrounding, the ignition risk reduction benefit would be smaller—approximately 62% vs. 99%. Moreover, as vegetation regrows in an area, wildfire risks can return to pre-fire levels. To underground in these areas in the future, we would need to remove previously overhead hardened lines at additional expense. Therefore, it is often more efficient to make the long-term investment in undergrounding during the initial fire rebuild and more effective in reducing ignition risk.

Further, PG&E disagrees with the statement that we are "supplanting" higher risk miles with fire rebuild miles or that we are not adequately addressing the highest risk areas with our undergrounding program. As indicated in response to Critical Issue RN-PG&E-22-03, between 2022-2026, the number of miles of undergrounding in the top 20% of risk-ranked circuit segments is estimated to be 88%, before additional PSPS, PSS identified and/or fire rebuild miles are added.[57] Higher risk miles that are not worked in a particular year are not supplanted by fire rebuild miles. The engineering studies for these miles often take longer and continue to be prepared when the projects are not being worked in the field. Thus, the fact that we are doing more work in fire rebuild areas is not preventing us from completing work in higher risk-ranked areas in a timely manner. In addition, EPSS and other mitigations are in place as mitigations in high-risk areas as we work toward our goal of undergrounding 10,000 miles to efficiently reduce approximately 70 to 80% of the wildfire risk across our system.[58]

2. A Separate Fire Rebuild Section Is Not Necessary

GPI proposes including a new fire rebuild subsection for the 2023 WMP that requires detailed information about past fires, rebuild timelines, and descriptions of how rebuild projects will affect overall risk buydown efforts. GPI suggests that this portion of

[57] PG&E Revised 2022 WMP, p. 568.

[58] PG&E's 2023 General Rate Case (GRC) Testimony, Ex. PG&E-4, Ch. 3, p. 3-3.

future WMP plans should renew each year for an update regarding ongoing fire rebuild projects.[59]

PG&E does not oppose providing additional information about fire rebuild work as part of future WMP submissions, but a separate WMP initiative is not necessary. As demonstrated in Table RN-PG&E-22-03-02, we can provide detailed breakdowns of our annual workplans if part of the WMP guidelines. These breakdowns can easily include information about the number of miles associated with fire rebuild projects within the undergrounding initiative. Tracking individual fire rebuild projects across annual WMPs, on the other hand, has the potential to significantly increase the length and complexity of future filings. Fire rebuild projects can stretch on for many years because they are dependent on customers returning to burned areas and requesting service. Accordingly, it is very difficult to project an exact timeframe for a fire rebuild project.

V. PLANNED UNDERGROUNDING LOCATIONS AND GOALS (RN-PG&E-22-04)

In Critical Issue RN-PG&E-22-04, Energy Safety requested that PG&E update our undergrounding plan to include information beyond 2023. In response, PG&E provided a spreadsheet containing detailed information for over 560 miles of undergrounding work identified for 2023 and over 3,000 miles of undergrounding work identified for 2024-2026. GPI and Cal Advocates provided comments on PG&E's response to this Revision Notice issue.

A. GPI

GPI first raises concerns about the stability of PG&E's WDRM as a tool to plan future undergrounding projects. Second, GPI requests additional information regarding the Wildfire Feasibility Efficiency (WFE) score used by PG&E when planning undergrounding work. Third, GPI questions whether PG&E is prioritizing too much

[59] GPI Comments, p. 5.

work in Tier 2 areas. Finally, GPI recommends that some additional undergrounding information be included as part of future WMP submissions. These comments are addressed below.

1. The WDRM Is the Right Tool for Planning Underground Work

GPI argues that shifts in circuit wildfire risk rankings between versions 2 and 3 of our WDRM, which were used to prioritize undergrounding in our 2022-2023 and 2024-2026 workplans, respectively, demonstrate that our models are still undergoing substantial material changes. As a result, GPI questions whether the WDRM is "stable or matured enough to inform risk spend efficient undergrounding deployment on such a large scale." [60]

PG&E recognizes that risk rankings have shifted from version 2 to version 3 of the WDRM, but the changes result from continuous improvements to our models.[61] As part of the WMP process, stakeholders have participated in numerous workshops regarding risk modeling, and PG&E's updates to WDRM v3 to address feedback previously provided. These updates included, among other things, improvements to climate impacts and expanded geography and coordination between PSPS and WDRM planning models.

More importantly, changes in risk rankings do not signify instability. Wildfire risk is dynamic and evolving, as is the modeling technology. The models are a statistical approach to predicting the occurrence of a low-probability, high-impact, dynamic climate driven event. In taking a stand that catastrophic wildfires will stop, we update risk models with the latest data from the previous year of events (outages, ignitions, PSPS damages, and fires). This refresh will drive some measure of change in the model results. Year over year, the models will statistically cover and address the patterns of high wildfire risk

[60] GPI Comments, p. 9.

[61] *See* Section II.B above describing improvements to the WDRM risk modeling.

that emerge. Customer and community safety require that we act now to prevent catastrophic wildfires rather than waiting for additional, undefined model maturity.

2. The Wildfire Feasibility Efficiency Calculation

GPI recognizes that bundling circuit segment work for undergrounding is reasonable for efficiency but requests further information regarding the WFE calculation that PG&E used to identify these opportunities.[62] PG&E provided the calculation in response to Critical Issue RN-PG&E-22-04 as follows:

> Simplified Wildfire RSE = Wildfire Risk/(Standard Cost * Feasibility Cost Multiplier), where Wildfire Risk is from the 2022 WDRM v3, and feasibility cost multiplier ranges from 1-3 accounting for hardness of rock, size of water crossing, and gradient.

In the above calculation, the WFE was referred to as the Simplified Wildfire RSE. For further information on specific WFE calculations for targeted 2024-2026 undergrounding circuit segment work identified, please refer to attachment "2022-08-22_PGE_2022_RN_Reply_Comments_Atch01" which was prepared in response to a data request as part of the 2023 GRC proceeding.

The WFE calculation is a helpful tool for planning future undergrounding projects because it recognizes that undergrounding costs can differ significantly based on terrain and other geographic factors. More specifically:

> PG&E selected undergrounding location candidates through a simplified RSE framework, in which each circuit segment was measured based on its 2022 WDRM V3 risk score and a feasibility multiplier that factored in the presence of things like hard rock, gradients, and water crossings. By taking the wildfire risk and dividing by a feasibility index multiplier, PG&E incorporated a simplified RSE framework into our selection criteria to identify the most appropriate circuit segments for the risk reducing mile per dollar.[63]

[62] GPI Comments, p. 8.
[63] PG&E Revised 2022 WMP, p. 577.

PG&E estimates there is an approximately 90% overlap in miles and 94% overlap in risk reduction when comparing workplans based on risk rank alone and risk rank feasibility using this simplified RSE.[64]

3. PG&E Is Not Biased Toward Tier 2 Undergrounding

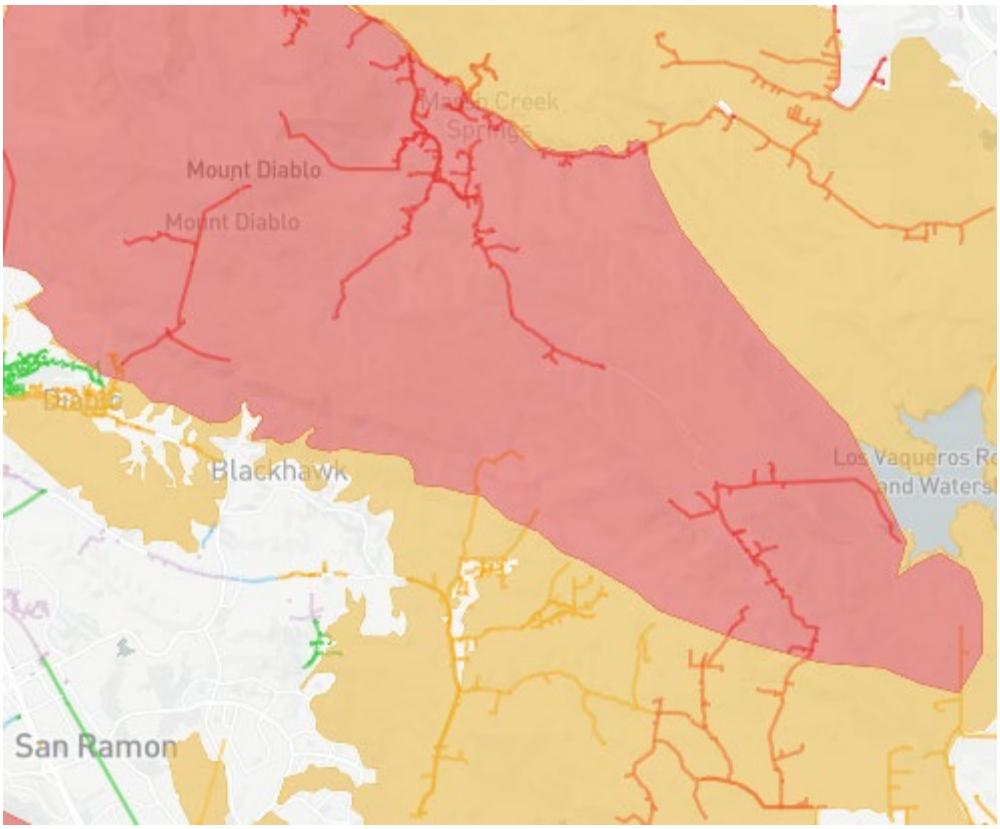
GPI suggests that PG&E's undergrounding plans are biased toward Tier 2 areas because Tier 3 areas are often located in mountainous regions and rock/rock hardness, water crossings, and gradient, may hinder undergrounding in high wildfire risk locations.[65] No such bias exists in our undergrounding plans. First, risk is not uniform across the HFTD, and it is incorrect to assume that all Tier 3 undergrounding work is higher risk than work in Tier 2. The HFTD boundaries, including Tiers 2 and 3, were published by the CPUC in early 2018[66], and risk modeling has improved significantly since that time. Current risk modeling incorporating updated ground fuels data indicates that there are both Tier 2 areas with high-risk scores and Tier 3 locations with lower-risk scores. As seen in Figure 1 below which depicts outputs from the WDRM v3, higher (red) and lower (marigold) risk circuit segments are located in both Tier 2 and 3 areas.

[64] PG&E Revised 2022 WMP, p. 577.

[65] GPI Comments, pp. 7-8.

[66] *See* Decision (D.) 17-12-024.

Figure 1: WDRM v3 Risk Circuit Segments



Further, as described above, our 2022–2023 undergrounding portfolio reflects work in flight at the time of our 10,000-mile underground program announcement last year.[67] This ramp-up period may include less Tier 3 work but, as GPI notes, approximately 70% of our undergrounding work from 2024-2026 is expected to take place in Tier 3. Plus, any Tier 3 work that is not completed in a given year based on external factors will roll into the following year because the miles are not necessarily dropped from the program.

4. GPI's Proposals for Future WMP Submissions

GPI recommends that PG&E be required to provide summary tables of our undergrounding workplan each year as part of the WMP, including project status (*e.g.*,

[67] PG&E Revised 2022 WMP, p. 566.

scoping, ready for construction).[68] In general, PG&E is not opposed to this request. However, PG&E does not support breaking the plan into discrete tables, as shown by GPI. Instead, PG&E recommends that the information be presented in a single spreadsheet, like the attachment provided in response to Critical Issue RN-PG&E-22-04. In addition, PG&E recommends that the utilities only be required to provide CPZ risk scores from the model used to plan the work to prevent confusion. In other words, PG&E would only provide version WDRM v2 scores for the circuit protection zones (CPZs) originally planned for work in 2023 and WDRM v3 scores for work originally planned to take place from 2024-2026.

Finally, GPI recommends that Energy Safety should require "year-ahead, 3-year WMPs in addition to WMP annual updates" given the length of time it takes to complete undergrounding projects.[69] PG&E disagrees with this proposal. Given the effects of climate change, and the dynamic nature of wildfire risk, utilities occasionally must pivot mitigation strategies quickly to keep customers and communities safe. One example of this type of change was PG&E's EPSS roll-out that was piloted in 2021 following the Dixie Fire and expanded in 2022. In addition, the updated WDRM v3 has several improvements including enhancements in consequence modeling based on new information. Without the ability to alter mitigation strategies, PG&E would not have been able to make these improvements. In addition, requiring a full three-year plan on top of separate, and complete, annual updates will create significantly more administrative work and may result in confusion as to which plan is in effect at any given time.

[68] GPI Comments, p. 6.

[69] GPI Comments, p. 6.

B. Cal Advocates

Cal Advocates suggests that in the 2023 WMP, PG&E should provide additional information to: (1) support our statement that undergrounding powerlines reduces wildfire risk by 99% in that location and (2) compare the effectiveness of undergrounding to other mitigation measures based on our own findings and information from other operators in California.[70] As Cal Advocates notes, we have already explained that our undergrounding risk reduction figure is supported by a seven-year set of CPUC-reportable ignitions—during which time no underground ignitions resulted in a fire greater than 10 acres—combined with subject matter expertise.[71] However, PG&E supports working with other utilities in an Energy Safety-led study on risk reduction from undergrounding as compared to other mitigations. We recognize there likely will not be sufficient time to complete any such study prior to the submission of the 2023 WMP. Therefore, we recommend that any such study begin in early 2023 for potential inclusion in the 2024 WMP.

Cal Advocates also questions why underground powerline ignitions are less likely to grow into a catastrophic wildfire. PG&E believes this would also be a good topic for the joint utilities to study. However, it seems clear that certain physical properties of underground powerlines mitigate against ignitions growing into catastrophic wildfires. First, vaults and pad mounts are enclosed/encased. Second, there is concrete surrounding the underground installation. Third, ignitions that occur where underground lines meet surface-level equipment are concentrated in discrete locations, whereas overhead lines create ignition potential across an entire span.

VI. ADDRESSING THE ASSET TAG BACKLOG (RN-PG&E-22-05)

In Critical Issue RN-PG&E-22-05, Energy Safety asked us to "create a plan that demonstrates consistent progress on reducing the number of open tags and improve the

[70] Cal Advocates Comments, p. 12.

[71] PG&E response Cal Advocates Data Request #28, Q4.

health" of our infrastructure.[72] In response, we provided a strategic plan to remediate our tag backlog while simultaneously reducing our risk of catastrophic fire by focusing on the tags in the highest risk (HFRA and HFTD) areas and the tags with the highest risk characteristics (ignition risk tags).[73] We also provided a detailed resource plan, including timeline and quantitative targets, to demonstrate how we will achieve our strategic plan and reduce the wildfire risk in our territory.[74]

A. Efficiently and Effectively Addressing the Asset Tag Backlog (Cal Advocates and GPI)

Cal Advocates and GPI both propose numerous changes to our plan for reducing our asset tag backlog.[75] However, the plan proposed in our Revised 2022 WMP remains the most effective and efficient way to reduce our risk of catastrophic wildfire while simultaneously reducing our asset tag backlog.[76] Below we address the suggestions made by Cal Advocates and GPI and explain why each should not be adopted.

In opening comments, Cal Advocates takes the position that we should be required to resolve the entire tag backlog, regardless of risk, as quickly as possible. This proposal appears as several varieties of the same argument, including:

- "PG&E should make an 'all hands on deck' effort to resolve all 'ignition risk tags' in the HFTD by the end of 2022;"
- "PG&E should remediate its full maintenance backlog no later than the end of the next three-year WMP cycle (2023-2025);"
- "PG&E should take no longer to address currently open maintenance tags than would be required if the same tag were opened today;"

[72] Revision Notice, p. 13.

[73] PG&E Revised 2022 WMP, pp. 675-689.

[74] PG&E Revised 2022 WMP, pp. 689-694.

[75] Cal Advocates Comments, pp. 19-20; GPI Comments, p. 13-14.

[76] PG&E Revised 2022 WMP, pp. 675-696.

- "PG&E must comply with CPUC General Order requirements for all new maintenance tags, effective immediately;"
- "Energy Safety should require PG&E to immediately submit a revised plan to address its open maintenance tags."[77]

As described in our Revised 2022 WMP, the asset tag backlog is the result of our concerted effort to perform accelerated and enhanced inspections to identify and repair non-conformances that pose a wildfire or reliability risk.[78] As much as we would like to resolve the entire asset backlog immediately, it is simply not feasible to do so, nor is it the best use of our resources. Instead, we must prioritize risk reduction over volume and, as a result, we are first focusing on reducing the tag backlog in our HFRA and HFTD areas, where 99% of our wildfire risk occurs.[79] Additionally, we are further risk prioritizing our work by segmenting our tag population into ignition risk tags and non-ignition risk tags, in order to achieve further risk reduction. This is the safest and most effective way to approach this problem, notwithstanding Cal Advocates' suggestion that we simultaneously focus on resolving non-HFTD or non-ignition risk tags.[80] The quantity of tags resolved is important but not at the expense of risk prioritization. The strategic plan proposed in our Revised 2022 WMP balances the resources needed to reduce the tag backlog with the resources needed to perform other important risk reducing wildfire mitigation work.

GPI argues that we "should be required to develop a proper work order tag QA/QC effort that reduces re-assignments and monitors program accuracy in order to eliminate their inefficiencies."[81] We believe that this misunderstands the purpose of our Field Safety Reassessment (FSR) program, where a qualified inspector annually

[77] Cal Advocates Comments, p. 19.

[78] PG&E Revised 2022 WMP, p. 678.

[79] PG&E Revised 2022 WMP, p. 676.

[80] Cal Advocates Comments, p. 19.

[81] GPI Comments, p. 13.

reassesses the field condition of open ignition risk tags in order to evaluate the current wildfire risk from that tag.[82] Given our risk-based approach, this is an important part of our strategic plan for prioritizing working down and our tag backlog. Additionally, we explain in our Revised 2022 WMP that, although we previously used the FSR program to both accelerate or extend certain tags, going forward this program will be focused on elevating tag priority when the risk from a tag has increased in the past year.[83]

GPI also comments that "PG&E should provide an explanation regarding how they will implement large volumes of F tag corrections planned without affecting other wildfire risk reduction WMP mitigation efforts including ignition risk work tag corrections."[84] F Tags are tags that are "of low potential impact to safety and reliability" and which must be addressed within two years for transmission assets and five years for distribution assets.[85] Given their low safety impact and longer resolution period, we must necessarily prioritize higher risk tags in our strategic plan. Therefore, we will work on resolving these tags as appropriate and consistent with our strategic plan. Our Revised 2022 WMP provides specific quantitative targets through the end of 2022 and forecasted through 2023.[86] We will continue providing these quantitative targets going forward and, each year, we will create an appropriate resource plan and budget to ensure this work, and all our other wildfire mitigation work, is performed.

Finally, GPI notes a discrepancy between the data provided in response to Table RN-PG&E-22-05-02 and Figure RN- PG&E-22-05-11.[87] Table RN-PG&E-22-05-02 shows a total of 150,635 open distribution E tags as of Q1 2022, while Figure RN-

[82] PG&E Revised 2022 WMP, p. 689.

[83] PG&E Revised 2022 WMP, p. 689.

[84] GPI Comments, pp. 13-14.

[85] PG&E Revised 2022 WMP, p. 680

[86] PG&E Revised 2022 WMP, p. 690.

[87] GPI Comments, p. 13.

PG&E-22-05-11 shows a total of 190,239 such tags.[88] The explanation for this variance is that the numbers come from different sources. The larger number, in Figure RN-PG&E-22-05-11, is based on our WDRM which incorporates not just E tags in HFRA or HFTD areas, but also all E tags within a 500-meter buffer radius of those areas. When these tags that are outside of HRFA and HFTD areas are removed, the numbers for these two populations are within approximately 3,000 tags of one another. This remaining difference between the tags represents the total decrease in the E tag population between December 15, 2021 and April 1, 2022, as more tags were closed than were created.

B. Proposals for Additional Requirements (Cal Advocates and GPI)

Cal Advocates urges Energy Safety to require that we file quarterly reports on our progress toward addressing our maintenance backlog.[89] We do not disagree with this recommendation but note that we have already created annual regulatory targets for this work in our Revised 2022 WMP, and we will already be providing public quarterly updates on our progress toward these targets as part of our Quarterly Initiative Update (QIU).[90] Additionally, we are already providing a quarterly report on open maintenance tags across our system as a result of our Wildfire Safety Inspection Program (WSIP) work.[91] Cal Advocates also suggests that we "be required to develop and file a remedial plan within 30 days" of falling more than 10% behind our maintenance backlog target.[92] Again, while we do not oppose this recommendation, we note that we are already required to provide corrective action plans for any delayed initiatives (even if delayed less than 10 percent) as part of our QIU and Quarterly Notification (QN) reporting.

---

[88] *See* PG&E Revised 2022 WMP, pp. 680 and 692, respectively.

[89] Cal Advocates Comments, p. 19.

[90] PG&E Revised 2022 WMP, pp. 689-690.

[91] For a detailed description of our WSIP efforts please see PG&E Revised 2022 WMP, p. 65.

[92] Cal Advocates Comments, p. 19.

Cal Advocates also argues that Energy Safety should require that we include in next year's WMP "a probabilistic wildfire risk analysis to estimate the number of ignitions and wildfires that are likely to occur due to PG&E's failure to correct maintenance problems by the deadlines prescribed in General Orders."[93] First, we disagree with Cal Advocates' assertion that wildfires "are likely to occur due to" our "failure to correct maintenance problems." As described in our Revised WMP, we are specifically targeting ignition risk tags in HFRA and HFTD areas for this very purpose, and the statistics in our Revised WMP show just how much wildfire risk reduction will be achieved.[94] Additionally, we do not believe a "probabilistic wildfire risk analysis" is necessary on this item as it is already incorporated into our wildfire risk models as part of our Revised WMP.[95] As a result, while we are not opposed to this recommendation, we do not think it is necessary or helpful.

VII. INCREASE IN DISTRIBUTION-LEVEL IGNITIONS (RN-PG&E-22-06)

Critical Issue RN-PG&E-22-06 directed us to explain a potential increase in distribution-level ignitions from equipment failure.[96] To address this, we provided background information explaining our equipment failure ignition trends, our plan to mitigate equipment-related ignitions, all additional efforts we are undertaking that are informed by our root cause analysis work, and our forecasts for projected ignitions by equipment type in the Revised 2022 WMP.[97]

GPI contends that our response to this Critical Issue did not "provide sufficient information to determine the ignition reduction values associated with each mitigation"

[93] Cal Advocates Comments, p. 19.

[94] PG&E Revised 2022 WMP, p. 676, Figure RN-PG&E-22-05-02.

[95] PG&E Revised 2022 WMP, pp. 149-179.

[96] Revision Notice, pp. 14-17.

[97] PG&E Revised 2022 WMP, pp. 697-707.

or how we "value the risk reduction…associated with overlapping mitigations."[98] GPI further states that we provide only "a generalized qualitative summary" of how we "calculate the projected ignition reduction rate due to planned and implemented mitigations."[99]

We appreciate GPI's interest in obtaining information on the calculations behind our wildfire mitigation ignition rate. This information is largely provided in our 2022 WMP Section 7.3, and the associated attachments, where detail is provided at the individual initiative level.[100] However, if GPI is interested in obtaining further information about our calculations, we would be glad to work with them as the data behind our calculations is voluminous.

VIII. ACCOUNTING FOR IGNITION MITIGATION MEASURES (RN-PG&E-22-07)

As part of Critical Issue RN-PG&E-22-07, Energy Safety requested that we provide an updated WMP Table 7.2 that better accounts for our ignition mitigation measures in our ignition projections.[101] In response, we revised Table 7.2 to include projections for ignitions that factor in risk reduction benefits from our wildfire mitigation measures and provided an extensive narrative description of the factors we use to calculate our ignition projections.[102]

A. The Use of Standard Formatting to Report Standard Deviation (GPI)

GPI argues that PG&E and the other utilities should "use standard formatting to report 1 or 2 sigma standard deviation for all historic averages and for values with a

[98] GPI Comments, p. 15.

[99] GPI Comments, p. 14.

[100] PG&E Revised 2022 WMP, pp. 375-396.

[101] Revision Notice, pp. 17-18.

[102] PG&E Revised 2022 WMP, pp. 111-116.

calculated confidence interval or error using standard formatting."[103] We support this proposal as we believe there are benefits to standardizing the reporting for these numbers.

B. Calculating the Wildfire Mitigation Adjusted Ignition Rate (GPI)

GPI also questions how we "arrived at the wildfire mitigation adjusted ignition rate (-3 and -7.4 percent) prior to EPSS-related ignition reductions, as well as the quality of pilot study findings used as the basis for assumed EPSS related ignition reduction rates."[104] As discussed above, in addition to WMP Section 7.3, and the associated attachments, we would be glad to work with GPI to provide additional detail on our ignition rate calculations. Regarding our EPSS-related ignition reductions, we are providing attachment "2022-08-22_PGE_2022_RN_Reply_Comments_Atch02" which provides an explanation for how the ignition reduction of our 2021 EPSS pilot program was calculated.

IX. QUALITY ASSURANCE AND QUALITY CONTROL OF ASSET INSPECTIONS (RN-PG&E-22-08)

Critical Issue RN-PG&E-22-08 instructed us to describe our plan to improve the quality of our asset inspections through our Quality Assurance (QA) and Quality Control (QC) processes.[105] We provided a detailed response to this Critical Issue in our Revised 2022 WMP: (a) outlining the actions we are taking to increase the quality of our inspections; (b) providing quarterly goals for reducing failure rates; (c) explaining the thresholds at which we take remedial action on inspectors; (d) describing how we escalate non-adherence to asset inspections processes; (e) identifying actions to improve the training for our inspectors; and (f) providing an update on our finding and failure rate since our initial 2022 WMP submission.[106]

---

[103] GPI Comments, p. 17.

[104] GPI Comments, p. 16.

[105] Revision Notice, pp. 19-20.

[106] PG&E Revised 2022 WMP, pp. 710-719.

A. Protocols for Poorly Performing Inspectors (Cal Advocates)

Cal Advocates urges Energy Safety to require that we "develop a clear protocol for addressing poorly performing inspectors" to include in our 2023 WMP "a process to sample and re-inspect assets that have been recently inspected by underperforming and fraudulent inspectors."[107] However, we provided just such a protocol for addressing underperforming inspectors and process for sampling and re-inspecting the assets they inspected, as part of our Revised 2022 WMP. Specifically, we note that all inspectors with a pass rate below 90% for distribution assets, and 95.5% for transmission assets, will receive remedial training, and any other actions deemed appropriate, to improve the quality of their inspections and to prevent a re-occurrence of their mistakes.[108]

Inspectors scoring below the 90 and 95.5% pass rates may also be required to re-attend "New Inspector" training, depending on the types of errors being made.[109] Additionally, supervisors and Inspection Review Specialists will be notified about underperforming inspectors and will take action as needed including: (a) scheduling field meetings/ride-alongs to observe and evaluate the inspectors in the field; (b) performing additional work verification on work completed by underperforming inspectors; and (c) meet with inspectors to review and discuss work results and areas for improvement.[110] For incidents constituting fraud rather than simple underperformance, automatic discipline is instituted, including termination when warranted.[111] When the type of fraud is work related and indicates doubts about an inspector's performance, we will perform a re-inspection of that inspector's work. We believe that these policies provide the proper amount of structure and flexibility to allow us to address underperforming or fraudulent

[107] Cal Advocates Comments, p. 21.

[108] PG&E Revised 2022 WMP, pp. 714-715.

[109] PG&E Revised 2022 WMP, p. 715.

[110] PG&E Revised 2022 WMP, p. 715.

[111] PG&E Revised 2022 WMP, p. 715.

inspectors. Each inspector's strengths, weaknesses, and actions will be different, and this framework allows us to address each inspector on a case-by-case basis to best resolve that particular situation, whether that be through additional training or termination.

B. Quarterly Reporting of QA/QC Pass/Fail Rates (GPI)

GPI urges Energy Safety to require us to provide quarterly reports on our pass/fail rates for our QA/QC.[112] We provide an in-depth description of our QA/QC quarterly goals in our Revised 2022 WMP, where we explain these goals are based on the previous year's QA/QC thresholds, and that we will continue to incrementally improve upon these goals in 2023.[113] Given the comprehensive description of our processes for improving the quality of our asset inspections, we do not believe requiring additional quarterly reports is necessary. However, if Energy Safety believes otherwise, we suggest that the most appropriate place to provide this information would be in the Quarterly Initiative Update.

X. VEGETATION MANAGEMENT CAPABILITIES (RN-PG&E-22-09)

GPI was the only party that addressed Critical Issue RN-PG&E-22-09, which involves benchmarking vegetation management practices with other utilities and the initial steps that we plan to take to implement the lessons learned from this benchmarking. GPI raises three issues regarding our critical issue response. First, in our description of initial steps to implement lessons learned, we described a pilot program to evaluate vegetation clearances based on the results of our inspections.[114] GPI assets that "PG&E should provide a better justification for the proposed pilot including how their pilot study area and duration (*e.g.*, project timeline) will yield actionable outputs and

[112] GPI Comments, p. 18.

[113] PG&E Revised 2022 WMP, pp. 713-714.

[114] PG&E Revised 2022 WMP, pp. 751-752.

outcomes that advance territory wide VM maturation in the areas identified by the Revision Notice."[115]

Critical Issue RN-PG&E-22-09 focused on benchmarking with other California utilities and one external utility to determine how each utility uses predictive modeling to schedule vegetation management and guide clearances. PG&E's current approach is similar to other utilities, but there are some differences that warrant a closer evaluation. The pilot was proposed to leverage the information obtained during the benchmarking exercise and determine what practices would be appropriate for PG&E's service territory. Our service territory is significantly larger and more environmentally diverse than the other California utilities. Thus, a pilot project is the best approach to evaluate expanding predictive modeling, tree species optimal clearances and guide procedural changes. Once the pilot location and scope has been determined, we intend to develop the necessary controls, guidance, milestones, and outputs for the proposed regional pilots described in our critical issue response. However, we are in the early stages of developing our pilot program. As the critical issue makes clear, PG&E was only required to outline "initial steps" for implementing lessons learned. The specific elements of the pilot program will need to be developed and an implementation plan adopted, which is why we proposed a start date in Q2 of 2023. In addition, we will be coordinating this pilot program with programmatic elements proposed in our 2023 GRC. All of this will take some coordination and planning to be successful. Although we understand GPI's interest in additional details, the pilot program is not yet at the stage of development that these details have been fully fleshed out.

GPI's second concern is that "PG&E should provide better justification for developing a new 'inventory of tree by species' and other risk factors and if or how they can build on the existing [Tree Assessment Tool (TAT)] to expand its functionality and

[115] GPI Comments, p. 18.

increase VM efficiency across related activities (e.g. tree removal, trimming, inspections)."[116] For clarification, PG&E's response to this Critical Issue did not propose creating a "new" inventory of tree species. Our Targeted Tree Species Study (TTSS) was completed on March 31, 2021 and we intend to leverage the Tree Assessment Tool (TAT) data going forward. PG&E is utilizing an assigned Data Scientist and other subject matter experts to further evaluate the TTSS, and other available data, such as the TAT database, emerging remote sensing products, LiDAR imagery bundles and risk models to further incorporate intelligence to act upon the TTSS recommendations. These actions are expected to support the identification potential improvements to reduce risk in a targeted and efficient manner. The 2023 WMP will provide details on the proposed Pilot project and how PG&E plans to leverage its existing databases.

Finally, GPI maintains that "PG&E should explain if or how the pilot study will inform whether and where increased clearances are recommended by the proposed cross-functional team, the development of 'areas of concern' and/or clearances based on 'species and region.'"[117] PG&E understands that GPI's concern is associated with refining "Areas of Concern" (AOC) through a cross-functional team as a foundational interdependency to define the best regions to target for the pilot. Our cross-functional team will be identified and begin reviews in Q3 of 2022. The ultimate definition of the pilot and expected outputs need to follow the identification of refined AOCs. This will include tree species, fire footprint and ignitions.

XI. THE USE OF ENHANCED POWERLINE SAFETY SETTINGS (RN-PG&E-22-12)

MGRA is the only party that commented on Critical Issue RN-PG&E-22-12, which deals with the evidence PG&E has used to support our EPSS program in the 2022 WMP. MGRA agrees that fast-trip is an effective wildfire mitigation tool and is proven

[116] GPI Comments, p. 19.

[117] GPI Comments, p. 19.

to "dramatically reduce ignitions," but MGRA questions whether PG&E's EPSS enablement criteria is based on the extent "it reduces the potential for *catastrophic* fire compared to other mitigations such as PSPS."[118] While MGRA recognizes that there are technical differences between utilities regarding how fast trip is implemented, MGRA notes that "both SCE and SDG&E require extreme weather conditions – Red Flag Warning or Fire Weather Threat (SCE) or extreme FPI or forecasted PSPS events (SDG&E), while PG&E has opted trigger on HFTD circuits under much less severe weather conditions . . ."[119]

As wildfire risk continues to grow throughout California and the Western United States, PG&E's focus is to protect the lives, homes, communities, and environment from catastrophic wildfires. Catastrophic wildfires that our state experienced in 2021—the Dixie Fire and the Caldor Fire—were not initially wind-driven fire events. By evaluating historical fires, and the conditions associated with each fire, we see that strong winds are not a prerequisite for catastrophic fires. While winds increase the risk for propagation and catastrophic outcomes, catastrophic wildfires can occur under any background wind condition if dry fuels, topography, and other factors align to increase wildfire risk. In addition, these megafires can create their own weather in some cases due to extreme heat being released from decades of fuel accumulations and consumption during an incident. For example, several large or catastrophic fires have occurred in our service territory when no RFW or strong winds were in effect including but not limited to the following fires: Dixie, Caldor, Butte, Mendocino Complex, Rim, King, Ferguson, Creek fires.

As noted earlier in these reply comments, California had extremely dry weather in 2020 and 2021. PG&E's entire service area experienced extreme and severe drought conditions before the rainstorms that occurred in the latter part of the year.[120] Prior to

[118] MGRA Comments, p. 14.

[119] MGRA Comments, p. 13.

[120] PG&E Revised 2022 WMP, Section 7.3.6.8, pp. 730-739.

2021, most of the total acreage impacted by large wildfires in our service area resulting from electric facilities occurred as a result of ignitions that started during RFW weather conditions.[121] In 2021, however, the acreage burned by large wildfires occurred because of ignitions that started on **non-RFW days**.[122] Given these changing environmental conditions, a tree or branch contacting a single powerline can lead to overwhelming damage and destruction. As discussed above, wildfires from vegetation debris falling into powerlines have the potential to become catastrophic, even outside the wind driven weather events that are typically associated with major wildfires.

Due to rapidly changing conditions and increasing wildfire risk, the utilities must have the flexibility to address their unique risk profiles based on environmental, geographical, and topographical differences, including the use of distinct electrical circuit configurations. As a result of these unique risk profiles, each utility's fast-trip program must be engineered and designed individually. For example, on September 7, 2021, at 2:36 p.m., our EPSS enabled Coarsegold 2104 circuit automatically shut off power after a healthy tree fell onto the line, breaking two poles and taking down a primary wire. This could have caused a major wildfire if our EPSS were not in place. Even during non-RFW days, the community where the fault occurred is at a high risk for wildfire, with large amounts of vegetation that could fuel a fire and tight roads which make egress for evacuating residents and ingress for first responders difficult. The EPSS adjusted settings on this circuit unquestionably helped prevent what could have been a catastrophic wildfire. This successful de-energization and restoration is what we strive for in the areas of our service territory with these adjusted settings, even during non-RFW days or extreme weather conditions. As discussed above, because our risk profile for EPSS enablement criteria is dynamic and requires continuous review and adjustments based on changing environmental, geographical, topographical conditions, including

[121] PG&E Revised 2022 WMP, Section 7.3.6.8, pp. 730-739.

[122] PG&E Revised 2022 WMP, p. 837.

improvements to our electrical system's design, technology, and engineering, we continue to collect and analyze system performance data on a real-time basis for our EPSS program. As referenced in our response to Critical Issue RN-PG&E-22-12, we continue to develop and collect data from our enabled EPSS field devices, as well as additional controlled testing, to refine and improve device protection settings.[123] Testing that is currently underway is focused on continued analysis of relevant failure modes, fault types, and the potential application of new or emerging technologies to improve our mitigations relative to:

- **High Current Faults** to continue to investigate and refine fast-trip protection settings and failure modes considering various operating, environmental, and failure conditions experienced throughout our unique service territory.

- **High Impedance (e.g., low-current) Faults,** including investigation of the fault signatures from our devices or potential signals from other connected devices within our system for improved identification and situational awareness of these occurrences in the field as well as automated controls to mitigate the faults.

- **Reliability Improvements and Mitigations** to test the efficacy or inform implementation of products and programs aimed at improving situational awareness or operational capabilities that enable us to respond and restore EPSS outages safely and efficiently considering both wildfire risk as well as the public safety impact of sustained, unplanned outages. [124]

While MGRA correctly notes that PG&E's EPSS enablement criteria differs from Southern California Edison Company's (SCE) and San Diego gas & Electric Company's (SDG&E) fast-trip criteria, as explained above, due to our unique service territory risk profile[125], outside of typical PSPS thresholds, EPSS is critical during hot-dry summer

[123] PG&E Revised 2022 WMP, p. 848.

[124] PG&E Revised 2022 WMP, p. 848.

[125] For example, PG&E's HFTD areas are much larger than SCE's and SDG&E's HFTD areas; PG&E's service territory covers 70,000 square miles which is approximately 1.4 times the square mile coverage of SCE and over 17 times larger than SDG&E's territory. The size difference is compounded by

days when there are no high winds that may necessitate PSPS, but continued low relative humidity, low fuel moisture levels, and where the volume of dry vegetation increases the risk of an ignition becoming a large, fuel-driven wildfire. As discussed in our response to RN-PG&E-22-12, we model these conditions at the circuit level at 2km x 2km level of granularity across our service territory using our Utility Fire Potential Index Models – this level of granularity allows us to target EPSS enablement based on local conditions.[126]

In addition to our improved modeling granularity that allows us to adjust our EPSS enablement criteria based on local conditions, a targeted outcome of the engineering and initial installation of EPSS device settings for our 2022 EPSS program is the operational capability to remotely enable EPSS on most circuits throughout our service territory during periods of elevated wildfire risk and return to normal settings when it is safe to do so.[127] This remote capability allows us to develop and further refine EPSS enablement criteria that enables these protection settings during conditions that historically accounted for 97% of acres burned and all of consequences.[128]

Based on 2022 early season fire activity, we updated our enablement criteria to reflect lessons learned and further mitigate wildfire risk, while allowing for return to

significantly different vegetative density and species types, as well as potential wildlife and third-party impacts to electric facilities. Development patterns and appropriate electric utility construction techniques are influenced by geology, topography, and vegetation resulting in PG&E's system having a higher proportion of overhead facilities than SCE and SDG&E. Additionally, PG&E's service territory has high percentages of forested areas in rugged terrain in comparison to the Southern California utilities which is compounded by historical differences in the design and construction techniques of the electric system – PG&E is a conglomerate of multiple utilities acquired over decades, which consisted of varying design and construction.

[126] PG&E Revised 2022 WMP, p. 851

[127] PG&E Revised 2022 WMP, p. 852

[128] Consequence includes impacted fatalities, structures destroyed, acres burned based on historical fires > 100 acres from 2012-2020 of any cause and these results are for current criteria: Enable EPSS for all circuits unless disable criteria met of R1 and damp or calm. See PG&E Revised 2022 WMP, p. 852.

normal settings when safe to do so.[129] In conditions that are below these risk-informed criteria, we return our system to its normal operating profile to maximize customer reliability and increase public safety from the perspective of both wildfire risk reduction and the safety consequence of outages. In July 2022, during non-RFW conditions, this unique EPSS enablement criteria allowed PG&E to enable 718 circuits and approximately 33,500 distribution circuit miles, protecting over 1 million customers. During that time, approximately 44 outages resulted from vegetation contacting powerlines, likely preventing wildfire ignitions from occurring in many, if not all, of those instances.

Thus, while there are differences between PG&E's EPSS enablement criteria and SCE's and SDG&E's fast-trip criteria, our protocols and criteria are based on the necessity to adjust to, and address, the continuously changing risk profile and adoption of improvements to our electric system design, technology, and engineering. Utilities must therefore be afforded flexibility with their respective fast-trip programs to further mitigate wildfire risk and improve reliability in accordance with the unique risks associated with each utilities' service territory.

XII. CONCLUSION

We appreciate the opportunity to work with various stakeholders as part of the wildfire mitigation plan process. Our Revised 2022 WMP demonstrates our company's

[129] Previously approved criteria were to enable EPSS at R3 conditions and certain R1 and R2 conditions that include high sustained wind speed, low relative humidity, and low 10-hour dead fuel moisture. See PG&E Revised 2022 WMP, p. 852

dedication to our stand that catastrophic wildfires shall stop, and we request that the plan be approved by Energy Safety.

Respectfully Submitted,

CHARLES MIDDLEKAUFF
JOEL CRANE
KENNETH LEE
Pacific Gas and Electric Company
77 Beale Street, B30A
San Francisco, CA 94105
Telephone: (650) 766-9147
E-Mail: charles.middlekauff@pge.com

AARON SHAPIRO
Shapiro Law
1375 Sacramento Street, Unit A
San Francisco, CA 94110
Telephone: (415) 754-8181
E-Mail: aaron@apshapirolaw.com

Attorneys for
PACIFIC GAS AND ELECTRIC COMPANY