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VIA ELECTRONIC FILING

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

**RE: MUSSEY GRADE ROAD ALLIANCE COMMENTS ON 2023-2025 WILDFIRE
MITIGATION PLANS R2 OF PG&E AND REVISION NOTICE RESPONSE**

Dear Director Thomas Jacobs:

The Mussey Grade Road Alliance (MGRA or Alliance) files these comments pursuant to the June 22nd Revision Notice¹ issued by the Office of Energy Infrastructure Safety (OEIS or Energy Safety) which authorizes public comment on the PG&E's Revision Notice Responses² by August 22, 2023 and reply comments by September 1, 2023.

Respectfully submitted this 22nd day of August, 2023,

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¹ Office of Energy Infrastructure Safety Issuance of Revision Notice for Pacific Gas and Electric Company's 2023-2025 Wildfire Mitigation Plan;

TN12595_20230622T131426_Revision_Notice_for_PGE's_20232025_WMP; June 22, 2023. (RN)

² 2023-2025 Wildfire Mitigation Plan Response to Revision Notice; Pacific Gas and Electric Company; August 7, 2023. (RN Response)

2023-2025 Wildfire Mitigation Plan R2; Pacific Gas and Electric Company; August 7, 2023. (WMP R2)

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On behalf of the Mussey Grade Road Alliance.

MUSSEY GRADE ROAD ALLIANCE COMMENTS ON PG&E'S REVISION NOTICE RESPONSE

The Mussey Grade Road Alliances (MGRA or Alliance) Comments on PG&E's Revision Notice Response are authored by MGRA's expert witness Joseph W. Mitchell, Ph.D.³

1. RN-PG&E-023-01 – 3 AND 10 YEAR INITIATIVE OBJECTIVES

Many of PG&E's 3- and 10-year initiative objectives do not meet Energy Safety requirements as outlined in the Technical Guidelines.⁴

Remedy:

PG&E must revise its 3- and 10-year objectives to address the specific issues that Energy Safety identifies above. PG&E may add, modify, and/or remove objectives, as needed, with the overall goal of strengthening its 3- and 10-year objectives so they are "specific, measurable, achievable, realistic, and timely.

1.1. Situational Awareness and Forecasting

Of PG&E's four 3-year objectives, three are targeted for completion by the end of 2023 and, as such, do not sufficiently demonstrate a long-term plan for situational awareness and forecasting.⁵

1.1.1. PG&E's Plan for EFD and DFA Deployment Lag Other Utilities and is Insufficiently Ambitious

In response to Energy Safety's Revision Notice, PG&E has added a number of more specific targets for a number of its Situational Awareness and Forecasting objectives. Among these, PG&E has added more detail regarding its Early Fault Detection (EFD) technology, which relies on

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⁴ RN; p. 4.

⁵ RN; p. 5.

detection of radio frequencies from faulty equipment,⁶ and Distribution Fault Anticipation (DFA) technology, which monitors anomalies in current and voltage.⁷ Specifically, PG&E has added new objectives SA-9, SA-10, and SA-11 to its list of initiative targets.

PG&E's original target SA-3 noted that "*EFD and DFA are emerging technologies. Standards and best practices are to be developed as PG&E gains expertise operating these technologies.*"⁸ While this may be true, PG&E's RN Response fails to note that the other major IOUs, SCE and SDG&E, are also deploying EFD and DFA technologies, and all IOUs are expected to collaborate on these technologies. Energy Safety has already noted the importance of EFD and DFA in its 2022 Revision Notice for SDG&E:

"SDG&E-22-13 New Technologies Evaluation and Implementation...

*All electrical corporations (not including independent transmission operators) must collaborate to evaluate the effectiveness of new technologies that support grid hardening and situational awareness such as REFCL and DFA/EFD, particularly in combination with other initiatives."*⁹

SDG&E's Wildfire Mitigation Plan includes a summary of progress to date by IOUs with various technologies, shown below:

⁶ Data Request Response CalPA_Set WMP-13_Q2

⁷ Id.

⁸ RN Response; p. 7.

⁹ 2023-2025 SDG&E Wildfire Mitigation Plan; p. D-16.

Table 8: New Technologies by Utility

New Technology / Protection Strategy	SCE	SDG&E	PG&E	Liberty	BVES	PacifiCorp
Fuse replacement (current limiting fuses, expulsion fuses)	Yes	Yes	Yes	Yes	Yes	Yes
Reclosing Settings (Disabling)	Yes	Yes	Yes	Yes	Yes	Yes
Fast curve settings / EPSS / SRP	Yes	Yes	Yes	Yes	No	Yes
Remote Controlled Automatic Reclosers / Remote Controlled Switches (RAR/RCS)	Yes	Yes	Yes	Yes	Yes	Yes
Distribution Fault Anticipation (DFA)	Yes	Yes	Pilot - Moving to Deployment	Investigating	No	Pilot
Early Fault Detection (EFD)	Yes	Yes	Pilot	No	No	No
Rapid Earth Fault Current Limiter (REFCL)	Pilot - Moving to Deployment	No	Pilot	No	No	No
Open Phase Detection (OPD)	Yes	No	Yes	No	No	No
Falling Conductor Protection (FCP)	No	Yes	Pilot	No	No	No
Smart meter (MADEC)	Yes	Yes	Yes	No	No	No
Household Outlet	Pilot	No	Pilot	No	No	No
Sensitive ground fault detection (relays)	Pilot	Yes	Yes	No	No	No
Electrical Grid Monitoring (EGM)	No	No	No	No	Pilot	No
Thor Hammer	No	No	Pilot	No	No	No
Intumescent wrap / Fire-wrap poles	Yes	No	Yes	No	Yes	Yes

Table 1 - SDG&E 2023-2025 Wildfire Mitigation Plan summary of new technology deployments by utility. Attachment B, p. 21.

As can be seen in SDG&E’s Table 8,¹⁰ PG&E lags both SCE and SDG&E in the deployment of both DFA and EFD, being only in the Pilot stage whereas both SCE and SDG&E are already deploying these technologies.

As reported by SDG&E, collaboration between utilities on these topics should already be initiated:

“In 2023, the utilities will continue to document and assess the estimated effectiveness of new technologies where data is available, their ability to reduce PSPS impacts, and will continue to document and share practices and implementation strategies. These objectives will be accomplished through biweekly meetings and a series of workshops. Based on discussions to date, the utilities provide the following preliminary workshop schedule and themes.

- *April 2023 – Disable Reclosing Settings – Discuss practices and effectiveness*
- *May 2023 – Fast Curve Settings – Discuss practices and effectiveness*
- *June 2023 – DFA – Discuss implementation strategies, practices and effectiveness*

¹⁰ Id.; Attachment B; p. 21.

- July 2023 – EFD – Discuss implementation strategies, practices and effectiveness
- Aug 2023 – REFCL Discuss implementation strategies, practices and effectiveness”¹¹

PG&E’s goals with regard to DFA and EFD are extremely modest:

SA-09 – Produce a feasibility proposal by the end of 2025.¹²

SA-10 – Install DFA on a total of 35 circuits, allowing about 11% eyes-on-risk, by the end of 2025.¹³

SA-11 – Install EFD sensors on 8 circuits, allowing < 5% eyes-on-risk by 2025.¹⁴

Given that 1) utilities have begun to coordinate on these technologies with each other 2) SCE and SDG&E are reportedly ahead of PG&E in their deployment of these technologies, and 3) PG&E is instrumenting a small fraction of its infrastructure and 4) PG&E plans to take years to understand how to use these technologies, it would be appropriate for Energy Safety to encourage acceleration of PG&E’s program.

Cynically, one might suggest that PG&E’s lack of enthusiasm may arise out of its total commitment to undergrounding as a solution, and its sidelining of other technologies as well as covered conductor, much as it has done with REFCL.¹⁵ If one adopts the PG&E premise that undergrounding is the most appropriate solution for the majority of its assets in high fire threat areas, then indeed spending on other safety measures may be superfluous. However, the deployment of PG&E undergrounding is both very slow and very expensive, and has a poor risk/spend efficiency, unlike many of the advanced technologies under consideration.

As MGRA noted in its comments, PG&E along with other utilities refuse to analyze mitigations *in combination*, such as covered conductor + advanced technologies, even though Energy Safety instructed them in 2022 to do so.

With this in mind MGRA suggested the following recommendation in its WMP Comments:

¹¹ Id. Attachment B; p. 23.

¹² RN Response; p. 9.

¹³ RN Response; p. 12.

¹⁴ Id.

¹⁵ MGRA 2023-2025 WMP Comments; p. 100.

“EFD has proven to be an effective and useful technology providing early warning of incipient faults, which can then be addressed by focused inspection. Utilities should be required to come up with plans to cover their HFTD infrastructure with appreciable risk by this technology within the next few years.”¹⁶

Recommendations:

- Energy Safety should join the meetings of utilities discussing advanced technologies such as DFA, EFD, and REFCL as soon as possible to provide input and to help utilities resolve any bottlenecks with regard to deployment of advanced technologies.
- PG&E should be required to substantially increase its targets for deployment of advanced technologies, diverting funds as necessary from lower priority undergrounding projects.
- PG&E should be required to analyze the mitigation of a *full portfolio* of combined mitigations as the alternative to undergrounding, including EFD, DCD, PVD, and DFA in combination with covered conductor.
- PG&E should also be required to perform an analysis of REFCL + CC as an alternative to undergrounding.

Remedies should be required in the 2024 update of the 2023-2025 WMPs.

1.2. Public Safety Power Shutoff (PSPS)

• PG&E provides two 3-year objectives and three 10-year objectives in this section. Two of the 10-year objectives are the same as the 3-year objectives and do not sufficiently demonstrate a long-term plan for reducing PSPS.

• PG&E’s PSPS objectives fail to demonstrate its commitment to reducing PSPS scale, scope, and frequency.

In response, PG&E has added several additional objectives to its power shutoff initiatives:

“PS-08: PG&E is adding a new 10-year objective (PS-08). This objective is related

¹⁶ MGRA 2023-2025 WMP Comments; p. 104.

to evaluating emerging technologies. PG&E will evaluate emerging technologies for transmission and distribution that may further reduce scale, scope, or frequency of PSPS. PS-08 replaces PS-03.

PG&E is continuously evaluating emerging technologies that can potentially reduce the impacts of PSPS as technologies can evolve year over year. For example, advanced protection and monitoring technologies such as downed conductor detection (DCD) devices, EPSS, drones, partial voltage, and Gridware.”¹⁷

“PS-09: PG&E is adding a new 10-year objective (PS-09). This objective is related to evaluating PSPS reduction through undergrounding. PG&E will look to reduce PSPS scale and scope over the ten years through our 10,000-mile undergrounding program. PS-09 replaces PS-04.

As part of a multiyear effort, PG&E’s undergrounding program is expected to reduce the scale, scope, and/or frequency of PSPS. PG&E is planning to underground 2,100 miles in 2023-2026 and will continue to pursue more undergrounding as part of this program. PG&E will use a back cast analysis to demonstrate the PSPS benefit associated with undergrounding work completed.”¹⁸

1.2.1. PG&E Fails to Account for De-energization Threshold Changes Made Possible by Covered Conductor Plus Advanced Technologies

PG&E continues to equate wildfire risk reduction and hardening with undergrounding. This assumption is only justified to the extent that the OEIS and Commission approve PG&E’s undergrounding proposal and the spending required to achieve it. While it is appropriate to consider the effect of new technologies on the extent and scope of power shutoff, several of the technologies that are effective in reducing wildfire risk including Downed Conductor Detection and REFCL have multiplicative effects when paired with covered conductor, since they specifically address vulnerabilities in covered conductor, and likewise covered conductor addresses issues such as conductor contact that ground detection technologies do not. Therefore, PS-08 should be expanded to include emerging technologies in conjunction with covered conductor.

¹⁷ RN Response; p. 30.

¹⁸ Id.

The extent and duration of power shutoff events are very sensitive to the threshold chosen for shutoff. MGRA's WMP comments showed this by looking at SDG&E historical data that tracked how much time each SDG&E weather station spent above threshold. This analysis showed that a threshold increase from 55 mph to 70 mph would reduce the number of measurements above threshold by 96%.¹⁹ So as covered conductor alternative technologies prove their effectiveness as demonstrated in post-shutoff damage assessments, it should be possible to significantly reduce PSPS impacts by making the threshold for shutoff more stringent. Undergrounding is not the only mitigation that can reduce PSPS effects.

1.2.2. PG&E's Technology and Hardening Initiatives Need 3 Year Targets

PG&E's PS-08 and PS-09 initiatives only appear in their 10 year plan. At the end of this period, the end result appears to be a report – of recommendations in the case of advanced technologies and a backcast in the case of hardening. In both cases, significant activity in both areas is anticipated in the 2023-2025 Plan timeframe, so a statement of interim goals should be made.

Recommendations:

- PG&E initiative PS-08 should include the combination of covered conductor with advanced technologies as mitigations that will address PSPS impacts in the long term.
- PG&E should be required to create a plan to assess the possible relaxation in PSPS thresholds that would be possible through the deployment of covered conductor and advanced technologies, and how this plan could be validated through outage, ignition, and post-PSPS damage surveys.
- PG&E should determine solid targets for PSPS reduction in the three year target timeframe due to the introduction of undergrounding, covered conductor, and advanced technologies.

¹⁹ MGRA 2023-2025 WMP Comments; pp. 108-109.

2. RN-PG&E-23-05: PG&E’S UNDERGROUNDING PLAN MAY LEAVE WILDFIRE RISK UNADDRESSED IN HIGHEST RISK AREAS

“PG&E must provide:

a. Regarding scaled back targets:

i. Analysis on the remaining miles originally scoped for undergrounding in 2022 but now no longer scoped for undergrounding within PG&E’s 2023-2025 plan. This should include risk-ranking of those miles, interim mitigations if these miles are scoped for undergrounding in the future, or alternative mitigations, particularly grid hardening, if the miles are no longer scoped for undergrounding.

ii. A list of CPZs that PG&E is not scoping for undergrounding in its 2023-2025 plan due to feasibility constraints but that are included within the top 20 percent highest risk CPZs. For each of these CPZs PG&E’s must provide its alternative mitigation or hardening plans.

b. Regarding the mitigation selection decision-making process:

i. Justification for the use of WFE as opposed to standard cost-benefit analysis when comparing mitigations, particularly in regard to feasibility.

ii. An updated estimation of risk reduction effectiveness for undergrounding accounting for the remaining risk associated with secondary and service lines.

iii. An updated analysis on any cost/benefit impacts for mitigation selection based on such updated undergrounding effectiveness calculation. This must include discussion of any changes in potential mitigation selection or project prioritization.”²⁰

2.1. PG&E’s (and Other Utility) Risk Estimates Lack Accuracy

When holding PG&E to account and making them address their highest risk circuits first, it is important to keep in mind that all utility risk estimations are “works in progress”, and the circuits now ranked as the highest risk may not be so ranked in the future. Biases and errors in the PG&E risk models have been discussed over the last few years in a number of MGRA filings. In this year’s WMP Comments these issues are addressed on pp. 30-76, and make up a major portion of MGRA’s submission. Of the three major IOUs, PG&E has made the most progress with its risk analysis over the past year, and has addressed issues regarding maximum fire size and tail risk, and bias due to power shutoff. However PG&E’s analysis still will show bias in the following areas:

²⁰ RN; p. 17.

- Overweighting of “agent” based ignition drivers – balloons, 3rd party, vehicles, animals – at the expense of vegetation contact and equipment damage. This may lead to a bias toward lower wind areas at the expense of higher wind areas.
- Lack of any explicit mechanism to identify extreme wind areas.
- Lack of incorporation of smoke effects may underweight risk from large fires that are remote from population centers.
- Lack of suppression effects can lead to a variety of different biases.

Hence, even if PG&E were to adhere to the list of risk-ranked circuits it currently has, this would be a “best guess”, and the strategy of throwing the most expensive mitigation (undergrounding) at each of these circuits may become problematic when the circuit prioritization is reshuffled again (as it has been in the past) as further advances and improvements to the risk models are incorporated. Hence PG&E should for each of these circuits estimate risk reduction using a combination of covered conductor (with corrected effectiveness) and advanced technologies.

2.2. PG&E Has Failed to Comply with Energy Safety’s Requirement for Alternative Mitigations

PG&E has failed to meet the requirements of this revision notice by failing to include a portfolio addressing the top 20% risk that includes alternative mitigations, particularly in cases where undergrounding is not planned prior to 2026.

As PG&E describes, of the 720 circuits in the top 20% remaining risk-ranked circuit segments:

11 have been hardened using CC and REFCL

153 are included in the 2023-2026 Undergrounding Workplan

477 are planned for undergrounding work after 2026

79 are not included in the work plan and have not been hardened.²¹

²¹ RN Response; p. 67.

This implies that only 23% of PG&E's highest risk circuits will be improved with hardening by 2026, with the remaining 77% relying only on PG&E's standard operational and inspection plans as mitigation – this despite spending nearly \$2 billion on undergrounding.²²

Southern California Edison's work over the last few years has shown that covered conductor can be deployed rapidly at scale, with thousands of miles of circuits upgraded since 2019. Edison has also show that it can build and operate REFCL protection on its substations. Under these circumstances, for PG&E to "barrel age" its at-risk customers for years in order to ensure maximum profit extraction when their lines are finally undergrounded at some future date is unconscionable. While the mitigations it has in place, such as standard maintenance and vegetation management, DCD, EPSS, and EPSS reduce risk they are not nearly as effective as these protections in combination with covered conductor and other advanced technologies, which together cost significantly less than undergrounding.

PG&E still steadfastly adheres to its purported 64% effectiveness for covered conductor despite the fact that its own most recent data shows outage reductions of around 70%.²³ Failures associated with catastrophic wildfires – equipment and vegetation contact – show mitigations of 77-82%, based on SCE data.²⁴ This is for covered conductor alone. In concert with DCD, REFCL and other advanced technologies effectiveness can reach 99% (vegetation contact), 77% (other object contact), and 85% (conductor damage), according to SCE estimates. These are the main drivers of catastrophic wildfires.

PG&E' insistence that mitigation and undergrounding are synonymous, and that residents will have to wait for reliability and safety if they don't have it already, and that ratepayers will have to pay the very highest costs for their electric service for these privileges is not conscionable and should not be tolerated by Energy Safety. PG&E's Plan should not be approved until PG&E adheres to OIES guidance and provides reasonable and accurate alternatives to undergrounding that address the top 20% risk circuits.

²² MGRA 2023-2025 WMP Comments; p. 20.

²³ Id; p. 91.

²⁴

Recommendations:

- PG&E should be required to develop an alternative portfolio that will more rapidly address the top 20% risk circuits in its service area, consisting of covered conductor in conjunction with one or more advanced technologies that addresses covered conductor vulnerabilities (such as DCD or Falling Conductor Protection).

3. RN-PG&E-23-08: PG&E’S PSPS DECISION-MAKING PROCESS DOES NOT ACCURATELY ACCOUNT FOR EPSS ENABLED CIRCUITS, WHICH COULD POTENTIALLY LEAD TO MORE PSPS EVENTS THAN NEEDED.

*PG&E must revise its WMP with a detailed plan and timeline on how it will accurately account for EPSS enabled circuits in its PSPS decision-making process.*²⁵

3.1. Relying on EPSS Rather than PSPS During Fire Weather Events May be Hazardous

Effectively, the question that Energy Safety is asking in this question is under what conditions and to what extent can PSPS be replaced by EPSS settings. While this is a reasonable question to ask, it needs to be addressed very carefully, since as PG&E notes, there were 31 HFTD CPUC Reportable Ignitions on circuits on which EPSS was enabled.²⁶ PG&E’s remediation plan states that “*The efficacy of EPSS in a high-wind scenario versus low-wind scenario is an area for further study. We anticipate very limited data in any statistical analyses of high wind ignitions cases given the short time frame the EPSS Program has been in effect and general lack of high-wind ignitions.*”²⁷ On the face of it this seems to be a reasonable approach – provided that the “high wind” events under study do not occur under conditions particularly conducive to rapid fire growth, and do not include additional aggravating factors such as low humidity, high temperature, or very low vegetation moisture content. Under such conditions, PSPS may be a better mitigation, and EPSS should not be experimentally used as a replacement until the wind characteristics of EPSS are better understood.

²⁵ RN; p. 31.

²⁶ RN Response; p. 112.

²⁷ Id.; p. 113.

3.2. Most EPSS Outages do not Occur Under Conditions Supporting Catastrophic Wildfire

When discussing EPSS it is important to emphasize that the vast majority of EPSS outages, to the extent that PG&E is able to locate their origin, occur under weather conditions that are not conducive to supporting large or catastrophic wildfires. MGRA analysis done for its comments on the 2023 WMP analyzed a number of such outages and the local weather conditions in the hour prior to the outage.²⁸ This analysis found that:

- Nearly half of all EPSS outage locations were in Non-HFTD areas.
- Of 34 specific events analyzed 17 occurred during conditions of calm wind, moderate to high humidity, and low temperatures. Of the 17 remaining events, only 7 had a coincidence of two weather conditions.

It should be emphasized that the weather thresholds used in this analysis were extremely conservative: $T > 25$ C, $RH < 25\%$, and wind gust > 15 mph. MGRA's analysis did not include vegetation information, which is something that should be reported as well with respect to EPSS events. The MGRA analysis concluded that: *"PG&E likely has significant leeway to reduce and restrict its EPSS criteria and thereby reduce EPSS impact on customers."*²⁹

Recommendations:

- PG&E should not "experiment" with changing PSPS thresholds for EPSS circuits until it better understands the relationship between EPSS and wind.
- PG&E should include an EPSS flag as a field in its Outage data.
- PG&E, in its future EPSS reporting, should be required to include relevant fire weather data in the area nearest to its outages, including at least temperature, wind gust speed, fuel moisture, and relative humidity. Ignition Potential, if calculated, should be included as well.
- PG&E should be made to justify criteria that allow outages in the case where there are no significant weather conditions that would support the growth of large fires, and why many

²⁸ MGRA 2023-2025 WMP Comments; pp. 111-115.

²⁹ Id.; p. 115.

EPSS outages originate outside of HFTD areas. If it fails to adequately justify its criteria PG&E should be required to come up with a remediation plan using further sectionalization, changes in its EPSS thresholds, and more dynamic adjustments to its equipment based on weather station data and fuel moisture data.

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