

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2023
Data Response

PG&E Data Request No.:	CalAdvocates_029-Q004		
PG&E File Name:	WMP-Discovery2023_DR_CalAdvocates_029-Q004		
Request Date:	September 7, 2023	Requester DR No.:	CalAdvocates-PGE-2023WMP-29
Date Sent:	September 27, 2023	Requesting Party:	Public Advocates Office
PG&E Witness:		Requester:	Holly Wehrman

This data request relates to PG&E's 2023 WMP Revision Notice Response (henceforth referred to as "PG&E's response"), filed August 7, 2023, in response to Energy Safety's Revision Notice for PG&E's 2023 WMP, and PG&E's subsequent Reply Comments filed on September 1, 2023.

QUESTION 004

Page 63 of PG&E's response states, "For example, we have found certain splices (e.g., splices within two feet of an insulator, and number of splices per span) do not pose an increased risk of ignition. Instead of issuing a non-ignition risk maintenance tag, the splices are better addressed by the asset management team as they are a potential indicator of a holistic asset health issue." PG&E's 2021 Electric Asset Management Plan for Electric Distribution Overhead Assets (referred to as AMP, provided in response to Data Request No. GIE004 Cal Advocates-PGE-Down Power Lines, question 3, on June 29, 2022), showed a high correlation between the presence of splices and the likelihood of wires down for small conductor (4 ACSR, 4 Cu, 6 Cu). See slides 12-14 of the AMP.

- a) Has PG&E performed a study on the correlation between the presence of splices and the likelihood of wires down for larger conductor types? If yes, please provide the results of this study.
- b) If the answer to part (a) is no, does PG&E plan to perform such a study? If yes, please provide the approximate date the study will be completed.
- c) If the answer to part (b) is no, please explain why.
- d) How did PG&E come to the conclusion that splices within two feet of an insulator did not pose an increased risk of ignition?
- e) How did PG&E come to the conclusion that the number of splices per span did not pose an increased risk of ignition?
- f) Please provide any studies, analyses, or reports to support your response to part (d).
- g) Please provide any studies, analyses, or reports to support your response to part (e).
- h) PG&E's response quoted above refers to "certain splices" and names two examples. Are there other types of splices that PG&E has concluded "do not pose an increased risk of ignition"?

- i) If the answer to part (h) is yes, please list all such types of splices.

ANSWER 004

Please note the attachments to this response contain confidential material.

- a) No, PG&E has not performed a formal study on the correlation between the presence of splices and the likelihood of wires down for larger conductor types.
- b) The current wire down database tracks conductor attributes for wire down incidents caused due to a conductor equipment failure or a connector/splice equipment failure. Analysis of this dataset has shown that presence of splices is one of the correlating factors for likelihood of equipment failure wire down. Furthermore, data shows that there is a higher failure rate of smaller wire conductors (#6 and #4 Cu) at locations with overlapping correlating conditions: corrosion zone, splices present, and thermal rating exceeded (I²t). Therefore, these asset health attributes are useful in assessing the holistic asset health of conductor segments.

This dataset has also shown that the wire down equipment failure per mile per year for small conductor is 0.008 WD/mile/year compared to 0.0034 WD/mile/year for larger conductor (data as of September 2023). Small conductor failure rate is 2.3x times the larger conductors. Over the 5 years approximately 89% (data as of September 2023) of the failed conductor are small wire conductors. Therefore, given the significantly higher rate of failure of small wire conductors, PG&E is currently analyzing and prioritizing replacement of small wire conductors for targeted proactive replacement program.

PG&E is currently establishing an Integrated Grid Planning program that assesses the holistic condition of all conductor segment in four categories: wildfire risk, capacity constraint, asset health, and reliability. As part of the IGP process we are establishing an asset health risk score for all conductor segments (smaller conductors and larger conductors).

- c) Not applicable, please see the response to subpart (b) above.
- d) In 2023, PG&E completed an analysis of effects of splice location on distribution circuits. The objective of the project was to evaluate the effects of splice proximity to dead ends and insulators, specifically due to aeolian vibration and large displacement cycles from wind sway. The testing was performed for compression splices with #4 ACSR, #2 copper, and #4 copper conductors. Splice locations investigated ranged from 6 inches to 6 feet. The results from the physical testing and modeling shows that splice location did not result in increased maximum displacements across all frequencies tested. In other words, although splices do pose a stress concentration point on conductor spans, that stress concentration does not increase with proximity to connection points.
- e) Based on failure analysis performed for splices, PG&E believes that the probability of failure of a span does scale with the number of splices. This is because splices tend to fail due to poor electrical or mechanical connections caused by poor workmanship during installation, environmental corrosion, or due to external damage (e.g., gunshot

damage). However, a higher number of splices alone does not indicate that failure is imminent.

For this reason, the maintenance tag process is not the appropriate mitigation / control for increased probability of failure of span due to high splice count when there are no visual indications of defects / imminent failure. PG&E is proposing that the proper mitigation and control is to consider splice count as a measure of circuit health and to incorporate that asset health measure into risk-based decision-making via asset management programs and integrated grid planning. PG&E will continue creating maintenance tags when visual inspection finds indication of defects / imminent failure of splices and other connectors.

- f) Please see attachment "*WMP-Discovery2023_DR_CalAdvocates_029-Q004Atch01CONF.pdf*" for a report prepared by the Applied Technology Services department providing the requested information.
- g) Not applicable, as PG&E is not in possession of any such studies, analyses, or reports.
- h) No, PG&E is presently unaware of any other types of splices that fit the category described. PG&E is conducting engineering analysis on other types of splice/connector configurations. However, the analysis is not yet complete.
- i) Not applicable, please see the response to subpart (h) above.