

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2023-2025
Data Response

PG&E Data Request No.:	SPD_016-Q007		
PG&E File Name:	WMP-Discovery2023-2025_DR_SPD_016-Q007		
Request Date:	May 30, 2024	Requester DR No.:	SPD_WSPS_PG&E_2024_006
Date Sent:	June 20, 2024	Requesting Party:	Safety Policy Division
PG&E Witness:		Requester:	Henry Sweat

SUBJECT: REQUEST FOR CONFIDENTIAL FILES

QUESTION 007

Mitigation Effectiveness

- a. Regarding use of the WBCA tool to incorporate cost effectiveness components, reliability considerations, and location-specific mitigation effectiveness calculations, as described in the 2025 WMP Update on page 51, list all mitigations which will employ location-specific mitigation effectiveness calculations when WBCA is adopted, with their WMP Initiative Activity name and Utility Initiative Tracking ID code.
- b. Provide the data used to create *Table ACI-PG&E-23-05-3*.
 - i. SPD expects to see a CPZ-level breakdown of the risk and the expected mitigation effectiveness for each driver.
 - ii. The data should include how the CPZ data is aggregated up to the level in the *Table ACI-PG&E-23-05-3*, and an explanation for how this occurs.
 - iii. The data should also include how the risk for each driver is aggregated and an explanation for how this occurs.
 - iv. Provide the data used to determine each mitigation effectiveness.
- c. PG&E stated the following:

Another compounding factor is PG&E's heavily forested service territory in the highest wildfire risk portions of High-Fire Threat District (HFTD). It is common for vegetation induced faults to bring down distribution wires in a way that they touch each other and create line-to-line or two-line-to-ground faults. These types of faults are not as likely in service territories that have more chaparral or low-lying brush vegetation because it is far less common for overhead strike potential to introduce multi-phase system fault conditions. Implementation of REFCL in areas with significant large tree habitats with high tree strike potential would not produce the same effectiveness as areas like California's high desert. An accurate assessment of the effectiveness of REFCL systems requires consideration of the specific geographic risk factors for the circuits upon which this technology is installed.

Provide data which substantiates this claim. Provide data which shows the prevalence of SLG, LL, LLG, LLL and LLLG faults on circuits in the HFTD. Provide data which shows the prevalence of SLG, LL, LLG, LLL LLLG faults for vegetation induced faults. Discuss how effective PG&E expects REFCL to be for each fault type and risk driver.

ANSWER 007

- a. The WBCA will evaluate different mitigations and combinations of mitigations that will likely change as we introduce new mitigation technology onto our system and/or replace existing mitigation approaches with new ones. Additionally, mitigations may change as we receive additional guidance from Energy Safety.

The current list of alternatives that PG&E can analyze with the WBCA are shown in Table 1 below.

The WBCA analyzes location-specific information at the circuit segment level for alternatives 1 through 8. The WBCA does not analyze Alternative 9, REFCL, because it can only be analyzed at the substation level. The WBCA cannot conduct circuit segment level analysis of REFCL.

The WMP Initiative Activity name and Tracking ID for the alternative mitigations are shown in Table 1 below.

**Table 1 – WBCA Mitigation Alternatives
WMP Activity Name and Tracking IDs**

Alternative	WMP Activity Name	WMP Tracking ID	Notes
Alternative 1 - Baseline			Represents the current state of the grid and is not a named WMP initiative.
Alternative 2 - Underground Primary	10K Undergrounding	GH-04	
Alternative 3 - Underground All			PG&E is evaluating its approach regarding the undergrounding of secondary and service lines. Underground All is not a named WMP initiative.
Alternative 4 - Covered Conductor with EPSS and Downed Conductor Detection (DCD)	System Hardening – Distribution Protective Equipment and Device Settings	GH-01 GM-07	
Alternative 5 - Bare Conductor Rebuild with EPSS and DCD	Downed Conductor Detection Protective Equipment and Device Settings	GM-06 GM-07	
Alternative 6 – Line Removal with Remote Grid	10K Undergrounding	GH-04	Line removal with remote grid is included in PG&E's overall system hardening program.
Alternative 7 - EPSS including DCD/Partial Voltage with Bare Conductor	Protective Equipment and Device Settings	GM-07	Bare conductor is not a named WMP initiative.
Alternative 8 – EPSS, DCD and PSPS with Bare Conductor			While we originally analyzed this alternative that was included in WMP ACI 23-05, it is not included in the Attachment 1 because inclusion of PSPS as part of long term mitigation planning it is not an alternative we are considering.
Alternative 9 – REFCL			REFCL is not a named WMP initiative. It was considered but not selected for this WMP period. (See PG&E 2023-2025 WMP R5, pp. 283-284). Additionally, because REFCL cannot be analyzed at the circuit segment level it is not included in Attachment 1.
Alternative 10 – Covered Conductor	System Hardening – Distribution	GH-01	

b. Please see “WMP-Discovery2023-2025_DR_SPD_016-Q007Atch01.xlsx.”

- i. The data used to create Table ACI-PG&E-23-05-3 does not use CPZ-level breakdown of the risk. Instead, Table ACI-PG&E-23-05-3 utilizes subject matter expertise review of the outage combinations, and subsequently, applies this against historical risk events in order to derive the effectiveness for the mitigation. See the following worksheets in the attachment with the associated data provided:
 - The worksheet titled ‘Outage_HFTD’ shows the risk event data.
 - The worksheet titled ‘Grid Hardening SME Input_v3’ shows the SME review of each outage combination and the mitigation solution’s potential effectiveness.
 - The worksheet titled ‘Mapping’ shows the conversion of SME defined effectiveness to percentage effectiveness (e.g. low = 20%).
 - The worksheet titled ‘Result’ shows the computed effectiveness across the historical outage dataset to arrive at the summarized values of Table ACI-PG&E-23-05-3.
- ii. Not applicable. As discussed in subpart b(i) above, the CPZ data is not aggregated up to the level in the Table ACI-PG&E-23-05-3.
- iii. Not applicable. The risk for each driver at the CPZ level was not aggregated to calculate the mitigation effectiveness for Table ACI-PG&E-23-05-3.
- iv. The data used to create Table ACI-PG&E-23-05-3 is shown in attachment “WMP-Discovery2023-2025_DR_SPD_016-Q007Atch01.xlsx.”

- c. The original response was not provided from a predefined dataset but rather based upon subject matter expertise.

Please see “WMP-Discovery2023-2025_DR_SPD_016-Q007Atch02.xlsx,” which is a summary of EPSS outages from 2022 to present and which demonstrates that a high percentage of primary system faults for known vegetation causes involve multiple phases based upon captured relay target information. Table 2 below summarizes the information in this attachment. Events involving multiple phases would show a decreased effectiveness of REFCL on ignitions as REFCL is only effective for single line to ground faults. Various correlations can be observed showing an increased probability of multi-phase faults due to increasing HFTD tier as well as tree strike potential risk.

Table 2. Vegetation Caused Faults on EPSS Circuits (2022 – Present)

Fault Condition	% of Events	% Circuit primary overhead miles in Tier 2	% Circuit Primary Overhead Miles in Tier 3	% of Priority Tree Mitigation
Multiphase Target	54.50%	52.39%	55.50%	57.26%
Single Phase Target	43.67%	44.69%	42.47%	39.85%

Fault Condition	% of Events	% Circuit primary overhead miles in Tier 2	% Circuit Primary Overhead Miles in Tier 3	% of Priority Tree Mitigation
No Fault Target	1.83%	2.92%	2.03%	2.89%