

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

PG&E Data Request No.:	CalAdvocates_048-Q003		
PG&E File Name:	WMP-Discovery2023-2025_DR_CalAdvocates_048-Q003		
Request Date:	May 16, 2024	Requester DR No.:	CalAdvocates-PGE-2025WMP-12
Date Sent:	May 31, 2024	Requesting Party:	Public Advocates Office
PG&E Witness:		Requester:	Tyler Holzschuh

SUBJECT: PG&E’S PLANNED FAST-TRIP SETTINGS FOR THE 2024 FIRE SEASON

QUESTION 003

For PG&E’s circuits above 35 kV, but not classified as part of the NERC bulk electric system, please describe, with references to PG&E’s procedures:

- a) PG&E’s fast-trip line-current thresholds;
- b) How PG&E’s fast-trip line-current thresholds are calculated from measured circuit values;
- c) The intentional delays assigned to those line-current thresholds;
- d) PG&E’s fast-trip ground-current thresholds;
- e) How PG&E’s fast-trip ground-current thresholds are calculated from measured circuit values;
- f) The intentional delays assigned to those ground-current thresholds; and
- g) How the current and delay thresholds differ from non fast-trip settings.

ANSWER 003

PG&E’s Transmission EPSS (a category of “fast-trip”) settings are applied only on a subset of radial lines that are not classified as NERC BES. The responses below pertain only to the EPSS settings, and do not apply to normal non-EPSS settings.

- a) Transmission line protection is typically not purely current based. Transmission line protection commonly uses impedance based relays (aka distance relays), for which the trip threshold is not defined in current (amperes), but as an impedance value (ohms).

For current based phase and ground overcurrent, Transmission EPSS phase instantaneous overcurrent and ground instantaneous overcurrent thresholds are set based on normal non-EPSS phase time overcurrent pickup and ground time overcurrent pickup thresholds respectively. Preferably, the settings are verified to be greater than 120% of distribution fault current for any tapped banks. However, if this criteria cannot be satisfied, providing instantaneous clearing for 100% of the transmission line is given precedence, and the risk of miscoordination with distribution faults is identified to Operations.

For impedance based distance elements, Transmission EPSS phase distance and ground distance thresholds are set based on normal non-EPSS Zone 2 phase distance and Zone 2 ground distance thresholds respectively. These Zone 2 elements are already normally overreaching the end of the line. The adjustment to these distance elements is not the pickup threshold, but rather eliminating the normal time delays used for relay coordination purposes.

- b) The response here is provided with the interpretation that “calculated” is in reference to how the protection engineer calculates the relay setting thresholds, and not how the protective relay calculates the measured circuit values to compare against the set thresholds.

Transmission line relay thresholds for both EPSS and non-EPSS settings are not calculated from measured circuit values, but are based on fault studies performed using a short-circuit model of the power system and by performing short-circuit studies. Relay thresholds also take into account facility ratings to avoid operating below the facility rating.

- c) Transmission EPSS settings have no intentional time delays.
- d) See response above to Part a.
- e) See response above to Part b.
- f) See response above to Part c.
- g) Current thresholds and delays (time dials) for phase time overcurrent and ground time overcurrent are identical for EPSS and non-EPSS settings.

Current thresholds for phase instantaneous overcurrent and ground instantaneous overcurrent are normally set higher for non-EPSS settings as compared to fast-trip settings for the purpose of relay coordination and selectivity of clearing only in-section faults. Delays for the instantaneous overcurrents are zero in both EPSS and non-EPSS settings.

Distance element thresholds for phase distance and ground distance are identical for EPSS and non-EPSS settings. Zone 1 distance element time delays are also identical for EPSS and non-EPSS settings. Zone 2 distance element time delays are intentionally set to zero in EPSS settings, while for non-EPSS settings would have a typical value of 20-30 cycles or longer for the purpose of relay coordination.