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

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DRU Index #:		Requester:	Holly Wehrman

The following questions relate to your 2023-2025 WMP submission.

QUESTION 009

8.1.2.10 – Other Grid Topology Improvements to Minimize Risk of Ignitions 8.1.2.10.1 – Downed Conductor Detection Devices Pg 374-375 of PG&E's WMP states:

> "Installation of DCD on existing, new, and retrofitted recloser controllers is expected to reduce the number of ignitions due to high impedance line-to-ground faults by quickly detecting and de-energizing the fault, which is the primary existing gap in EPSS protection on primary overhead distribution conductor. Approximately half of the CPUC reportable ignitions in HFTD that occurred in 2022 while EPSS was enabled were the result of high-impedance faults."

a) Explain the existing gap on EPSS.

b) Explain how DCD technology can mitigate this gap to encompass all high impedance faults.

c) List the advantages of having both programs working simultaneously.

d) What percentage of high-impedance faults does PG&E anticipate could be mitigated by EPSS alone?

e) What percentage of high-impedance faults does PG&E anticipate could be mitigated by DCD alone?

f) What percentage of high-impedance faults does PG&E anticipate could be mitigated by the combination of EPSS and DCD?

ANSWER 009

a) While EPSS has proven to be highly effective in lowering the incident energy during traditional faults and associated potential ignitions, reliable detection, and de-energization of high impedance fault conditions continues to be a gap that we are working to close. As part of EPSS, we deployed an expansive use of low set, non-directional ground fault overcurrent protection, commonly referred to as Sensitive Ground Fault (SGF) to aid in this effort.

   While SGF has been effective in closing the gap on high impedance faults, it also has effectiveness limits and further protection strategies like DCD that are being

explored to allow for even greater sensitivity, detection, and de-energization of high impedance fault conditions.

In addition to SGF and DCD, partial voltage (PV) force out and the gang trip functionality which are incorporated under the core EPSS strategy have also been deployed to help close the gap. These practices are all part of a defense in depth strategy to provide layered levels of protection against high impedance faults.

b) DCD implements very sensitive and sophisticated levels of ground fault protection that specifically look for characteristics of arcing associated with line to ground faults. With high sensitivity, there is a higher likelihood of protective relay misoperation which may result in an outage for a non-fault condition. DCD works to overcome this by looking for the specific arcing characteristics that must be present for an actual fault condition.

c) DCD is a further enhancement to EPSS, rather than a separate program. EPSS is designed to lower the incident arc energy for traditional faults, add gang, three phase tripping past fuses, and introduce higher impedance fault detection down to 15 amps. DCD and other high impedance fault detection methods assist in de-energizing fault conditions which are below the normal detection capabilities of traditional ground overcurrent protection, as low as 1 amp.

d) As mentioned above, EPSS is a suite of enhanced protection schemes. It is not separate from DCD. Further, given the nature of these fault conditions, we do not readily have access to the data to support this statistic.

e) As mentioned above, EPSS is a suite of enhanced protection schemes. It is not separate from DCD. DCD requires EPSS to be enabled to function. Further, given the nature of these fault conditions, we do not readily have access to the data to support this statistic.

f) Based upon limited field experience and post event data analysis, we estimate that incrementally approximately 25% of all 2022 EPSS high impedance line to ground fault ignitions would have been mitigated by DCD.