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

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PG&E Witness:		Requester:	Holly Wehrman

System hardening alternatives analysis

Table ACI-PG&E-23-05-3 on page 55 of PG&E's 2025 WMP Update lists 10 possible alternatives PG&E anticipates using in its WBCA. Questions 1 through 9 relate to this table.

QUESTION 003

List the assumptions unique to each of the ten alternatives.

ANSWER 003

The assumptions for each of the 10 alternatives are as follows.

Alt. 1 – Baseline

There are no assumed savings or ignition reduction in the Baseline scenario.

Alt. 2 – Underground Primary

All primary overhead outages for lines that are undergrounded are mitigated, 100% of ignition risk is reduced. Secondary/service conductor phase-to-phase outage ignition reduction is significant, however, there is still a chance for contact failure. Secondary/service conductor phase-to-ground ignition reduction is less than average. No additional ignition risk reduction is achieved via enhanced settings.

Alt. 3 – Underground All

All primary and secondary overhead outages for lines that are undergrounded are mitigated, 100% of ignition risk is reduced. No additional ignition risk reduction is achieved via enhanced settings.

Alt. 4 – Covered Conductor (CC) Overhead with EPSS and DCD

Phase-to-phase outage ignition risk is mostly reduced, but overhead construction still leaves potential for ignition. Phase-on-ground and line-to-ground outage ignition reduction was less than average (40%). Splice/jumper failure ignition risk is mostly reduced, but overhead construction still leaves potential for ignition. Pole/crossarm failure ignition risk reduction is significant, but there is still a chance for contact failure.

Secondary/service conductor phase-to-phase outage ignition risk reduction is significant but there is still a chance for contact failure. Secondary/service conductor phase-to-

ground outage ignition risk reduction was less than average. Additional ignition risk mitigation is achieved via enhanced settings.

Alt. 5 – Bare Conductor Rebuild with EPSS and DCD

Replacing overhead conductor, including removing splices & replacing jumpers, reduced most of the risk of those conductor ignition types, however, there is still potential for ignition. There is no phase-to-phase and phase-to-ground outage ignition reduction. Additional ignition risk mitigation is achieved via enhanced settings.

Alt. 6 – Line Removal with Remote Grid

All primary overhead outages are mitigated, there are no overhead ignition events. Secondary/service conductor phase-to-phase outage ignition risk reduction is significant, however, there is still a chance for contact failure. Secondary/service conductor phase-to-ground ignition risk reduction is less than average. There are no additional ignition reductions achieved via enhanced settings.

Alt. 7 – EPSS including downed conductor detection (DCD)/Partial Voltage (with bare conductor)

Phase-to-phase outage ignition risk is mostly reduced, but overhead construction still leaves potential for ignition. Phase-on-ground and line-to-ground outage ignition reduction was less than average (40%). No effectiveness savings for secondary/service.

Alt. 8 – EPSS and PSPS (with bare conductor)

The analysis for alternative 8 varies from the prior 7 alternatives due to the inclusion of PSPS. This is because unplanned outages cannot occur simultaneously to pro-active PSPS de-energization. Instead, alternative 7 was used as the basis for step 1 of the analysis to establish the effectiveness of bare conductor with EPSS as 60.4%. Subsequently, the observed effectiveness of PSPS, 78%, was added as an incremental reduction to the residual risk post-alternative 7. The resulting calculation is shown below:
Effectiveness = 60.4% + 78% x (100%-60.4%) = 91.3%

Alt. 9 – Rapid Earth Fault Current Limiter (REFCL), CC Overhead, EPSS and DCD

REFCL only mitigates risk for phase to ground faults. REFCL Transient Outage (90%) – Transient type faults that the three second delay would prevent from impacting the system. Savings also applied to unknown cause outages with line-to-ground fault targets. Additionally, with instantaneous setting enabled REFCL Single Line to Ground 80% effective, REFCL Double Line to Ground faults 65% effective. Additionally, please see the response to Request No. 6 for additional details of high-level bank screening assumptions.

Covered Conductor Rebuild – New

The analysis for Covered Conductor Rebuild – New mirrors the baseline assumptions of Alternative 4 without considering EPSS/DCD.