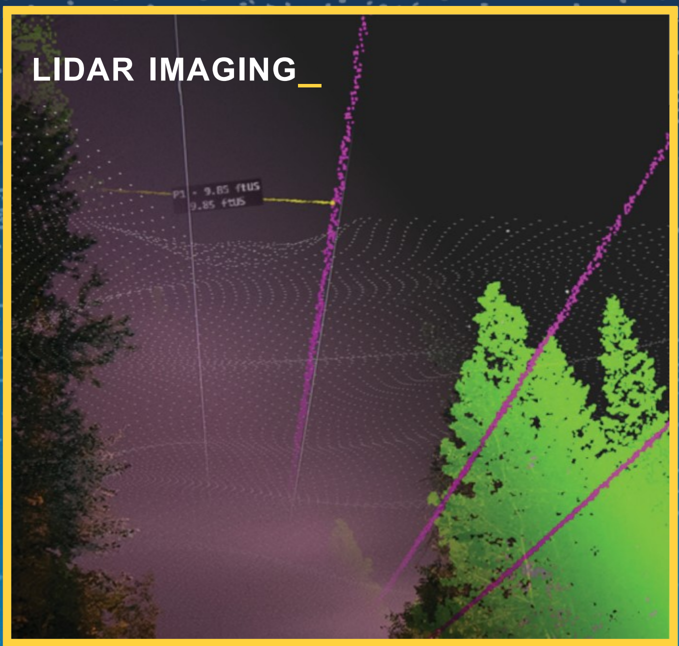
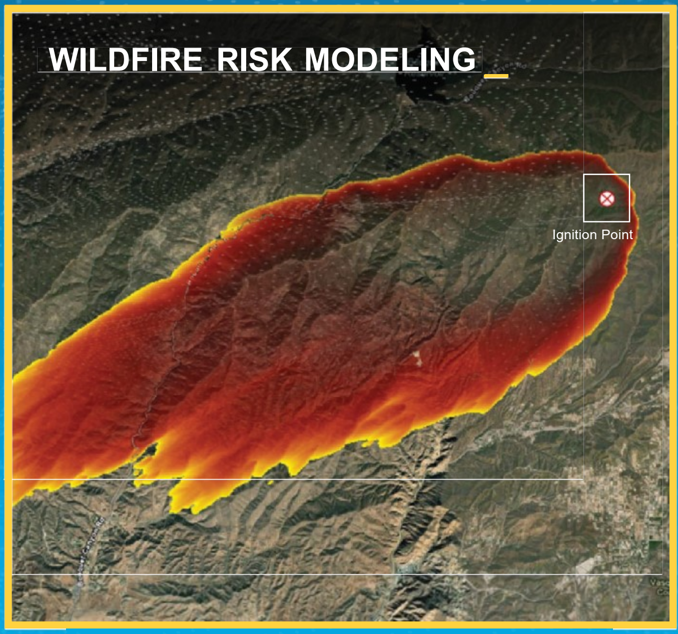
2025
WILDFIRE MITIGATION PLAN UPDATE





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SOUTHERN CALIFORNIA EDISON®

Docket: 2023 to 2025 Electrical Corporation Wildfire Mitigation Plans
Docket#: 2023-2025 WMPs

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1. Updates to Risk Models

The electrical corporation must report on updates to its risk models. The collective updates to risk models are categorized as either "significant" or "non-significant." The electrical corporation must categorize the collective changes to its risk models as either significant updates or non-significant updates, not both. The proceeding subsections outline the thresholds to determine if updates to risk models are "significant" or "non-significant."

When determining if updates to risk models are "significant" (Section 1.1.1) or "non-significant" (Section 1.1.2), the electrical corporation's analysis must be independent of risk reduction resulting from deployed mitigations described in the approved 2023-2025 Base WMP. For example, if a circuit was undergrounded in late 2023, the analysis would not take that risk reduction into account and would evaluate the risk for that circuit consistent with the point in time represented by WMP Table 6-5 in the approved 2023-2025 Base WMP.

An electrical corporation must analyze its top 5 percent of highest risk circuits, segments, or spans to determine whether updates to its risk models are significant. An electrical corporation's top ignition risk circuits, segments, or spans are the top 5 percent of highest ignition risk circuits, segments, or spans when the circuits, segments or spans are ranked individually from highest to lowest circuit-mile-weighted ignition risk. An electrical corporation's top Public Safety Power Shutoff (PSPS) risk circuits, segments or spans are the top 5 percent of highest PSPS risk circuits, segments, or spans when the circuits, segments or spans are ranked individually from highest to lowest circuit-mile-weighted PSPS risk.

In this chapter, SCE describes the updates to its ignition risk model that have resulted in significant changes to the population of the top 5% of all circuits when they are ranked from highest to lowest by circuit-mile-weighted ignition risk score. These changes include updates to SCE's wildfire consequence model and Probability of Ignition (POI) model.

Generally speaking, the updates are of an incremental nature and reflect improvements in areas such as fuel layers, geographic resolution, and data accuracy. Below, SCE explains its reasoning behind these updates, how risk has shifted, and resulting changes in mitigation planning.

SCE has not updated how it calculates PSPS risk, and as such, does not discuss PSPS risk in this chapter.

1.1 Significant Updates

If an electrical corporation's updates to its risk models are significant, it must:

- *Discuss its updated methodology and models (e.g., using a new machine learning algorithm, changing how wildfire consequences are calculated, or changes to assumptions);*
- *Provide justification for the updates;*
- *Show how risk has shifted as a result of the updates; and*
- *Report any resulting changes to prioritization of mitigation initiatives and scheduling and workplans for the implementation of mitigation initiatives resulting from these updates.*

The electrical corporation must use the format established by Tables 1-1 and 1-2 of these 2025 WMP Update Guidelines to summarize the updated top 5 percent of highest-risk circuits, segments, or spans. If one or both tables are more than 20 lines, then an electrical corporation may submit a spreadsheet as an attachment to the 2025 WMP Update rather than a table to provide the information. Discussions of significant updates to risk models must be limited to 20 pages total. Figures and tables are excluded from the 20-page limit.

SCE has made updates to its wildfire risk models[1] that fall within Energy Safety's definition of "significant," and discusses these updates in Section 1.3. As Tables 1-1 and 1-2 exceed 20 lines, SCE provides the high-risk circuit information as an supporting document to this 2025 WMP Update, available at www.sce.com/safety/wild-fire-mitigation.

1.1.1 Top Risk-Contributing Circuit, Segments, or Spans

Significant updates to risk models are defined as:

- *Any change or combination of changes to a risk model that moves 10 percent or more of ignition risk into or out of the top ignition risk circuits, segments, or spans, and/or*
- *Any change or combination of changes to a risk model that moves 10 percent or more of PSPS risk into or out of the top PSPS risk circuits, segments, or spans.*

The electrical corporation must use the format established by Tables 1-1 and 1-2 of these 2025 WMP Update Guidelines to summarize the updated top 5 percent of highest risk circuits, segments, or spans. If one or both tables are more than 20 lines, then an electrical corporation may submit a spreadsheet as an attachment to the 2025 WMP Update rather than a table to provide the information. Discussions of significant updates to risk models must be limited to 20 pages. Figures and tables are excluded from the 20-page limit.

[1] SCE considers Ignition Risk as synonymous with Wildfire Risk, consistent with how both terms are used in the 2023-2025 WMP.

Example 1

Assume there are 300 circuits in an electric corporation's high-fire risk area, which means that 15 circuits are in the top 5 percent when all circuits are ranked from highest to lowest by circuit-mile-weighted ignition risk score. If a circuit or combination of circuits that have a total of 10 percent or more of the ignition risk scores in the top 5 percent of circuits fall out of or move into the top 5 percent of circuits, compared to the point in time represented by WMP Table 6-5, the update is considered a significant *update under this requirement. Movement of a circuit or combination of circuits that have a total of 10 percent or more of the total ignition risk scores within that top 5 percent list (e.g., moving from a lower position to a higher position) is not relevant toward the 10 percent threshold.*

Then the electrical corporation would conduct a similar analysis as the example above ranking circuits from highest to lowest by circuit-mile-weighted PSPS risk score to determine if updates to its risk model are significant under this requirement.

Example 2

Consider Table 1-1, below. If the Modoc circuit, with 12 percent of the total ignition risk score in top 5 percent of circuits, were to move out of the top 5 percent, this would be "significant." Similarly, if the Alpine and Kings circuits (circuits not previously in the top 5 percent) moved into the updated top 5 percent of circuits with a combined 10 percent of the total ignition risk scores, this would be "significant." The same considerations could be applied to Table 1-2.

Table 1-1. Example of Top 5% Ignition Risk Circuits/Segments/Spans

Risk Rank	Circuit Name	Circuit-Mile-Weighted Ignition Risk Score	% of Total Ignition Risk in Top 5%
1	Modoc	118	12%
2	Trinity	85	9%
3	Sierra	86	9%
4	Inyo	87	9%
5	Lassen	80	8%
6	Mariposa	75	8%
7	Tehama	67	7%
8	Siskiyou	58	6%
9	Glenn	55	6%
10	Calaveras	49	5%
11	Plumas	46	5%
12	Colusa	46	5%
13	Imperial	42	4%
14	Riverside	41	4%
15	Kern	40	4%
	Total	**975**	**100%**

Table 1-2. Example of Top 5% PSPS Risk Circuits/Segments/Spans

Risk Rank	Circuit Name	Circuit-Mile-Weighted PSPS Risk Score	% of Total PSPS Risk in Top 5%
1	Lassen	4	16%
2	Trinity	3	12%
3	Sierra	2	8%
4	Glenn	2	8%
5	Plumas	2	8%
6	Imperial	2	8%
7	Kern	2	8%
8	Inyo	1	4%
9	Mariposa	1	4%
10	Siskiyou	1	4%
11	Calaveras	1	4%
12	Colusa	1	4%
13	Riverside	1	4%
14	Modoc	1	4%
15	Tehama	1	4%
	Total	**25**	**100%**

1.1.2 Qualitative Updates

Updates to risk models are also considered significant if any of the following qualitative updates are made:

- *Introduction of a new model.*
- *Discontinuation of an existing model.*
- *Any change in existing model application or use-case. For example, newly applying an existing vegetation risk model to PSPS decision-making.*
- *Introduction of new data types. For example, incorporating additional risk drivers into newer versions of a model.*
- *Changes to data sources. For example, using a new source of data to measure vegetation moisture content.*
- *Changes to third-party vendors for risk modeling or inputs to risk modeling.*

Examples of qualitative updates that are not considered significant updates to risk models include, but are not limited to, the following:

- *Updating an existing dataset (e.g., augmenting ignition and outage datasets with 2023 data).*
- *Fixing code errors.*
- *Cleaning input data.*

SCE has not implemented qualitative changes that would meet the criteria specified above. Please see Section 1.3 for SCE's explanation of the significant changes in its wildfire risk model, which are of a quantitative nature.

1.2 Non-Significant Updates

If an electrical corporation's updates to its risk models do not meet the "significant" criteria of Section 1.1.1, the electrical corporation must provide a tabulated summary of changes in risk ranking of the top 5 percent ignition risk and PSPS risk circuits, segments, or spans.

The electrical corporation must use the format established by Tables 1-1 and 1-2 of these 2025 WMP Update Guidelines to summarize the updated top 5 percent of highest risk circuits, segments, or spans. If one or both tables are more than 20 lines, then an electrical corporation may submit a spreadsheet as an attachment to the 2025 WMP Update rather than a table to provide the information.

Energy Safety defines a non-significant update as:

- *Any change or combination of changes to the risk model that moves less than 10 percent of ignition risk into or out of the top ignition risk circuits, segments, or spans and less than 10 percent PSPS risk into or out of the top PSPS risk circuits, segments, or spans; or*
- *Any change that only moves ignition and PSPS risk within the top risk segments.*

SCE's changes to its risk models meet the criteria for significant changes, and as such SCE does not have non-significant changes to report.

1.3 Significant Updates to SCE's Wildfire Risk Models

Based on the criteria in Section 1.1.1, SCE's updates to its wildfire risk model have resulted in significant changes, which SCE describes below.

SCE does not have significant changes to report regarding its calculation of PSPS risk.

1.3.1 Discuss its updated methodology and models (e.g., using a new machine learning algorithm, changing how wildfire consequences are calculated, or changes to assumptions)

SCE updated both its wildfire consequence model and its Probability of Ignition (POI) model.

SCE's updates to its wildfire consequence model include updates to surface fuels, ignition point spacing, changes in asset geometry, and improvements in urban encroachment.

SCE's updates to its POI model include updates to existing data sets, such as the use of more granular information (e.g., daily loading from hourly meter data intervals) and refreshed corrosion and flood zone information. Updates to the POI model can increase or decrease the relative POI of various assets, which impacts the risk scores. The following summarizes updates made to the POI model:

- Incorporated latest outage and asset failure data
- Refresh of asset data replacements as well as new locations.
- Loading data from customer meters has been incorporated into the transformer sub model, which identifies locations where transformers may be loaded beyond normal use.
- Refreshed corrosion and flood zones due to above average rain in 2023 that impacted the zones according to the Federal Emergency Management Agency (FEMA).
- Refreshed tree and avian data.

SCE provides additional detail on both updates (i.e. to the wildfire consequence model and to the POI model) below, following the required prompts established in Section 1.1 of the WMP guidelines.

1.3.2 Provide justification for the updates

Updates to Wildfire Consequence Model

Surface Fuel Updates (Wildfire Consequence Model)

SCE improved several aspects of its surface fuel model to better reflect how wildfire could propagate across the diverse ecological regions in its service territory. These changes better reflect potential wildfire rate of spread and intensity in discrete locations.

Changes to the current version of SCE's wildfire consequence model include modifications to surface fuels in the following regions (see Figure SCE 1-01).

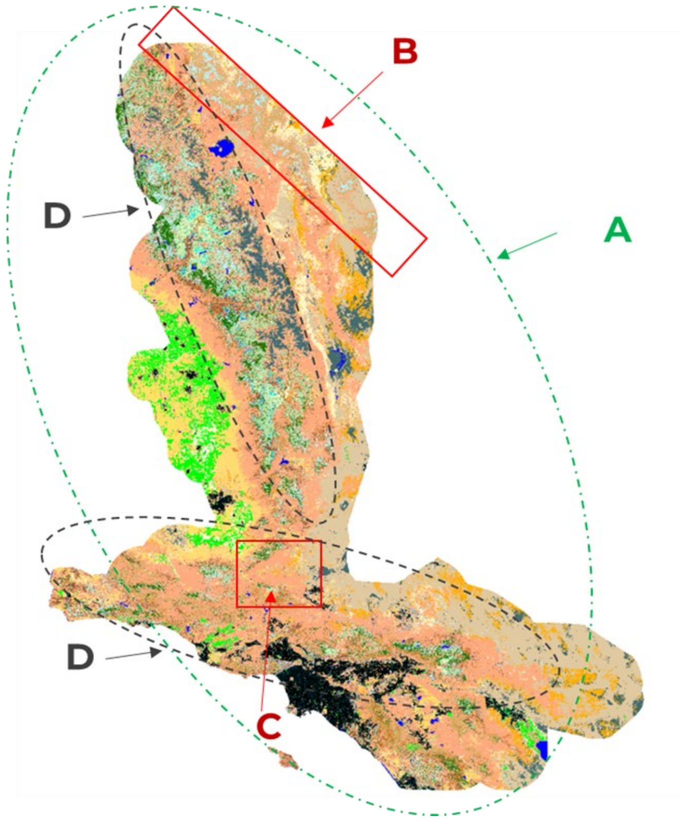
A. Areas within and adjacent to High Fire Risk Areas (HFRA): Updated based on historical fire analysis.

B. California/Nevada border: Adjusted fuel models to remove the sharp transition in fuel types along the states' boundary lines.

C. High Desert: Adjusted fuels in the Antelope Valley area.

D. High Sierras: Replaced Scott and Burgan (2005) timber fuel model with new model calibrated with information from California Fire Guard data.

Figure SCE 1-01: Map indicating modifications to existing surface fuel models in SCE's service territory.



Explanation of modifications (denoted by areas A, B, C, and D in Figure SCE 1-01 above) to existing surface fuel models:

> A: Areas within and adjacent to HFRA - Fuel models within the footprint of major wildfire scars were recreated to represent pre-wildfire fuels through a methodology known as Secondary Succession.[2]
>
> B: California/Nevada border - Fuel models in these locations were slightly adjusted to better represent the fuel types–primarily low and moderate, dry climate grass and shrub fuels–along the political boundary between states to remove the sharp transition in fuel types from one state to another.
>
> C: High Desert (Antelope Valley area) - Fuel models in these locations were adjusted to better reflect the transition from moderate load, dry climate, grass fuel types to low load, dry climate, grass fuel types to better represent the fire ecology in this region.

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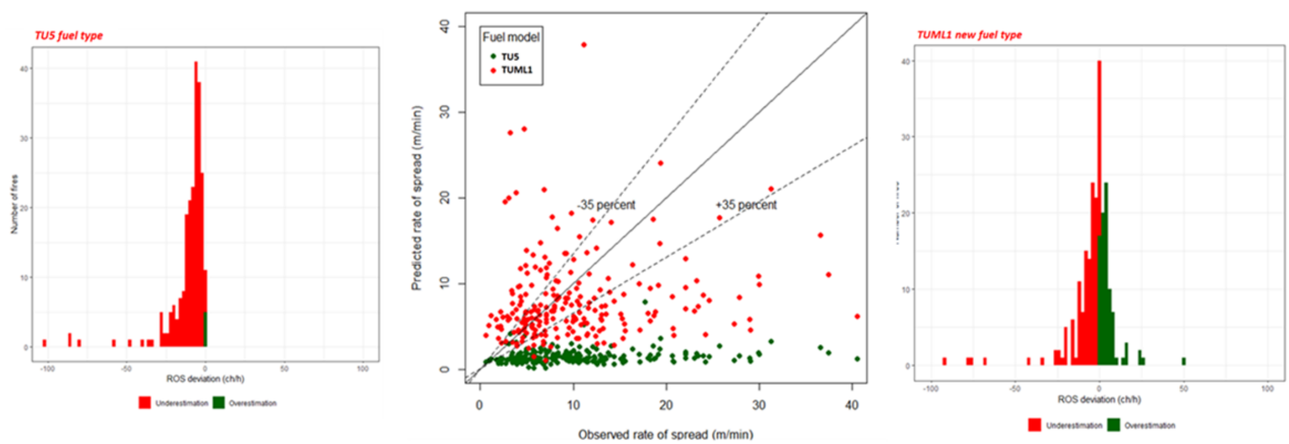
[2] Succession describes the patterns of change in ecosystems when a new environment is formed or after an existing environment is disturbed through environmental processes, such as wildfire. Secondary Succession occurs when an area previously occupied by a dominant species is re-colonized following a disturbance. An example of secondary succession is that forests cleared by wildfire will quickly be repopulated with grasses, then a few years later with shrubs, and finally by juvenile native species will emerge seeded from surrounding untouched forests. These juvenile species then grow into mature forests. See Chryssanthi A., E. Voultsiadou, and C. Chariton-Charles (2019); Encyclopedia of Ecology (Second Edition), Secondary Succession. Elsevier. Pp. 369-378, ISBN 9780444641304, https://doi.org/10.1016/B978-0-12-409548-9.10594-9.

D: High Sierras - Two entirely new fuel models were developed—171: TUML1 (171) Timber Understory Dynamic ML (TSYL 2022) and 191: TLML1 (191) Timber Litter ML (TSYL 2022)—to replace the existing Scott and Burgan (2005) timber fuel models for those categories. See Figure SCE 1-02 below for a comparison of the new fuel models with the Scott and Burgan timber fuel models. These fuel models were developed through daily validation of fuels with fire behavior data from CalFire and California National Guard FireGuard data. Based on these validation efforts, the performance of the original Scott & Burgan timber fuel models did not match the observed and expected fire behavior in that these models consistently underestimate the Rates of Spread (ROS) in timber areas. The new fuel models correct for this underprediction.

Figure SCE 1-02: Comparison of Timber Understory fuel model performance – Scott and Burgan (TU5, left) and Technosylva (TUML1, right) – Predicted (red) vs Observed (green)

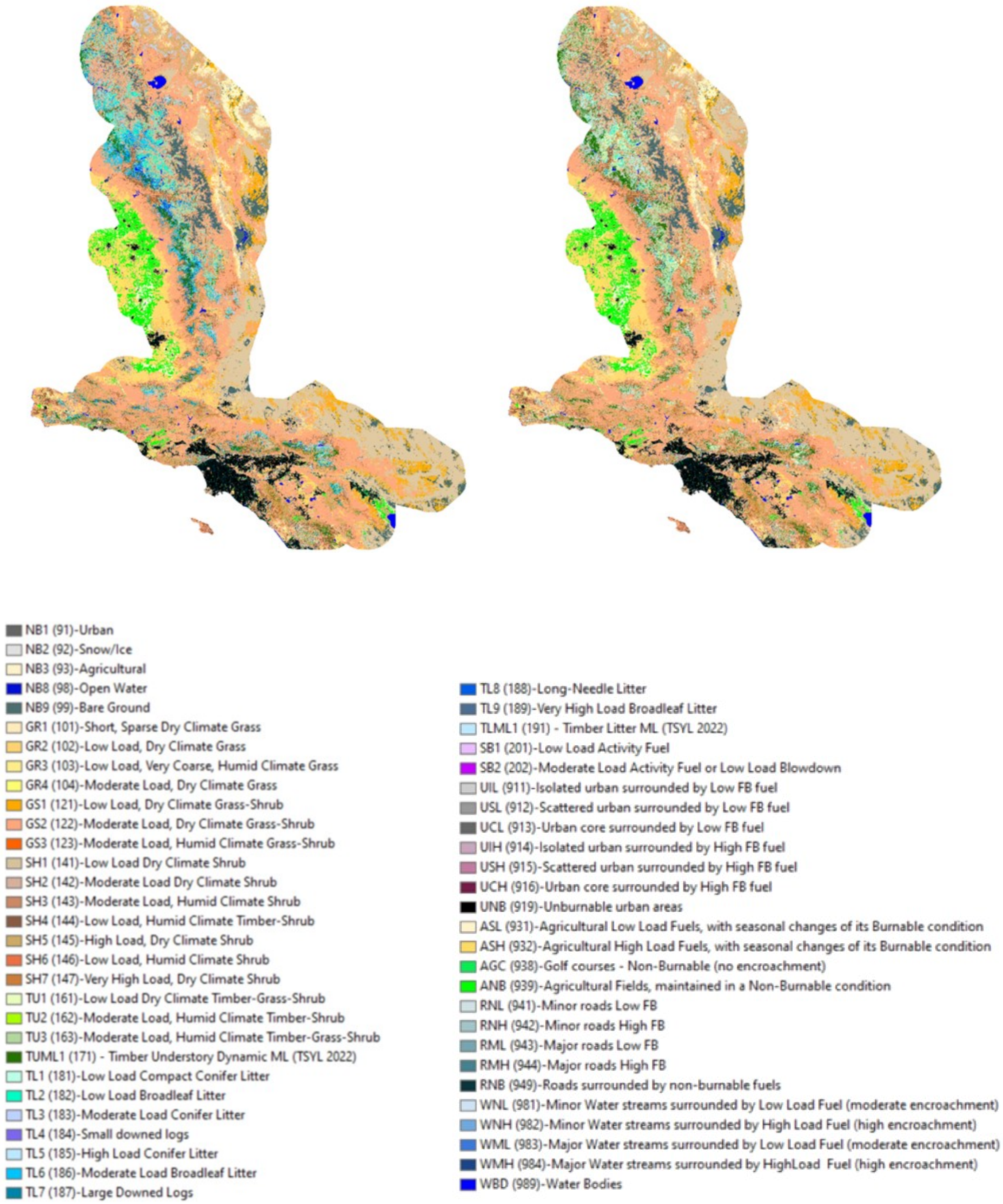


Note the consistent underprediction in the original Scott and Burgan model (red bars, see reference for additional detail).[3]

Figure SCE 1-03 below provides an overview of the fuel model updates in SCE's service area.

[3] *See* Cardil Adrián, Monedero Santiago, SeLegue Phillip, Navarrete Miguel Ángel, de-Miguel Sergio, Purdy Scott, Marshall Geoff, Chavez Tim, Allison Kristen, Quilez Raúl, Ortega Macarena, Silva Carlos A., Ramirez Joaquin (2023) Performance of operational fire spread models in California. International Journal of Wildland Fire 32, 1492-1502.

Figure SCE 1-03: Summary of Fuel Model updates in SCE's Service Territory – Previous version (left), New version (right). See legend for fuel models.



Modifications to Ignition Point Spacing (Wildfire Consequence Model)

Ignition point spacing was revised to better represent local fuel conditions to improve the fidelity and accuracy of simulations in proximity to overhead utility assets.

In previous versions of SCE's wildfire consequence model, ignition points were spaced within a 200-meter (m) grid[4] around assets to mitigate or reduce misaligned asset geolocation data (see Figure SCE 1-04). Additionally, ignition points were not created for assets that were in locations with fuel types that were not conducive to wildfire ignition or spread (e.g., urban, bare ground, water, etc.).

In the updated model, ignition points are spaced within a 100m grid along overhead distribution assets (see Figure SCE 1-05). Supplemental ignition points were added to represent asset locations, in addition to existing simulations for overhead distribution lines. Ignition points that were more than 100m away from ignitable fuel were removed.

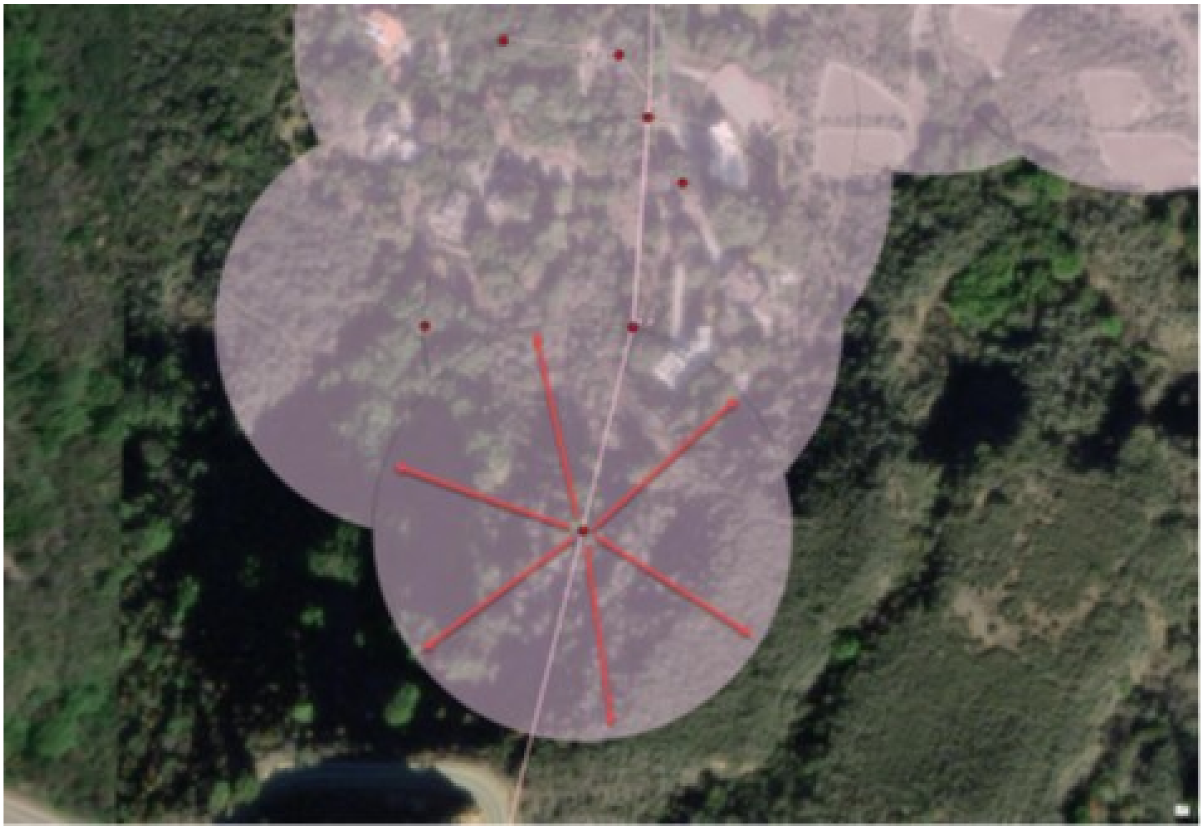
[4] SCE uses a similar "buffer" in conjunction with adopted High Fire Threat District (HFTD).

Figure SCE 1-04: Overhead Distribution Assets (white) and ignition points (blue) – Previous Wildfire Consequence Model

Figure SCE 1-05: Overhead Distribution Assets (white) and new ignition point locations (red) – Updated Wildfire Consequence Model

Additionally, the wildfire simulation methodology was modified to incorporate wind speed and direction to adjust ignition point in relation to asset locations, as described in Figure SCE 1-06.

Figure SCE 1-06: 100m buffer (pink, shaded) from each asset indicating how far the starting point for the ignition event should shift due to wind speed and direction in a simulation.



Modifications to Asset Geometry (Wildfire Consequence Model)

Asset geometry was revised to better represent asset locations to improve the fidelity and accuracy of simulations in proximity to surface fuels.

The previous version of the wildfire consequence model used geospatial asset data from March 2021 for overhead distribution and transmission lines, FLOCs, poles (distribution) and towers (transmission). SCE has taken steps to refine the geospatial locations for overhead assets with increasing accuracy through various data collection methods (see Figure SCE 1-07, below). The latest version of the wildfire consequence model uses geospatial asset data from June 2022 (lines) and July 2022 (FLOCs).

Figure SCE 1-07: Distribution lines from March 2021 (blue) and June 2022 (white)

<u>Updates to POI Model</u>

To help calculate baseline wildfire risk, SCE estimates the POI for each individual ignition driver for distribution and transmission assets. These ignition drivers include Equipment/Facility Failure (EFF), Contact From Object (CFO), and sub-drivers such as EFF: Conductor Failure or CFO: Vegetation.

As noted in SCE's 2023-2025 WMP, SCE considers Ignition Likelihood to be synonymous with POI.[5] The pre-mitigated POI for every asset is a probabilistic assessment of ignition likelihood prior to mitigation deployment. The conditional POI associated with EFF and CFO probabilities are based on the sum of individual component probabilities of individual subcomponent models (e.g., EFF-conductor, CFO- vegetation, etc.). These subcomponent models utilize machine learning (ML) algorithms to assess the relevance of ignition drivers relevant to that subcomponent type. For instance, each EFF related subcomponent model uses historical asset outage data, current asset condition (e.g., age, voltage, inspection results, etc.), and relevant environmental attributes (e.g., historical wind, asset loading, number of customers, temperature, relative humidity, etc.).

SCE tests and updates these sub models using new observed failures and new inspection, remediation, or replacement information. SCE's most recent refresh/updates to its POI model

[5] SCE's 2023-2025 Wildfire Mitigation Plan (October 26, 2023), p. 117.

are explained below. The 2023 POI model was refreshed in mid-2023 and incorporated mitigations deployed as of mid-2023. Although this model incorporates six months of 2023 mitigation data, the overall impact to the model results from POI updates are relatively small compared to the impact of wildfire consequence model updates in 2023.

Asset Sub Model Information (POI Model)

Asset sub models for POI (OH Conductor, OH Transformer, OH Switch, and OH Capacitor) were refreshed in mid-2023 with updated asset inventories, historical failure, inspection and remediation data, mitigations deployed as of mid-2023, along with updates to other input data (e.g., weather information). These models are typically refreshed annually to account for changes to the grid infrastructure (e.g., installed mitigations, circuit reconfigurations, etc.) and to update the models with the newest data since the previous refresh. This ensures that at the time of refresh, the models reflect the most current state of the grid.

Asset Data Refresh (POI Model)

Asset data updates include new and replacement components, outage information and new circuit configurations. This information allows for a more accurate POI based on more recent data on the assets.

Incorporation of Meter Loading Data into the Transformer Sub Model (POI Model)

Meter hourly meter usage data is used to update loading related features in the Transformer sub model. Average loading and peak loading are calculated directly from the last five years of data. To generate the percentage of time overloading, daily maximum loading data is aggregated and peak loading at the structure is first calculated, then compared with name plate of the transformers at the structure level. If peak loading exceeds transformer kVA, it is counted as overloading for that day. By looking at the past five years of daily data, SCE can calculate the number of days the transformers experienced overloading and the percentage of time overloading.

Refreshed Corrosion and Flood Zones (POI Model)

Corrosion and flood zone data were refreshed as a result of FEMA updating their flood zone and corrosion data. These updates were made, in part, due to the high amount of rainfall in California in 2023.

Refreshed Tree and Avian Data (POI Model)

Tree and avian data are refreshed on a yearly basis and used in the Conductor CFO sub model. Each year, new trees near conductor are monitored, trimmed, and removed. The spatial proximity of each tree to segments is found using ArcGIS, and each tree within 50 feet of a segment is assigned to that segment. A tree may be assigned to more than one segment. A summary statistic is created for each tree feature to account for multiple trees being assigned to a single segment.

Avian data is collected based on field observations of outages. As such, avian data is always associated with an outage, and is always proximal to SCE equipment. This data is aggregated into a spatial density model, then the location of each segment is extracted from the kernel. This assigns a relative density of avian incidents to each segment.

1.3.3 Show how risk has shifted as a result of the updates

Summary of Circuit Changes from Risk Model Updates

Table SCE 1-01 shows the number of circuits that dropped from or moved into the top 5% due to the changes discussed previously in this Chapter.

Table SCE 1-01: Summary of Changes in Circuits due to POI and/or Consequence Risk Model Updates

Circuit Movement Drivers	Type of Movement	Count of Circuits
Consequence Rank Decrease	Dropped from top 5%	3
Consequence and POI Rank Decrease	Dropped from top 5%	12
POI Rank Decrease	Dropped from top 5%	8
Miscellaneous/Other Rank Decrease	Dropped from top 5%	6
Total Circuits that Dropped from Top 5%		**29**
Consequence Rank Increase	Moved into top 5%	13
Consequence and POI Rank Increase	Moved into top 5%	1
POI Rank Increase	Moved into top 5%	12
Miscellaneous/Other Rank Increase	Moved into top 5%	3
Total Circuits that Moved into Top 5%		**29**
No Changes	**Stayed in top 5%**	**19**

Below, SCE provides an explanation of the different types of circuit movement drivers.

1. **POI Rank Changes**: POI Rank includes POI Equipment Failure drivers and Circuit Structure Changes. Additionally, the 2023 POI model was refreshed in mid-2023 to reflect mitigations and incorporates six months of 2023 covered conductor and targeted undergrounding deployment, which may have resulted in some circuits dropping from the top 5% of risk.

    a. **POI Equipment Failure Drivers**: The POI of these drivers are susceptible to modifications in circuit structure and mitigation deployment. As new assets are incorporated and old ones deactivated, equipment and structural features undergo updates. This is especially prevalent in the HFRA zone, which has seen substantial mitigation effort.

b. **Circuit Structure Changes**: Circuits are dynamic systems subject to schematic and structural alterations. Changes in the assets within a circuit, as well as changes to the assets included in the circuit, can lead to different risk aggregations, where high risk structures can move from one circuit to another.

2. **Miscellaneous/Other Rank Changes**: These changes represent shifts in circuit rank due to minor variations that can move a circuit from the top 5% to the top 10%, or vice versa. Since the list is a forced ranking, even minor movements to one circuit will, by definition, cause changes to the sequence and population of remaining circuits on the list. Despite no inherent changes in the circuit in terms of POI or consequence rank, individual circuits may experience a slight rank adjustment.

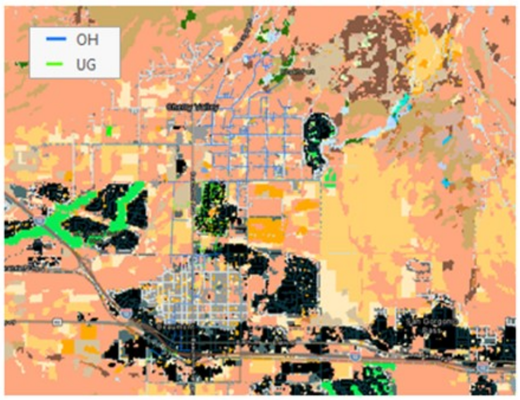
3. **Consequence Rank Changes**: These alterations are based on updates to the wildfire consequence model, as detailed above in Section 1.3.2.

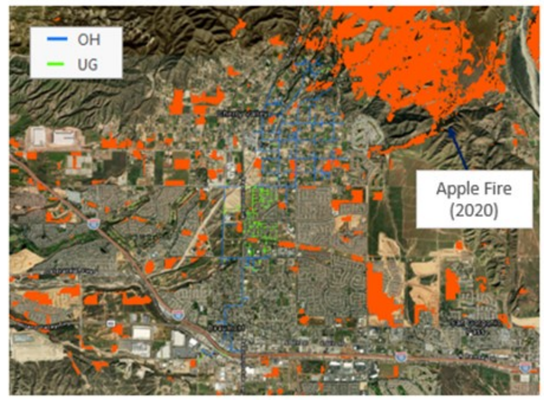
Examples of Circuit Changes Due to Wildfire Consequence Model Updates

SCE provides below illustrative examples of how its wildfire consequence model updates described in Section 1.3.1 have affected specific top risk circuits in its HFRA:

- Ida Circuit (see Figure SCE 1-08): This circuit dropped from the top 5% of circuit risk primarily due to wildfire consequence fuel model updates. Consequences adjusted in this location primarily due to a fuel model update to account for fuel regrowth following the Apple Fire (2020) (see SCE 1-03 for Fuel Legend).

Figure SCE 1-08: Ida Circuit (Cherry Valley, CA 116°58'33"W 33°58'34"N) with updated fuels to account for fuel regrowth following the Apple Fire (2020)





Ida Circuit (Cherry Valley, CA 116°58'33"W 33°58'34"N)

<u>*Top Left*</u>: Secondary Succession (i.e., fuel regrowth) algorithm applied in Apple Fire burn scar footprint New Shrub fuel (medium tan, dark brown) replaced previously forested area in upper right of picture.

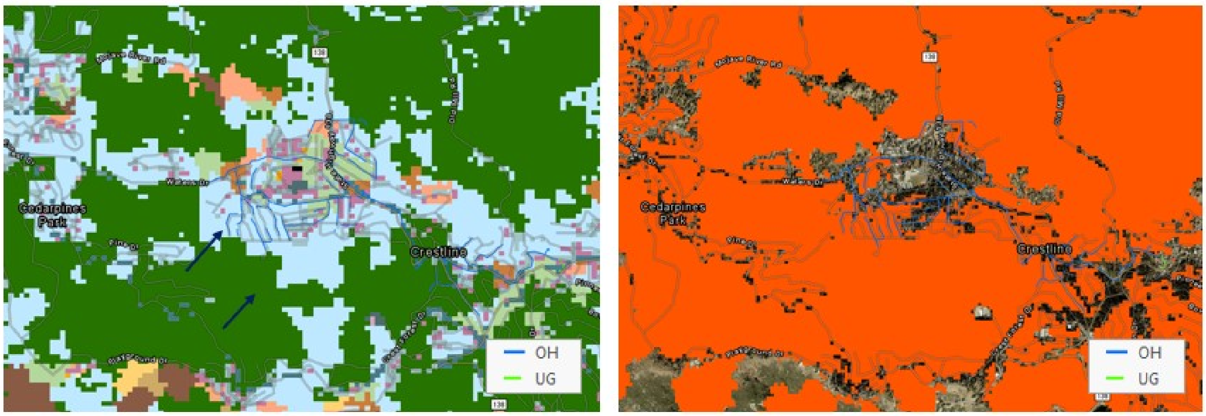
<u>*Top Right*</u>: Summary of fuel model changes (orange) from previous fuel layer.

<u>*Bottom Right*</u>: Satellite and street view basemap for reference.

1:20,000 scale

- Seely Circuit (see Figure SCE 1-09): This circuit moved into the into the top 5% of circuit risk primarily due to wildfire consequence fuel model updates. Consequences adjusted in this location primarily due to a combination of new Timber Understory (TUML1, medium green) and Timber Litter (TLML1,light blue) fuel layers along adjacent overhead electrical lines (medium blue) (see SCE 1-03 for Fuel Legend).

_Figure SCE 1-_09: Seeley Circuit (Crestline, CA 117°18'5"W 34°14'56"N)) with new Timber Understory and Timber Litter Fuel Layers



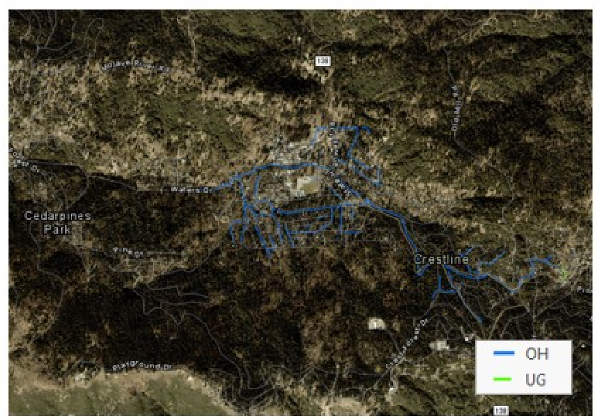
Seeley Circuit (Crestline, CA 117°18'5"W 34°14'56"N)

Top Left: Timber Understory (TUML1, medium green) and Timber Litter (TLML1,light blue) fuel layers along adjacent overhead electrical lines (medium blue).

Top Right: Summary of fuel model changes (orange) from previous fuel layer.

Bottom Right: Satellite and street view basemap for reference.

1:20,000 scale

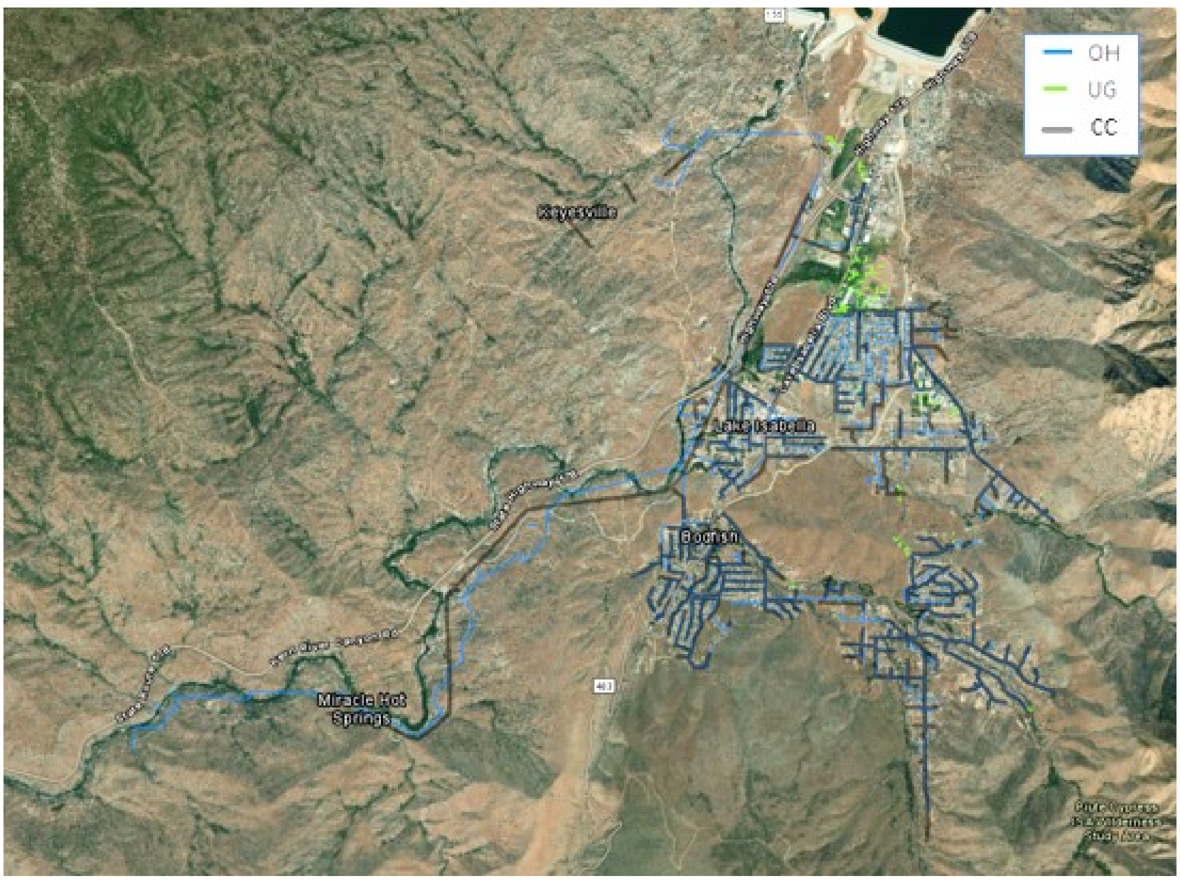


Examples of POI Changes

Below are examples of circuits that changed rank due to POI changes:

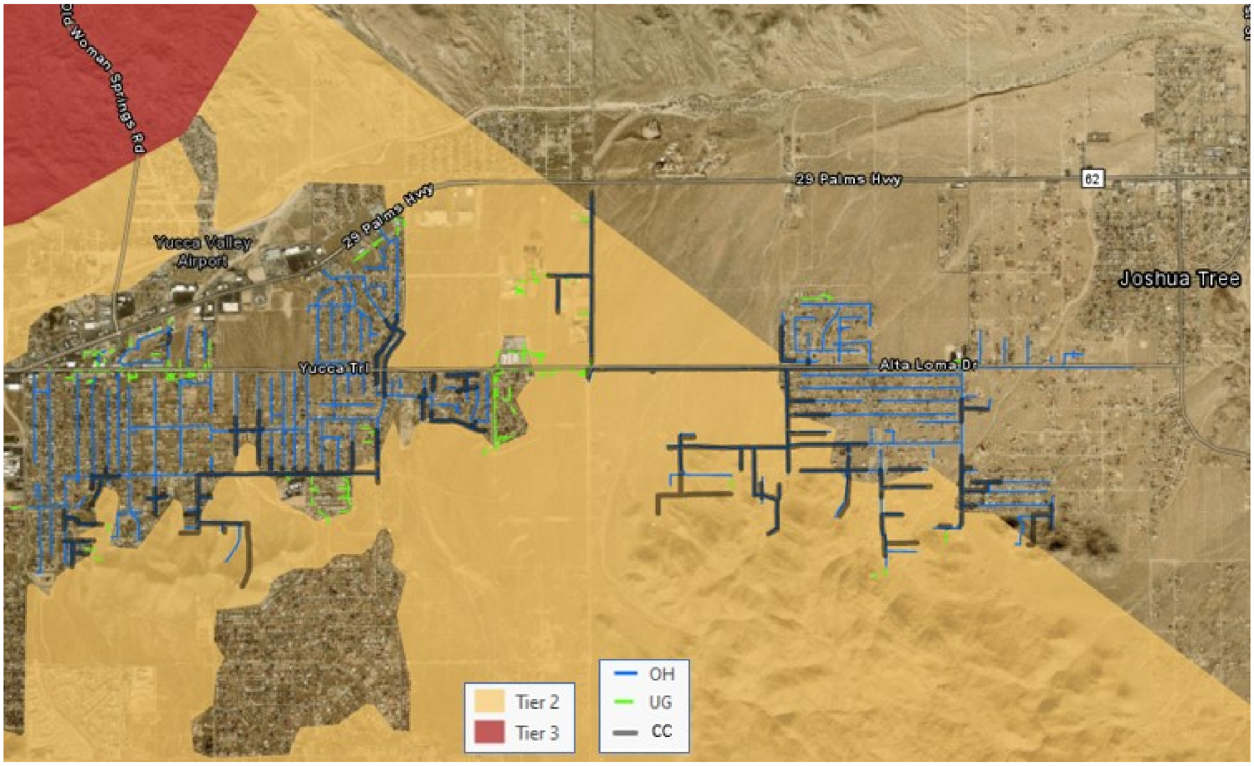
- Erskine Circuit (see Figure SCE 1-10). This circuit was in the top 5% of risk but dropped down primarily due to changes in POI. Although this is a large circuit that had mitigation work done on it to reduce risk, the mitigations were not part of this calculation. Rather, the POI update reflects refreshed data, including newer equipment in different configurations, that impacts POI and drops the equipment failure prediction rate to a lower value. As depicted in Figure SCE 1-12, below, parts of the Erskine Circuit are now covered by covered conductor (grey) or undergrounded (green). This in turn changes the configuration of the Erskine Circuit, making some circuit segments shorter and introducing new equipment (e.g., switches, capacitors, or conductors). All of these circuit configuration changes are accounted for in the updated risk modeling output.

Figure SCE 1-10: Erskine Circuit with Updated Circuit Configurations



- Burnt Mountain Circuit (see Figure SCE 1-11): This circuit was in the top 5% of risk but dropped down primarily due to changes in POI. A small part of total circuit is in HFRA (overlap with yellow). Mitigations deployed on the circuit in late 2022 and early 2023 changed the layout and updated asset information, which in turn impacted the POI of the circuit and changed circuit risk ranking in the process.

Figure SCE 1-11: Burnt Mountain Circuit and Overlap with HFRA



1.3.4 Report any resulting changes to prioritization of mitigation initiatives and scheduling and workplans for the implementation of mitigation initiatives resulting from these updates.

The timing and method of integrating new risk model information, and how it overlaps with older risk model information, depends on the type of mitigation work done. Below, SCE describes how various wildfire mitigation areas ingest new risk information.

Asset Inspections

When refreshed outputs of POI and wildfire consequence risk models are received, SCE incorporates these updates into the inspection strategy accordingly. As described on Page 291 of SCE's 2023-2025 WMP, when POI and wildfire consequence models are updated, structures for asset inspections are then prioritized while accounting for the resource requirements of potential emergent inspections throughout each year. SCE began using the latest output of the risk model described in this 2025 WMP Update in its 2024 asset inspection cycle.

Vegetation Management

SCE used the POI and consequence risk model outputs described in this 2025 WMP Update to reprioritize some of its vegetation management scope in 2024. SCE will incorporate its refreshed POI and consequence modeling outputs at the start of the vegetation management planning cycle for vegetation management programs such as Hazard Tree Mitigation Plan (HTMP) and work prescription prioritization. SCE's next planning cycle will begin in 2025-2026.

System Hardening

With hardening mitigations such as covered conductor and targeted undergrounding, there is typically a lag in applying new risk model information due to the time it takes to scope, design, release and construct the mitigations. When new risk model updates are released, the risk output is integrated into the scoping schedule, typically by informing the release of future scope. New scope is created based on the latest risk model output and added to existing scope for construction.

There are some exceptions in which the latest risk model output may supersede the risk model output used for existing scope. For example, during the Review and Revise phases of the IWMS, the subject matter expert review team will compare each circuit segment scoped according to the new and old risk model outputs to determine the final list of scoped miles.

For the risk modeling updates described above, SCE intends to begin using the risk modeling output in covered conductor scope released in Q1 2024, which are slated for construction in 2025, and targeted undergrounding scope released in Q1 2024, which are slated for construction in 2027. For further context on interim mitigation strategies—given the lead times for grid hardening activities can be several years—please see Section 2.1.

1.3.5 Updated Top Risk Circuits

The electrical corporation must use the format established by Tables 1-1 and 1-2 of these 2025 WMP Update Guidelines to summarize the updated top 5 percent of highest-risk circuits, segments, or spans. If one or both tables are more than 20 lines, then an electrical corporation may submit a spreadsheet as an attachment to the 2025 WMP Update rather than a table to provide the information. Discussions of significant updates to risk models must be limited to 20 pages total. Figures and tables are excluded from the 20-page limit.

Please see below for the first 10 rows of each table. The full versions are available in at available at www.sce.com/safety/wild-fire-mitigation.

Table 1-1: Top 5% Ignition Risk Circuits/Segments/Spans

Risk Rank	Circuit Name	Circuit-Mile-Weighted Ignition Risk Score	% of Total Ignition Risk in Top 5%
1	CRAWFORD	0.1941	4%
2	LOUCKS	0.1773	4%
3	ENERGY	0.1484	3%
4	PHEASANT	0.1441	3%
5	CERRITO	0.1350	3%
6	PELONA	0.1268	3%
7	AMETHYST	0.1264	3%
8	RANGER	0.1217	3%
9	LIMITED	0.1087	2%
10	CHAMPION	0.1083	2%
please see SCE's WMP supporting documents for entire table			

Table 1-2: Top 5% PSPS Risk Circuits/Segments/Spans

Risk Rank	Circuit Name	Circuit-Mile-Weighted PSPS Risk Score	% of Total PSPS Risk in Top 5%
1	HUBBLE	0.0115	15.2%
2	KONA	0.0056	7.3%
3	SLALOM	0.0051	6.8%
4	ROI-TAN	0.0042	5.6%
5	BOBSLED	0.0031	4.1%
6	TRI CITY	0.0027	3.6%
7	SILVA	0.0026	3.4%
8	SLOPE	0.0025	3.3%
9	VARGAS	0.0023	3.1%
10	SAUTERNE	0.0022	2.9%
please see SCE's WMP supporting documents for entire table			

1.4 Redlines to Base WMP Due to Reportable Changes

Please see the table below for redlines in the 2023-2025 WMP due to the reportable changes discussed in this section.

Section	Table or Figure (if applicable)	Page Number(s)	Description of Redline
6.2.1.1	N/A	101	Edits to narrative text to reflect fuel model changes.
6.2.3	Table 6-2	145	Edits to Vegetation Fuels row to reflect fuel model changes.
6.4.1.2	N/A	160	Edits to narrative text to reflect fuel model changes.
6.4.2	Table 6-5	163-164	Edits to table for alignment with outputs due to risk model changes.
7.1.2	Figure 7-1	221	Edits to figure for alignment with outputs due to risk model changes.
7.2.2.3	Table 7-4	222-227	Edits to table for alignment with outputs due to risk model changes.

2. Changes to Approved Targets, Objectives, and Expenditures

The electrical corporation must report qualifying changes to targets, objectives, and expenditures from its approved 2023-2025 Base WMP. Each change must be justified by lessons learned, internal policy changes, new laws or regulations, corrective actions resulting from Energy Safety's compliance process, or other explanations for the change. Thresholds for qualifying changes to targets, objectives, and expenditures are set forth below.

2.1 2025 Targets or Target Completion Dates

For large volume work (equal to or greater than 100 units), the electrical corporation must report changes of 10 percent or greater to a 2025 target from the electrical corporation's approved 2023-2025 Base WMP.

For small volume work (less than 100 units), the electrical corporation must report changes of 20 percent or greater to a 2025 target from the electrical corporation's approved 2023-2025 Base WMP.

Please see the following table for SCE's proposed changes to 2025 targets. Each change is explained in the narrative following the table. SCE also notes that the full context for each target, including any language related to target achievement, is found in the appropriate target table in the 2023-2025 WMP. The table below is meant to summarize the changes, not to serve as a reference point for compliance.

Moreover, as of the date of this 2025 WMP Update, SCE's Test Year 2025 General Rate Case (GRC) is pending. SCE's work plans may undergo further updates to align SCE's WMP targets with the requirements and amounts authorized in SCE's final 2025 GRC decision, after that decision is issued.

SCE Table 2-11: 2025 Target Changes

Initiative Activity	Initiative ID	Change Category[6]	Original Value[7] (compliance or strive)[8]	Updated Value	Target Percentage Change	% Risk Impact: Original[9]	% Risk Impact: Updated
Covered Conductor	SH-1	Lessons Learned, Other	700 circuit miles (compliance) 850 circuit miles (strive)	500 (compl.) 600 (strive)	-29%	4%	1.5%
Undergrounding Overhead Conductor	SH-2	Lessons Learned, Other	48 circuit miles (compliance)	30 (compl.)	-38%	N/A	N/A
REFCL – GFN	SH-17	Lessons Learned, Other	4 substations w/completed construction (compliance)	2 (compl.)	-50%	1.8%	1.8%[10]
Transmission High Fire Risk-Informed (HFRI) Inspections and Remediations (Ground and Aerial)	IN-1.2	Lessons Learned, Other	28,000 structures (compliance)	24,500 (compl.)	-13%	N/A	N/A
Expanded Clearances for Generation Legacy Facilities	VM-3	Other	60 sites (compliance) 70 sites (strive)	48 (compl.) 56 (strive)	-20%	21%	25%[11]

Managing Wildfire Risk in the Context of Modified Grid Hardening Targets

Below, SCE proposes reductions to three of its central grid hardening mitigations. SCE explains the rationale behind each change, but also wishes to provide more general comments on its risk mitigation practices given the lead times and potential delays with hardening mitigations.

- SCE performs risk-prioritized inspections to identify maintenance issues that may lead to equipment failure at the highest frequency (at least once a year) of anywhere in its service area, significantly surpassing the minimum General Order 165 required frequency of once every five years.

[6] Per OEIS criteria, the change category can be: lessons learned, internal policy changes, new laws or regulations, corrective actions resulting from Energy Safety's compliance process, or other explanations.

[7] From 2023-2025 Base WMP, version date Oct 26, 2023, available at https://www.sce.com/safety/wild-fire-mitigation.

[8] In some cases, an initiative has two targets. SCE refers to the lower value as the "compliance" target and the higher value as the "strive" target. SCE only includes the values in this table that it proposes to change.

[9] In cases in which a program has a strive target and a compliance target, the risk reduction is based on the compliance target.

[10] The 1.8% risk reduction is based on the original compliance target, which SCE proposed to retain as a strive target, hence it remains unchanged.

[11] Although scope is decreasing from 70 to 56 sites, forecasted risk reduction increased due to updates to risk models.

- SCE also performs vegetation management (e.g., line clearing, pole brushing, hazard tree management) to address the largest drivers of contact-from-object faults. Similar to asset inspections, for certain vegetation management activities, Severe Risk Areas receive more frequent treatment compared to the rest of SCE's service territory. For example, Severe Risk Areas receive an annual Hazard Tree inspection and many receive annual expanded structure brushing. SCE also uses its Areas of Concern (AOC) program to identify specific areas with heightened short-term potential for wildfire risk, and to schedule additional or accelerated inspections and/or vegetation management activities.
- SCE also employs fast curve settings, often paired with fast acting current limiting fuses certified by CAL FIRE, to quickly reduce the energy released during a fault, should one occur.

Finally, as a last resort, SCE also employs Public Safety Power Shutoffs to de-energize lines if winds and fire potential present too dangerous of conditions to operate the grid.

SCE also discusses its hardening prioritization approaches in its response to ACI SCE-23-09.

SH-1: Covered Conductor

SCE seeks to reduce both the compliance target and strive target. As SCE enters the final years of programmatic wildfire covered conductor deployment, and less scope remains for execution, target achievement is more sensitive to constraints such as environmental reviews and permitting. Further, SCE outperformed its covered conductor WMP targets for 2022 and 2023, reducing the necessity to complete the miles in 2025 and allowing for them to be completed in later years.

SH-2: Undergrounding Overhead Conductor

SCE seeks to reduce the compliance target based on lessons learned from undergrounding execution in 2023. Given that SCE conducts an extensive review process before scoping any targeted undergrounding pursuant to its IWMS framework and that process was ongoing in 2022 and 2023, there will be a limited amount of scope ready for execution in 2025. When key factors in the execution process such as land rights, permitting, easements, agency approvals, and associated negotiations (e.g. if a local agency must approve an easement) experience any sort of delay, without extra scope to pivot to, reduction in throughput occurs and average completion timelines increase. As the review process completes in 2024, SCE expects this constraint to ease starting in 2026.

SH-17: Rapid Earth Fault Current Limiters (REFCL) Ground Fault Neutralizer (GFN)

SCE seeks to reduce the compliance target to complete construction of GFN at four substations to two substations, and to add a strive target to complete construction of GFN at four substations. In other words, SCE will strive to perform the same level of work as originally forecasted in the 2023-2025 WMP. This proposed change is based on lessons learned and other challenges expected in 2025. Specifically, SCE anticipates material and supply challenges in 2025 for REFCL GFN work, in addition to engineering complications at the substations in scope for 2025. While SCE will endeavor to achieve the original target to complete construction of GFN at four substations, SCE seeks to adjust the target based on developments that have occurred since SCE initially set the target in early 2023.

VM-3: Expanded Clearances for Generation Legacy Facilities

SCE seeks to reduce both the compliance target and strive target. SCE executed this program at 63 sites in 2023, exceeding both the compliance target of 50 sites and the strive target of 60 sites. Due to the volume of work completed in 2023, SCE anticipates a lower volume of work in 2025.

IN-1.2: Transmission High Fire Risk-Informed (HFRI) Inspections and Remediations (Ground and Aerial)

SCE seeks to reduce the compliance target based on lessons learned in 2022 and 2023 related to environmental and access issues that can influence SCE's ability to perform a complete inspection. SCE plans to prioritize inspection resources to the highest-risk structures, as well as to make repeated efforts in situations in which the initial inspection attempt is incomplete. SCE does not seek to change the strive target.

Additional Update Regarding IN-9b: Transmission Conductor & Splice Assessment: Spans with X-Ray

SCE seeks to communicate its intentions with this program even though it is not seeking to formally change the target. In Table 8-4 of the 2023-2025 WMP, the 2025 target for IN-9b is "Target to be developed based on an engineering analysis to be performed in 2023 and 2024." SCE intends to continue IN-9b with a 2025 compliance target of 50 inspections and a 2025 strive target of 100 inspections, based on the value of the results of this program in results observed to date.

Redlines to Base WMP Due to Reportable Changes

Please see the table below for redlines in the 2023-2025 WMP due to the reportable changes discussed in this section.

Section	Table or Figure (if applicable)	Page Number(s)	Description of Redline
8.1.1.2	Table 8-3	238	Edits to SH-1 target to reflect changes.
8.1.1.2	Table 8-3	238	Edits to SH-2 target to reflect changes.
8.1.1.2	Table 8-3	241	Edits to SH-17 target to reflect changes.
8.1.2.1.1	N/A	252	Edits to narrative text to reflect SH-1 target changes.
9.1.4	Table 9-5	618	Edits to SH-1 target to reflect changes.
8.1.1.2	Table 8-4	242	Edits to IN-1.2 target to reflect changes.
8.2.1.2	Table 8-14	378	Edits to VM-3 target to reflect changes.

2.2 Initiative Objectives

The electrical corporation must report any changes to forecasted initiative objective completion dates in its approved 2023-2025 Base WMP that shift an objective's completion to a different compliance period.

The electrical corporation may not add or delete 3- and 10-year objectives set forth in its approved 2023-2025 Base WMPs.

SCE does not propose any changes to forecasted initiative objective completion dates.

2.3 Expenditure Changes

The electrical corporation must report any changes to 2025 projected expenditures in its approved 2023-2025 Base WMP that result in an increase or decrease of more than $10 million or constitute a greater than 20 percent change in an initiative's planned total expenditure in the 2025 compliance period.

Please see the following table for changes in expenditures that meet the criteria specified above. Each change is explained in the narrative following the table.

For programs in which SCE has proposed a change to the 2025 target, the values are based on the revised target. SCE also notes that in the cases in which a program has both a strive and compliance target, projected expenditures are based on the strive target.

SCE Table 2-32: 2025 Expenditure Changes

Initiative Activity	Initiative ID	Original 2025 Projected Expenditure[12] ($M)	Updated 2025 Projected Expenditure ($M)	Difference ($M)(%)	Increase/ Decrease Greater than $10M? (Y/N)	Increase/ Decrease Greater than 20%? (Y/N)
Covered Conductor	SH-1	$627.98	$489.98	($138.01) (22%)	Y	Y
Expanded Clearances for Generation Legacy Facilities	VM-3	$0.86	$0.45	($0.41) (47%)	N	Y

SH-1: Covered Conductor

As discussed previously, SCE seeks to reduce the 2025 target for this activity, which has led to a reduction in the anticipated 2025 costs.

VM-3: Expanded Clearances for Generation Legacy Facilities

As discussed previously, SCE seeks to reduce the 2025 target for this activity, which has led to a reduction in the anticipated 2025 costs.

Redlines to Base WMP Due to Reportable Changes

Please see the table below for redlines in the 2023-2025 WMP due to the reportable changes discussed in this section.

Section	Table or Figure (if applicable)	Page Number(s)	Description of Redline
4.3	Table 4-1	22	Updated values reflecting reportable expenditure changes.
4.3	Figure SCE 4-01	22	Updated values reflecting reportable expenditure changes.

[12] From Table 11 of SCE's Quarterly Data Reporting (QDR).

3. Quarterly Inspection Targets for 2025

The electrical corporation must define quarterly targets (end of Q2 and end of Q3) for 2025 asset and vegetation inspection targets established as end-of-year targets in its approved 2023-2025 Base WMP. The electrical corporation must use the format established by Table 3-1 to report these quarterly targets. Changes to end-of-year 2025 targets must be reported and explained pursuant to Section 2: Changes to Targets, Objectives, and Expenditures, above.

For its redlined and clean 2023-2025 Base WMP, the electrical corporation must add columns for end of Q2 2025 and end of Q3 2025 targets to its asset inspection and vegetation inspection target tables.

Please see below for SCE's quarterly targets for 2025. The table only includes the compliance target for 2025 for programs that have both a compliance target and a strive target (such as IN-1.1 and VM-2), as the quarterly targets are developed based on the compliance target.

For programs in which SCE has proposed a change to the 2025 target, the quarterly values are based on the revised target.

SCE also notes that the full context for each target, including any language related to target achievement, is found in the appropriate target table in the 2023-2025 WMP.

Table 3-1: Asset Inspections and Vegetation Management Targets for 2025

Initiative Activity	Tracking ID	Target End of Q2 2025 & Unit	Target End of Q3 2025 & Unit	End of Year Target 2025 & Unit	x% Risk Impact 2025
Distribution HFRI Inspections and Remediations (Ground and Aerial)	IN-1.1	101,000	172,000	187,000 structures	90%
Transmission HFRI Inspections and Remediations (Ground and Aerial)	IN-1.2	14,000	22,500	24,500 structures	88% (ground) 88% (aerial)
Infrared Inspection of Energized Overhead Distribution Facilities and Equipment	IN-3	2,000	5,300	5,300 overhead circuit miles	60%
Infrared Inspection, Corona Scanning, and High-Definition Imagery of Energized Overhead Transmission Facilities and Equipment	IN-4	600	900	1,000 overhead circuit miles	59%
Generation HFRI Inspections and Remediations in HFRA	IN-5	55	170	170 assets	14%
Inspection and Maintenance Tools	IN-8	Monitor utilization of inspection work management tool, and make	Monitor utilization of inspection work management tool, and make	Monitor utilization of inspection work management tool, and make enhancements as necessary	N/A

Initiative Activity	Tracking ID	Target End of Q2 2025 & Unit	Target End of Q3 2025 & Unit	End of Year Target 2025 & Unit	x% Risk Impact 2025
		enhancements as necessary	enhancements as necessary		
Transmission Conductor & Splice Assessment: Splices with X-Ray	IN-9b	N/A	N/A	N/A[13]	N/A
Hazard Tree Management Program (HTMP)	VM-1	233	356	440 grids/circuits	63%
Structure Brushing	VM-2	26,180	33,830	63,700 structures	62%
Dead & Dying Tree Removal	VM-4	311	422	536 grids/circuits	100%
Detailed Inspections for the Prescription, Where Necessary and Feasible, of Expanded Vegetation Clearances from Distribution Lines in HFRA	VM-7	308	539	770 grids/circuits	100%
Detailed Inspections for the Prescription, Where Necessary and Feasible, of Expanded Vegetation Clearances from Transmission Lines in HFRA	VM-8	273	378	416 circuits	100%
LiDAR Distribution Vegetation Inspections	VM-9	500	1,020	1,020 circuit miles	N/A
LiDAR Transmission Vegetation Inspections	VM-10	1,423	1,692	1,750 circuit miles	N/A

Redlines to Base WMP Due to Reportable Changes

Please see the table below for redlines in the 2023-2025 WMP due to the reportable changes discussed in this section.

Section	Table or Figure (if applicable)	Page Number(s)	Description of Redline
8.1.1.2	Table 8-4	242-244	Updates to 2025 asset inspection targets to reflect quarterly values.
8.2.1.2	Table 8-14	379-381	Updates to 2025 vegetation inspection targets to reflect quarterly values.

[13] The 2025 target for IN-9b is currently stated as, "Target to be developed based on an engineering analysis to be performed in 2023 and 2024." SCE is not seeking to change this target, per the explanation provided in Section 2.1.

4. New or Discontinued Programs

The electrical corporation must report on the creation of a new program or the discontinuance of a program described in its approved 2023-2025 Base WMP. Each change must be justified by lessons learned, internal policy changes, new laws or regulations, corrective actions resulting from Energy Safety's compliance process, or other explanations for the change.

An electrical corporation's discussion on new or discontinued programs must be limited to 20 pages total. Figures and tables are excluded from the 20-page limit.

SCE seeks to discontinue one program, described below.

IN-9a: Transmission Conductor & Splice Assessment: Spans with LineVue

In the 2023-2025 WMP, the 2025 target for this program was "to be developed based on an engineering analysis to be performed in 2023 and 2024." Based on the 0% find rate in 2023 and 2024, and the cost and complexity of performing the inspections, SCE determined that resources can be used more effectively for other inspection programs.

Redlines to Base WMP Due to Reportable Changes

Please see the table below for redlines in the 2023-2025 WMP due to the reportable changes discussed in this section.

Section	Table or Figure (if applicable)	Page Number(s)	Description of Redline
8.1.1.2	Table 8-4	244	Strike IN-9a from 2025 columns as the program will close in 2024.

5. Areas for Continued Improvement

5.1 Risk Methodology and Assessment

SCE-23-01. Cross-Utility Collaboration on Risk Model Development

Description: SCE and the other IOUs have participated in past Energy Safety- led risk modeling working group meetings. The risk modeling working group meetings facilitate collaboration among the IOUs on complex technical issues related to risk modeling. The risk modeling working group meetings are ongoing.

- *Required Progress: SCE and the other IOUs must continue to participate in all Energy Safety-led risk modeling working group meetings.*

The Joint Utilities look forward to continued engagement in Energy Safety-sponsored risk modeling working group (RMWG) meetings. These meetings have been valuable to discuss technical aspects of wildfire and PSPS risk modeling for planning and operational purposes. They allow a venue for Energy Safety to gather multiple perspectives from various stakeholders, including utilities, state agencies, and intervening parties. We believe these working group meetings complement similar working groups sponsored by the International Wildfire Risk Mitigation Consortium (IWRMC) and the Edison Electric Institute (EEI). The Joint Utilities appreciate that Energy Safety revised the cadence and organization of these meetings in 2023, most notably the development of a schedule of topics for discussion well in advance of each session. These modifications have allowed utilities to properly prepare for working group sessions, ensure appropriate SMEs are available, and allow utilities to balance internal resource constraints, particularly during peak wildfire season.

For future workshops, SCE recommends Energy Safety consider broadening the scope of the topics to include level-setting presentations from utilities that cross over into the areas addressed by the CPUC Rulemaking to Further Develop a Risk-Based Decision-Making Framework (R. 20-07-013) and/or the Order Instituting Investigation on the Commission's Own Motion on the Late 2019 Public Safety Power Shutoff Events (I.19-11-013). We also recommend that Energy Safety continue to consider the impact of peak wildfire season, and resource constraints in drafting Wildfire Mitigation Plans (WMP) in crafting its RMWG agenda for the following year.

SCE-23-02. Calculating Risk Scores Using Maximum Consequence Values

Description: SCE's use of maximum consequence values, as opposed to probability distributions, to aggregate risk scores is not aligned with fundamental mathematical standards and could lead to suboptimal mitigation prioritization decisions.

Required Progress: In its 2025 Update, SCE must:

- *Provide a plan with milestones for transitioning from using maximum consequence values to probability distributions in its 2026-2028 Base WMP when aggregating risk scores for the following:*
  - *Mitigation evaluation.*
  - *Cost/benefit calculations.*
  - *Risk ranking.*
- *If SCE is unable to transition to using probability distributions, it must:*
  - *Propose an alternative strategy or demonstrate that its current methodologies are providing accurate outputs for calculating known risk. SCE must provide concrete validations, including estimations for usage of maximums, averages, and probability distributions where possible. Explain why or how it is unable to move toward the use of probability distributions when aggregating risk scores. This must include discussion of any existing limitations or potential weaknesses.*
  - *Provide an explanation for each calculation of risk scores where SCE is aggregating risk scores in which maximum consequence was used.*
  - *Describe any steps SCE is taking to explore the use of probability distributions in the future.*

Required Progress Item #1: Provide a plan with milestones for transitioning from using maximum consequence values to probability distributions in its 2026-2028 Base WMP when aggregating risk scores for the following:

- *Mitigation evaluation.*
- *Cost/benefit calculations.*
- *Risk ranking.*

SCE does not anticipate transitioning from using maximum consequence values to probability distributions in its 2026-2028 Base WMP when aggregating risk scores for the items listed above. Maximum consequence values are necessary to identify catastrophic wildfires, as catastrophic wildfires occur infrequently (yet have severe consequences when they do) and are difficult to predict using a normal probability distribution. In the sections below, SCE demonstrates that its current methodologies are providing accurate outputs for calculating known risk.

Required Progress Item #2.a.1: If SCE is unable to transition to using probability distributions or averages, it must:

- *Propose an alternative strategy or demonstrate that its current methodologies are providing accurate outputs for calculating known risk.*

SCE's use of maximum consequence values is better suited than the use of probability distributions or averages for assessing wildfire risk because catastrophic wildfires are rare events whose risk would not be adequately captured by probability distributions or averages. There are good reasons why SCE uses maximum consequence values to develop its risk mitigation strategies. Most fundamentally, SCE's use of maximum consequence values enables its modeling efforts to identify the types of extreme events that have harmed Californians in recent years—events that could be missed or otherwise obscured if SCE was required to look solely at averages or probability-adjusted values. Those extreme events represent precisely the catastrophic outcomes that SCE's wildfire mitigation strategy is designed to avoid, consistent with Energy Safety's long-term vision of no catastrophic utility-related wildfires.

SCE's methodology of calculating risk scores using maximum consequence values is also consistent with the language of Senate Bill (SB) 901, which states that utilities must adopt cost-effective approaches to minimize the risk of "catastrophic wildfires."[14] It is appropriate, and consistent with the language of SB 901, to perform risk modeling that seeks to identify and evaluate the types of worst-case wildfire events with the highest potential to cause public harm. The language of SB 901 is not targeted to mitigate against average (e.g., expected value) or above-average wildfires. Rather, the statute requires utilities to describe the preventative strategies and programs they have adopted to minimize the risk of "catastrophic wildfires"—i.e., the extreme wildfire events that have plagued California, as well as other states and countries (e.g., the 2021 Marshall Fire in Colorado, the 2023 Afternoon Fire in Hawaii, and the 2023 Canada Wildfires, with notable records – British Columbia, Alberta, Quebec, and Nova Scotia[15]) in recent years.

<u>Discussion of Maximum Consequence Versus Probability in the Context of the 2023 Afternoon Fire in Lahaina, Hawaii</u>

Tragic real-world events demonstrate that SCE's current methodology of using maximum consequence values is providing accurate outputs for calculating known risk. The 2023 Afternoon Fire in Lahaina, Hawaii is an example of a recent catastrophic wildfire (i.e., a low probability, high consequence event) that is well represented using conditions closer to maximum consequence values rather than average (i.e., expected) values. During the early morning hours of August 8, 2023, higher than normal peak winds began to damage structures in Lahaina. Several brush fires were reported immediately adjacent to the town. The wildfire rapidly grew in both size and intensity and began to impact structures in the northeastern part

[14] Cal. Pub. Util. Code § 8387(b)(2)(C) (2016) (amended 2019).

[15] Livingston, I. (2023, October 18). Canada's astonishing and record fire season finally slows down. *The Washington Post*. Retrieved from https://www.washingtonpost.com/weather/2023/10/18/canada-historic-2023-wildfire-season-end/

of the town. Hundreds of homes burned in a matter of minutes, and residents were quickly surrounded. On August 17, emergency officials reported that over 115 people were missing, and 2,200 out of the 2,600 structures in the town had been completely destroyed.[16]

In early August 2023, a high-pressure system developed north of the Hawaiian island chain and created a stationary trough of warm, dry air. Concurrently, Hurricane Dora formed southeast of the island, and strengthened and intensified as it moved from east to west (see Figure ACI SCE-23-02, below). The differences in pressure gradients between the high-pressure system to the north and the low-pressure system (Hurricane Dora), aided by the strong trade winds propelling Hurricane Dora east to west, pulled and strengthened dry winds from the north. These winds gained momentum as they moved downslope on the leeward side of Haleakalā Crater toward the coast and the town of Lahaina. These 850-hectopascals (hPa) wind speeds were *6 standard deviations* (~30mph) stronger than average (see Figure ACI SCE-23-02b).[17] Wind speeds of this magnitude (850-hPa[18]) have an 85 year return interval (85-year storm) according to ERA5 1990-2022 records on the island.

While wildfires are not uncommon on the island, the ignition events that ensued represented a series of concurrent and compounding events which were well outside the expected wildfire weather conditions for this island. These strong, dry winds (exceeding 80 miles per hour, sustained) occurred during a period of moderate drought conditions, as 2023 was not a particularly dry year based on historical conditions.[19] However, by isolating the occurrence of strong, dry winds with "the dry season" (April through October) when fuels on the island are fully cured, the recurrence interval for this type of dry, windy event is once in over 2,000 years (1 in 2,000).

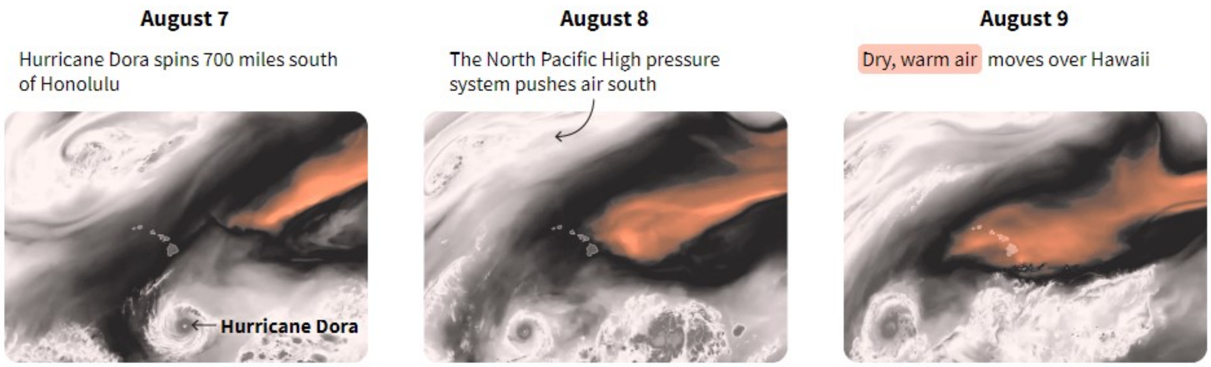
[16] Goering, C. (2023, August 17) Following a week of ongoing response and relief efforts, nearly a thousand of Maui's loved ones reported still missing. *Pacific Disaster Center*. Retrieved from https://www.pdc.org/data-collection-mapping-search-recovery-maui-wildfire-response/

[17] Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2023) ERA5 hourly data on single levels from 1940 to present. *Copernicus Climate Change Service (C3S) Climate Data Store (CDS)*, DOI: 10.24381/cds.adbb2d47

[18] One hectopascal (hPa) is equal to 100 pascals or 1 millibar of pressure, which a measure of force exerted by the weight of air upon a surface.

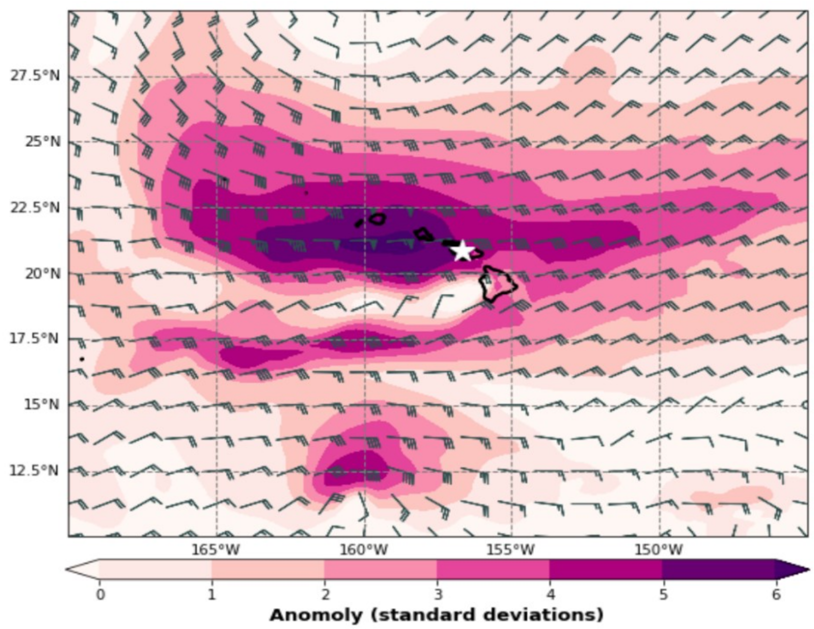
[19] NOAA National Integrated Drought Information System. In *Drought.gov*. Retrieved from https://www.drought.gov/historical-information?dataset=0&selectedDateUSDM=20120110

Figure ACI SCE-23-02a: Air Masses in the Vicinity of the Hawaiian Island Chain, August 7-9, 2023



Source: Reuters 2023 [20]

Figure ACI SCE-23-02b: Wind Speed Anomalies, Hawaiian Island Chain, August 2023, indicating speeds exceeding 6 standard deviations higher than the expected value



Technosylva's Wildfire Simulation tools, used by SCE and other utilities, were able to accurately simulate the resulting consequences of the 2023 Afternoon Fire (Lahaina) using publicly available weather data. These simulations support the importance of using maximum consequences across a wide range of weather scenarios to help ensure wildfire mitigation activities locations are prioritized based on the known potential impacts to people and property. Figure SCE ACI 23-02c depicts a simulation of wildfire spread based on the known weather conditions and ignition points of the 2023 Afternoon Fire using Technosylva's Wildfire

[20] Dickie, G., Trainor, C., Chung, D., & Hartman, T. (2023, August 21) Earth, wind and fire. *Reuters*. Retrieved from https://www.reuters.com/graphics/HAWAII-WILDFIRES/DRIVERS/gdvzwwgwrpw/

Analyst. For comparison, see Landsat 8 nighttime photograph taken at a similar approximate timestamp as the Technosylva simulation (Figure SCE ACI 23-02d).

Figure ACI SCE-23-02c: Technosylva Wildfire Analyst Simulation of Afternoon Fire (Source: Technosylva Wildfire Analyst), North orientation to the left of the graphic

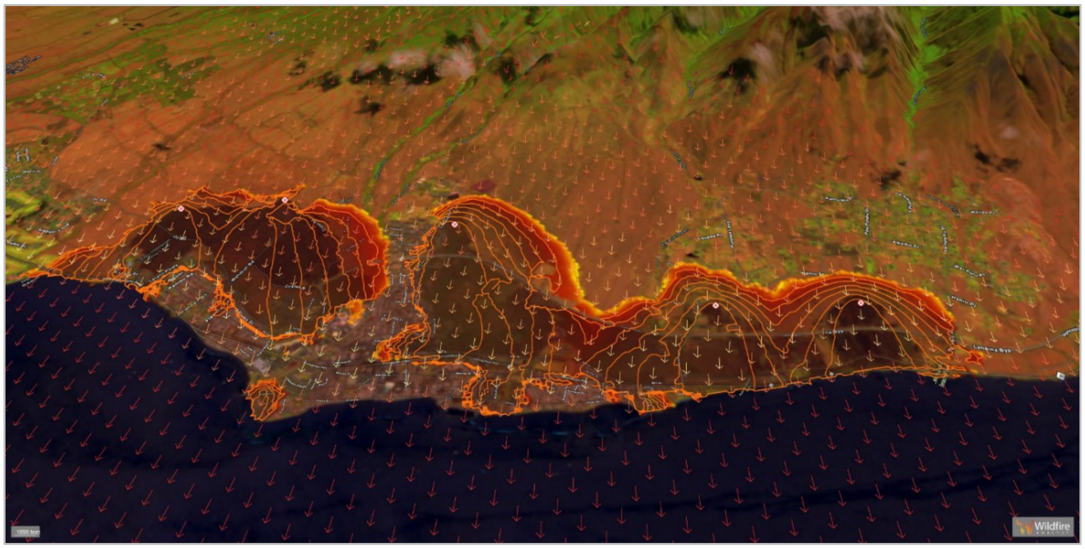
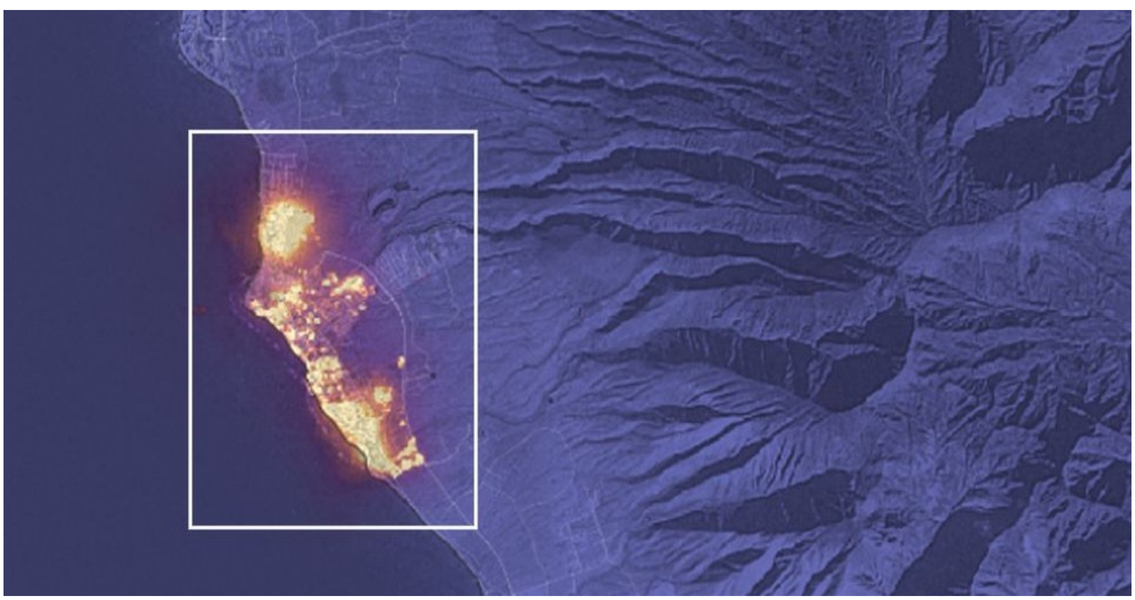


Figure ACI SCE-23-02d: Actual wildfire footprint (Source: NASA Earth Observatory, Landsat 8, Aug. 8, 2023); North orientation to the top of the picture.



The 2023 Afternoon Fire in Lahaina is a stark reminder of the critical importance of using maximum consequence values in risk modeling to mitigate the risk of catastrophic wildfires. Catastrophic wildfires do not follow normal probabilistic distributions (e.g., the roll of a dice) but are best represented by selecting an appropriate tail value (i.e., maximum consequence over an 8-hour simulation) from a power-law distribution (e.g., sales of books, where some books sell much more than others). Catastrophic wildfires are better represented by power-law distributions because the vast majority of wildfires are relatively small and do not impact people and/or property; only a select few are catastrophic. Therefore, it is of critical importance that utilities understand where these catastrophic consequences could manifest themselves. Furthermore, probabilistic distributions are poor indicators or predictors of the next risk event, especially when it comes to rare tail events such as a catastrophic wildfire. Probabilistic distributions have other shortcomings as well. They do not capture the spatial and temporal patterns of specific wildfires in specific locations, and they do not provide the granularity needed to scope individual projects.

SCE is not aware of any mathematical standard prohibiting a utility from considering the maximum potential consequence for ignition at a given location and using this data to inform risk evaluation and mitigation selection. The underlying mathematical premise referenced in this ACI as "not being aligned with fundamental mathematical standards" is the Central Limit Theorem. The Central Limit Theorem states that the average of n=1,2,3 . . . independently random variable samples converge to a normal distribution (also known as a "bell curve" in common parlance) as the number of samples "n" increases (i.e. rolls of the die). The reasoning behind the use of this Theorem is that losses will converge in the long run, and one should not be willing to "pay" more than the average benefit to mitigate each occurrence of a risk event.

For consequences that follow well-defined "thin tailed" distributions, convergence happens relatively quickly, meaning that the true mean of the distribution can be approximated with relatively small sample sizes. However, catastrophic wildfires do not follow normal distributions. In fact, several parties, including SCE, U.S. Forest Service, and Mussy Grade Road Alliance (MGRA), presented data in OEIS Risk Modeling working groups pointing out the opposite—that wildfire events are best represented by "fat-tailed" power-law distributions (i.e., Pareto distribution, gamma, lognormal, etc.). For these types of distributions, there will never be enough samples to use in estimation because the mean is infinite (see Taleb 2023). Using probabilistic distributions to represent these types of events will always tend to underestimate the true mean (if it exists) simply because tail events are the most significant contributors to the mean. By definition, they are rare.

In other words, it may take too long for those averages to converge to a mean value, if at all. Expected value is an academic measure of the long-run, probability-weighted average of a risk distribution. It is not an indicator or predictor of the magnitude of the next risk event, which could fall anywhere on the risk distribution. This is why it is critical that SCE be afforded flexibility to use risk scoring based on maximum consequence values. SCE's methodology of using maximum consequence values is consistent with the language of SB 901, which seeks to minimize the chance that the probabilities will converge around a normal distribution before a low probability/high consequence event (i.e., a catastrophic wildfire) occurs. Requiring SCE to abandon its existing methodology of utilizing maximum consequence values and forcing SCE to adopt probability distributions instead would not only contravene the intent of SB 901, but it would also create a moral hazard by relying on metrics to prioritize mitigation deployments in locations where *average* wildfires (e.g., the mean) rather than *catastrophic* wildfires (e.g., well beyond the expected value) may occur. Catastrophic events represent consequences that are greater than the expected value - in some cases, by several orders of magnitude.

Consistent with the intention to prevent catastrophic wildfires, SCE uses its wildfire risk modeling simulations to represent the consequences associated with an ignition escaping initial containment and burning in an unsuppressed manner over an eight-hour period, similar to the 2023 Afternoon Fire example in Hawaii provided above. This approach is described in SCE's previous WMPs and in more recent RAMP and GRC applications. SCE continues to believe it is prudent to utilize this wildfire risk modeling approach because of the recent history in which significant wildfires have escaped containment, have been too intense to be sufficiently suppressed, and have occurred when fire suppression resources are stressed.[21] SCE's wildfire risk modeling simulations are also conservative estimates, given that we expect climate change to exacerbate underlying conditions, which could lead to more intense wildfires.

Required Progress Item #2.a.2: If SCE is unable to transition to using probability distributions or averages, it must:

- *SCE must provide concrete validations, including estimations for usage of maximums, averages, and probability distributions where possible.*

SCE uses deterministic, physics-based models, rather than probabilistic based models.

SCE uses the types of physics-based models that are also used by CalFire. These models are validated using satellite-based California National Guard FireGuard data to provide accurate outputs for calculating known risk. Validation of these models is discussed in a 2023 academic paper titled Performance of Operational Fire Spread Models.[22] These validations demonstrate the accuracy and model performance including variations in fuel types, the estimation of fuel characteristics, and wind speeds over broad spatial and temporal scales. SCE would welcome additional discussions regarding the benefits and drawbacks on the use of probabilistic models rather than deterministic models for the purpose of mitigation scoping, prioritization and deployment in the context of OEIS risk modeling working groups.

Required Progress Item #2a: If SCE is unable to transition to using probability distributions or averages, it must:

- *Explain why or how it is unable to move toward the use of probability distributions when aggregating risk scores. This must include discussion of any existing limitations or potential weaknesses.*

SCE uses deterministic, physics-based models, rather than probabilistic based models. As discussed in OEIS-sponsored risk modeling working groups, catastrophic wildfires are low

[21] Morris III, G., and Dennis, C. (2020) 2020 Fire Siege. *Cal Fire*. Retrieved from https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/calfire-website/our-impact/fire-statistics/cal-fire-2020-fire-siege.pdf?rev=1b7ef7b1dc154bbb802837b4ed926ed3&hash=6B24123C6C744A0DA95D5FE37DC70FD5

[22] Cardil, A., Monedero, S., SeLegue, P., Navarrete Poyatos, M. Á., & et al. (2023). Performance of operational fire spread models in California. *International Journal of Wildland Fire, 32*(11).

probability, high consequence events that interact with the local terrain, fuel, and weather conditions in a specific manner. While the use of probability distributions may be useful from a system or territory-wide level, these types of models do not capture the spatial and temporal patterns of specific wildfires in specific locations as well as location-specific physics-based models (which are employed by SCE, CalFire, and others). In other words, there may be events that do not appear catastrophic system-wide but would prove catastrophic if confined to a specific geographic area. Additionally, these system-wide probabilistic models lack the granularity needed to scope individual system hardening projects.

Given that SCE uses a deterministic score, rather than a probabilistic score, it does not use aggregate risk scores to inform location-specific mitigation deployment or prioritization. Instead of using aggregate risk scores, SCE's risk scores are derived at the tranche (i.e., asset level). This methodology is consistent with CPUC guidance to provide risk scores "*based on how the risks and assets are managed by each utility, data availability and model maturity, and strive to achieve as deep a level of granularity as reasonably possible*."[23] The way in which SCE currently presents its data is consistent with this guidance, which allows IOUs the flexibility in their methodology to present risk, including the use of maximum consequence to represent a catastrophic wildfire event (e.g. tail risk) at specific locations. These granular risk scores are used to derive cost effectiveness ratios (e.g., risk spend efficiency (RSE)) estimates at a reasonable asset level.

Required Progress Item #2b: If SCE is unable to transition to using probability distributions or averages, it must:

- *Provide an explanation for each calculation of risk scores where SCE is aggregating risk scores in which maximum consequence was used.*

SCE provides aggregate risk metrics in Table 6-5 of its 2023-2025 WMP and Tables 14 and 15 of its Quarterly Data Reports. SCE uses the sum of the PSPS risk score and the ignition risk score to develop the overall utility risk score for each circuit as reported in these tables. The risk scores for ignition risk are calculated at the FLOC level (see section 6.1.2 in the previous WMP) and then aggregated to the circuit level for the circuits inside HFRA per HFRA mile, as described in the previous WMP.

While the risk scores for each individual asset can be aggregated to the circuit segment, circuit, or even system wide, the aggregate risk scores are not used by SCE. To the extent that SCE were to aggregate risk scores, these scores would only be used for reporting purposes as required for regulatory filings. SCE does not use "top down" aggregate risk metrics but rather employs granular, asset-specific metrics in its wildfire mitigation work.

We note that relative ranking of consequence values would practically be the same when scaling from granular risk scores to a system-wide metric. However, in order to calculate the risk spend efficiency (RSE) ratios (or cost-benefit (CB) ratios) appropriately at the system-wide

[23] D.22-12-027, Phase II Decision Adopting Modifications to the Risk-Based Decision-making Framework Adopted in Decision 18-12-014 and Directing Environmental and Social Justice Pilots. Appendix B, Row 14: Definition of Risk Events and Tranches (emphasis added).

level, SCE would be required to also scale the costs used for those calculations. Artificially increasing the costs would result in a distorted view of the relative risk spend efficiency when comparing mitigations, which SCE does not believe is the intended outcome of this ACI.

SCE welcomes continued discussion regarding the practical utility of developing a separate metric for aggregating risk scores.

Required Progress Item #2c: If SCE is unable to transition to using probability distributions or averages, it must:

- *Describe any steps SCE is taking to explore the use of probability distributions in the future.*

In its 2026-2028 WMP filing, SCE intends to provide additional information for its wildfire simulations so that parties can better understand the historical return interval (e.g., quasi-probabilistic) of the weather scenarios used in its wildfire simulations. This return interval information can be used in conjunction with consequence values to better understand the relative risk of catastrophic wildfires in discrete locations. We will continue to note the potential limitations and weaknesses of using this approach—namely, that even the use of the maximum consequence values may underrepresent the risk at certain locations given that the risk is likely to increase over time. We have chosen to truncate the simulations to eight hours under known, historical conditions to balance the uncertainty of exogenous factors relevant to each simulation (e.g., sudden changes in weather and suppression), as well as potential future conditions (e.g., climate and population).

SCE-23-03. PSPS and Wildfire Risk Trade-Off Transparency

Description: SCE does not provide adequate transparency regarding PSPS and wildfire risk trade-offs, or how it uses risk ranking and risk buy-down to determine risk mitigation selection.

Required Progress: In its 2025 Update, SCE must describe:

- *How it prioritizes PSPS risk in its risk-based decisions, including trade-offs between wildfire risk and PSPS risk.*
- *How the rank order of its planned mitigation initiatives compares to the rank order of mitigation initiatives ranked by risk buy-down estimate, along with an explanation for any instances where the order differs.*

Required Progress Item #1: How it prioritizes PSPS risk in its risk-based decisions, including trade-offs between wildfire risk and PSPS risk.

SCE seeks to clarify that the question of "PSPS and wildfire risk trade-offs" can be understood in two contexts. The first example is the decision process on whether or not to proactively de-energize for PSPS. The second example is the longer-term process of wildfire mitigation planning and mitigation selection.

Context #1: PSPS Decision Process

The CPUC authorized electric IOUs to proactively de-energize powerlines to protect public safety to prevent catastrophic wildfires when strong winds, heat events, and other hazardous conditions are present.[24] When catastrophic wildfire conditions are present, SCE only considers PSPS as a measure of last resort.[25] SCE is required by Commission directive to minimize the use of PSPS given the hardships they cause for our customers. During PSPS events, customer impacts are reduced by, (1) de-energizing only when necessary, based on real-time weather reporting; (2) isolating only those circuits that present significant risk; (3) moving customers between circuits (sectionalization); and (4) turning off specific segments while keeping other segments of the same circuit energized (segmentation).[26]

Prior to making a de-energization decision, SCE weighs the wildfire-potential benefits of a PSPS against the potential public safety risks using a PSPS risk comparison tool. This information is used, along with other factors, when making de-energization decisions for specific locations. The results of the PSPS risk comparison tool for each circuit in scope for PSPS events are published in SCE's post-event reports. Even in these cases, SCE has several additional programs to mitigate PSPS risk as described in Sections 8.4 and 8.5 of SCE's 2023-2025 WMP.

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[24] See "Background" in Section 1 of D.21-06-014, Decision Addressing the Late 2019 Public Safety Power Shutoffs by Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to Mitigate the Risk of Wildfire Cause by Utility Infrastructure.

[25] Southern California Edison. (2021). *Quantitative and Qualitative Factors for PSPS Decision-Making*. Retrieved from https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/PSPS%20Decision-making%20Technical%20Paper.pdf.

[26] When operationally possible/feasible based on real-time conditions and grid connectivity.

Context #2: Wildfire Mitigation Planning & Selection

SCE does not consider "tradeoffs" in PSPS and wildfire mitigation planning decision making because the decision is not mutually exclusive. SCE does not choose between mitigating wildfire risk or mitigating PSPS risk.

As shown in the circuit-level risk data provided in Table 15 of the WMP Quarterly Data Reports, PSPS risk at the circuit level is far outweighed by wildfire risk in nearly every circuit. Local mitigation planning decisions are typically driven by which wildfire mitigations are appropriate. As an ancillary benefit, some wildfire risk mitigations also reduce PSPS risk. For example, SCE increases wind speed thresholds for isolatable circuit segments protected by covered conductor and eliminates PSPS altogether for isolatable circuit segments protected by undergrounding. High wind conditions beyond covered conductor thresholds are one criterion for targeted undergrounding in our Severe Risk Area methodology.[27]

SCE also notes that, due to its very low nominal cost relative to very high wildfire risk reduction benefits, PSPS would appear highly favorable as a wildfire risk mitigation when compared against non-PSPS wildfire mitigations in metrics such as Risk Spend Efficiency (RSE), Cost/Benefit, or in other quantitative rankings. However, as a matter of both common sense and CPUC guidance,[28] despite any relatively favorable RSE scores, it would be inappropriate to make decisions on this basis. The Commission has stated that it is not appropriate to justify the use of PSPS based on its RSE. Specifically, in the Final Decision in Track 1 of SCE's Test Year 2021 GRC, the Commission stated the following:

> "Regarding the use of RSEs, the S-MAP settlement (D.18-12-014) provides that utilities are to provide a ranking of proposed mitigations by RSE as part of their GRC submission. As a general matter, RSEs provide a useful point of comparison regarding the cost effectiveness of proposed mitigations belonging to the same risk tranche and, with the exception of Public Safety Power Shutoff (PSPS) the default should always be for a utility to provide RSE calculations for its proposed mitigations."[29] The Commission further observed that "[a]s noted in Resolution WSD-002, RSE is not an appropriate tool for justifying the use of PSPS."[30]

Required Progress Item #2: How the rank order of its planned mitigation initiatives compares to the rank order of mitigation initiatives ranked by risk buy-down.

SCE seeks to clarify that it does not use a "rank order of mitigation initiatives ranked by risk buy-down" nor a "rank order of its planned mitigation initiatives" and as such provides detail below on how it approaches mitigation evaluation and selection.

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[27] 2023 – 2025 Wildfire Mitigation Plan, Southern California Edison, March 27, 2023, p. 112, Table SCE 6-03 (Severe Risk Area Criteria), https://www.sce.com/safety/wild-fire-mitigation.
[28] See D.21-06-034, p. 17, citing D.19-05-042, Appendix A at A1; D. 20-05-051, Appendix A at 9.
[29] D.21-08-036, p. 38 (emphasis added).
[30] Id. at p. 38, fn. 95.

Mitigations are not deployed by developing a ranking of "best to worst" and then deploying mitigations based on such a ranking in a linear fashion of going down a list. Instead, SCE takes a portfolio approach to reduce the risk of wildfire PSPS. Individual locations receive a combination of mitigations selected from the WMP categories of hardening, inspections, vegetation management, situational awareness, emergency preparedness, and community outreach based on the specific wildfire and PSPS risk drivers present at each location. Each mitigation is effective precisely because it addresses these specific risk driver(s), and not overall risk. As few mitigations are 100% effective for any given risk driver, it is not prudent to only have a single mitigation addressing specific risk drivers. SCE's approach is therefore comprised of more than one mitigation to address risk at a particular location. For example, detailed asset inspections help to mitigate wildfire risk from pole-top equipment failures, but that should not be the only activity mitigating that risk driver. Accordingly, SCE also deploys fuses, fast curve settings, structure brushing, and other activities, depending on the location.

SCE also considers cost and feasibility when deploying mitigation initiatives. For example, fast curve settings are effective at mitigating risk of ignition, but there are other more effective mitigations such as covered conductor and undergrounding. However, fast curve is lower cost and easier to deploy than either of those mitigations.

Further, some mitigations are deployed based on compliance requirements, such as vegetation management. SCE must deploy these mitigations, no matter where they rank in terms of effectiveness.

Deploying mitigations based solely on a rank order of effectiveness would not be cost effective. For example, targeted undergrounding is the most effective practical mitigation in terms of risk reduced. However, it also typically takes longer to deploy, may not be feasible in all areas, and can be a higher cost than other mitigations. Hence SCE uses it in a targeted manner in areas presenting the most severe risk.

SCE has provided data on mitigation effectiveness values at the level of individual mitigations, such as in Appendix F2 of the 2023-2025 WMP and in Table SCE 7-02 within Chapter 7 of the 2023-2025 WMP. SCE has also provided RSE values at the mitigation level in filings such as the 2022 RAMP.[31] These two data points—mitigation effectiveness values and RSE values—are the closest data that SCE has regarding the ACI's language about a "rank order of mitigation initiatives ranked by risk buy-down."

[31] *See* Application of Southern California Edison Company Regarding 2022 Risk Assessment Mitigation Phase (RAMP), available at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M476/K640/476640383.PDF.

SCE-23-04. Incorporation of Extreme Weather Scenarios into Planning Models

Description: SCE currently relies on wind conditions data representing the past 20 years that does not consider rare but foreseeable and significant risks. It does not evaluate the risk of extreme wind events in its service territory to prioritize its wildfire mitigations using MARS and IWMS.

Required Progress: In its 2026-2028 Base WMP, SCE must report on its progress developing statistical estimates of potential wind events over at least the maximum asset life for its system and evaluate results from incorporating these into MARS and IWMS when developing its mitigation initiative portfolio or explain why the approach would not serve as an improvement to its mitigation strategy.

SCE will respond to this ACI in its 2026-2028 Base WMP, as directed.

5.2 Wildfire Mitigation Strategy Development

SCE-23-05. Cross-Utility Collaboration on Best Practices for Inclusion of Climate Change Forecasts in Consequence Modeling, Inclusion of Community Vulnerability in Consequence Modeling, and Utility Vegetation Management for Wildfire Safety

Description: SCE and the other IOUs have participated in past Energy Safety- sponsored scoping meetings on these topics but have not reported other collaboration efforts.

Required Progress: SCE and the other IOUs must participate in all Energy Safety-organized activities related to best practices for:

- *Inclusion of climate change forecasts in consequence modeling.*
- *Inclusion of community vulnerability in consequence modeling.*
- *Utility vegetation management for wildfire safety.*

SCE must collaborate with the other IOUs on the above-mentioned best practices. In their 2025 Updates, the IOUs (not including independent transmission operators) must provide a status update on any collaboration with each other that has taken place, including a list of any resulting changes made to their WMPs since the 2023-2025 WMP submission.

Required Progress Item #1: Inclusion of climate change forecasts in consequence modeling.

The Joint IOUs participated in Energy Safety-organized activities related to inclusion of climate change forecasts in consequence modeling and welcomes continued discussion on this topic. We presented our methodology for integrating global climate models into wildfire consequence models using a 2030 climate change analysis at an OEIS sponsored workshop in July 2023 using information from California's Fourth Climate Assessment. The joint IOUs also note that they are participating in the Climate and RDF proceedings pending before the Commission, where integration of climate models into the risk-based decision-making framework is an active topic of discussion and work on California's Fifth Climate Assessment is ongoing.

Required Progress Item #2: Inclusion of community vulnerability in consequence modeling.

The Joint IOUs participated in Energy Safety-organized activities related to inclusion of community vulnerability in consequence modeling and welcomes continued discussion on this topic. We presented our methodology for integrating social vulnerability into wildfire and PSPS consequence models into wildfire risk modeling at an OEIS-sponsored workshop in May 2023.

Required Progress Item #3: Utility vegetation management for wildfire safety.

With its Joint IOUs SCE actively participate in utility vegetation management collaborative efforts such as the Study for Effectiveness of Enhanced Clearances, with the objective of developing a standardized cross-utility database monitoring the effectiveness of enhanced clearances and tree-caused circuit interruptions. This ongoing initiative includes recurring, bi-weekly meetings amongst the utilities, along with occasional, direct participation from Energy Safety.

The Joint IOUs have also collaborated on the Annual Benchmarking of Best Practices in Quality-related areas, with the objective of understanding each IOU's QA/QC programs as they relate to assuring vegetation work is performed to regulatory and other compliance standards. The latter effort includes focus areas for Quality Control (e.g., discussions on the type and frequency of inspections), Quality Assurance, Training, and Quality Records Management. In addition to these formal efforts, relationships built with our peer IOUs have opened greater lines of communication for other discussions such as those on fuel and debris management practices. SCE welcomes continued discussion on debris management practices. In 2023, SCE, PG&E and SDG&E held two working sessions to discuss the different types of programs and practices each IOU has in place for disposing and recycling woody debris and vegetation. Also in 2023, the joint IOUs held meeting to discuss each utility's respective fuels management programs and began initial collaboration on a possible scoping study on best practices and efficacy of fuels management.

The joint IOUs are founding members of the International Wildfire Risk Mitigation Consortium, which was formed to address best management practices for utility vegetation management for wildfire risk abatement. Lastly, SCE and its Joint IOU partners (PG&E and SDG&E) held two working sessions in 2023 to discuss the different types of programs and practices each IOU has in place for disposing of and recycling woody debris and vegetation. Multi-national utilities participate in this initiative providing comprehensive awareness, science-based approach, and solution-oriented perspectives. Meetings and webinars are held monthly and cover a wide range of topics including hazard tree assessment, remote sensing technology, and risk modeling.

The Joint IOUs welcomes continued discussion on these and other utility vegetation management topics.

Required Progress Item #4: In their 2025 Updates, the IOUs (not including independent transmission operators) must provide a status update on any collaboration with each other that has taken place, including a list of any resulting changes made to their WMPs since the 2023-2025 WMP submission.

The Joint IOUs meet monthly to perform deep dive discussions and comparisons of many areas of the WMP. Topics generally cover mitigation strategy and implementation, regulatory developments, and knowledge sharing.

In accordance with the 2023-2025 WMP, the Joint IOUs' participation in this monthly forum has influenced its approach to the following:

- Interpretation and consistency in approach to applying the risk model changes in Chapter 1
- Approach and eligibility criteria for 2025 program target changes in Chapter 2.1
- Information sharing on new programs discussed in Chapter 4
- Interpretation and consistency in approach to ACIs received by multiple IOUs, (e.g. SCE ACIs #1, #2, #3, #4, #5, #7, #11, #17, and #18 as well as corresponding ACIs from SDG&E and PG&E)

SCE-23-06. [intentionally left blank]

Energy Safety has removed SCE-23-06 and has left the identification numbering for the remaining areas for continued improvement unchanged.

5.3 Grid Design, Operations, Maintenance

SCE-23-07. Continuation of Grid Hardening Joint Studies

Description: The utilities have jointly made progress addressing the continued Joint IOU Covered Conductor Working Group area for continued improvement (SCE-22-09 and SCE-22-11). Energy Safety expects the utilities to continue these efforts and meet the requirements of this ongoing area for continued improvement.

Required Progress: In its 2025 Update, SCE, along with all other IOUs (not including independent transmission operators), must continue the relevant studies and meetings and report on the progress and outcomes of these studies and meetings in the Joint IOU Covered Conductor Working Group Report. This must include:

- *Progress made on any next steps included in the report.*
- *A description of any lessons learned SCE has applied to its WMP, including a list of applicable changes and a timeline for expected implementation.*
- *A summary of any completed workshops, including a list of topics and dates, and takeaways.*
- *A list of additional workshops and proposed dates.*

Additionally, SCE must continue to collaborate with other utilities on efforts relating to grid hardening. In its 2026-2028 Base WMP, SCE, along with other utilities, must submit a report which discusses continued efforts including:

- *The IOUs' joint evaluation of the effectiveness of undergrounding. This must account for any remaining risk from secondary or service lines, analysis of in-field observations from potential failure points of underground equipment, and ignition risk as well as PSPS risk.*
- *The IOUs' joint lessons learned on undergrounding applications. This must include use of resources to accommodate undergrounding programs, any new technologies being applied to undergrounding, and cost or deployment maximization efforts being used.*
- *The IOUs' joint evaluation of various approaches to implementation of protective equipment and device settings. This must include analysis of the effectiveness of various settings, lessons learned on how to minimize reliability and associated safety impacts (including use of downed conductor detection and partial voltage detection devices), variations on settings being used including thresholds of enablement, and equipment types in which such settings are being adjusted.*
- *The IOUs' continued efforts to evaluate new technologies being piloted and deployed. This must include, but not be limited to: REFCL, EFD, DFA, falling conductor protection, use of smart meter data, open phase detection, remote grids, and microgrids.*
- *The IOUs' joint evaluation of the effectiveness of mitigations in combination with one another, including, but not limited to overhead system hardening, maintenance and replacement, and situational awareness mitigations.*

Required Progress #1: Progress made on any next steps included in the report.

Please see the joint IOU update below for further details.

Required Progress #2: A description of any lessons learned SCE has applied to its WMP, including a list of applicable changes and a timeline for expected implementation.

Please see the joint IOU update below for further details. SCE also discusses new covered conductor inspection and maintenance updates for 2024 and beyond in ACI SCE-23-11.

Required Progress #3: A summary of any completed workshops, including a list of topics and dates, and takeaways.

Please see joint IOU update below for a discussion of 2023 workshops by workstream.

Required Progress #4: A list of additional workshops and proposed dates.

SCE does not currently have any workshops scheduled with Energy Safety in 2024, but expects to continue the relevant workstreams discussed below, including workshops as necessary.

Please also see the following explanation of the working group activities in 2023 and results.

Introduction

In the 2021 WMP Update Final Action Statements, Energy Safety ordered the Joint IOUs[32] to coordinate to develop a consistent approach to evaluating the long-term risk reduction and cost-effectiveness of covered conductor (CC) deployment, including 1) the effectiveness of CC in the field in comparison to alternative initiatives, and 2) how CC installation compares to other initiatives in its potential to reduce PSPS risk. The utilities formed a Joint IOU Covered Conductor Working Group and developed an approach and preliminary milestones to enable the utilities' to better discern the long-term risk reduction effectiveness of CC to reduce the probability of ignition, assess its effectiveness compared to alternative initiatives, and assess its potential to reduce PSPS risk in comparison to other initiatives. The approach consisted of multiple workstreams including:

- Benchmarking
- Testing
- Estimated Effectiveness
- Recorded Effectiveness
- Alternatives Comparison
- Potential to Reduce PSPS Risk; and
- Costs

[32] In this progress report, "Joint IOUs," "IOUs," or "utilities" refers to SDG&E, PG&E, SCE, PacifiCorp, BVES, and Liberty.

In the 2022 WMP Update filings and subsequently in the 2023-2025 WMP, the utilities produced a joint report that provided an update on their progress for each of the workstreams, added efforts, and preliminary plans for 2023.

In the 2022 WMP Update Final Decisions, Energy Safety identified Areas of Continued Improvement and Required Progress (ACI) for all utilities to expand this working group to include:

1) Joint CC Lessons Learned
2) CC Maintenance and Inspection (M&I) Practices; and
3) New Technologies Implementation

Given these directions, the utilities expanded the Joint IOU Covered Conductor Working Group to include ten workstreams and began meeting on the new workstreams in Q3/Q4 2022. Below is the summary of process made in 2023 to address the commitments identified in the report.

Overview
In 2023, the utilities conducted workshops across the various workstreams. New workstreams evaluated CC M&I best practices, assess data and information on effectiveness of new technologies and shared practices and implementation strategies, and review studies on CC's ability to reduce PSPS impacts. The utilities continued to further benchmark efforts, improve methods for estimating and measuring effectiveness, and continue to track and compare unit costs. Below, the utilities describe the progress made on each workstream.

Testing
In our 2023-2025 WMPs, the utilities committed to conducting meetings and workshops to assess the testing results, determine if any additional tests are needed, and determine if any mitigations are warranted such as changes to materials, construction methods, or inspection practices. The Joint IOUs held bi-weekly meetings to review testing results. In addition, workshops were held with Energy Safety to discuss the following topics relating to testing:

- May 2023 – Corrosion Testing;
- June 2023– Aging Susceptibility testing; and
- July 2023 - Status of IOUs remaining testing results

Corrosion testing resulted in minor aluminum degradation below the covering following the corrosion testing, though copper CC had similar performance as the exposed bare conductor. SCE continues to inspect in-service installations of CC for monitoring the applied performance of the conductor. As a result of the discussions and outcome of the supplemental testing results, the Joint IOUs concluded that no additional testing was warranted at this time. All results have been submitted to OEIS. The Joint IOUs have concluded this workstream.

PG&E has incorporated the lessons learned from the testing results in 2024 update to PG&E's Overhead Assessment Inspection Job Aid TD-2305M-JA02, as described in response to ACI PG&E-23-08. Furthermore, please also see responses to ACI PG&E-23-08 for PG&E's planned evaluation of additional conductor types to mitigate water intrusion. This effort will be conducted outside of the Joint IOU efforts.

Recorded and Estimated Effectiveness

The joint IOUs have met monthly in 2023 to discuss the results of recorded and estimated effectiveness for covered conductor. These discussions have demonstrated that while there is a need to align consistent methods, based on the individual constraints each utility faces, some of the drivers and data will ultimately be different. The Joint IOUs will continue to compare risk drivers, the results of recorded and estimated effectiveness, identify current alignment and opportunities for alignment and understand differences.

Alternatives, New Technology, Benchmarking and PSPS

The team decided to combine the alternatives, benchmarking, PSPS and new technologies workstreams. The team met biweekly to discuss the various technologies being considered and/or adopted by each Joint IOU, shared lessons learned, and discussed if these new technologies had any impact on PSPS. As a workstream the team identified questions on some of the new technologies for benchmarking. The team is finalizing the questions and plan to complete the benchmarking survey in 2024.

The Joint IOUs held three workshops with OEIS to discuss these workstreams:

- June 2023 – Distribution Fault Anticipation (DFA) – Discuss implementation strategies, practices and effectiveness
- July 2023 – Early Fault Detection (EFD) – Discuss implementation strategies, practices and effectiveness
- August 2023 – Rapid Earth Fault Current Limited (REFCL) – Discuss implementation strategies, practices and effectiveness

During the workshops the Joint IOUs shared how each utility was using the technology, the current status of implementation, and impacts to PSPS. No additional technology is being considered, therefore this workstream has concluded.

M&I Practices

In 2023, the utilities met monthly to discuss utility specific general and CC M&I practices and presented the materials in a workshop with Energy Safety on July 24, 2023. At the conclusion of the workshop, it was determined that no additional workshops were necessary.

For SCE, please see the response to ACI SCE-23-11, regarding CC inspection and maintenance.

In 2023, PG&E worked on the update of the Electric Distribution Overhead inspection Job Aid and in December released the updated Job Aid TD-2305M-JA02 that includes additional guidance for the inspection of Covered Conductor.

Costs

In 2023, the utilities discussed the unit costs of CC and undergrounding and compared at a high level the different cost drivers. This discussion better informed the utilities of the differences behind the unit costs. The utilities meet regularly and will continue to share as information changes and costs are better defined with more installation.

Conclusion

All of the utilities met regularly on all workstreams in 2023 and addressed all of the commitments identified in the 2023-2025 Joint IOU Covered Conductor Effectiveness Report. In addition, all of the utilities developed standing monthly Joint IOU meetings, which created a forum to share updates on wildfire topics and to stay updated on key developments. The utilities also developed an undergrounding working group to discuss challenges with undergrounding and related lessons learned. These forums will allow the joint utilities to continue data sharing and knowledge transfer on important wildfire mitigation topics.

SCE-23-08. Vibration Dampers Retrofit

Description: SCE's current targets for its vibration damper retrofit have been extended through at least 2025. SCE's original procedures were to include vibration dampers during initial installation, therefore leaving some areas without vibration dampers for many years.

Required Progress: In its 2025 Update, SCE must:

- *Provide an update on any remaining vibration dampers within the retrofit scope, including any planned for installation after 2025. This must include an analysis of resource availability constraints due to supply chain issues.*
- *Provide additional analysis demonstrating prioritization of vibration damper retrofits and installations in areas of highest susceptibility to Aeolian vibrations. This must include, at a minimum:*
    - *A list of locations where vibration damper installation has been delayed due to supply chain issues.*
    - *A map designating areas as high, medium, or low Aeolian vibration susceptibility categories.*

Required Progress #1: Provide an update on any remaining vibration dampers within the retrofit scope, including any planned for installation after 2025. This must include an analysis of resource availability constraints due to supply chain issues.

SCE started its vibration damper retrofit program in 2022. The retrofit program targets covered conductor installed prior to 2021. SCE has approximately 1,750 structures in the remaining scope, with targets of 500 installations in 2024 and 600 installations in 2025. SCE estimates the remaining scope of 650 installations (pending how many vibration dampers are actually installed in 2024-2025) would be completed following 2025, but SCE's operational plans may change based on results in 2024 and 2025.

SCE experienced a vibration damper supply shortage in 2021 and part of 2022. The supply chain issues were resolved by the end of 2022. Covered conductor installations in which vibration damper installations were delayed due to supply chain issues are being addressed individually, and are not part of the scope of the retrofit program for pre-2021 installations.

Required Progress #2a: Provide additional analysis demonstrating prioritization of vibration damper retrofits and installations in areas of highest susceptibility to Aeolian vibrations. This must include, at a minimum:

- *A list of locations where vibration damper installation has been delayed due to supply chain issues.*

Since May 2023, SCE has been working to install vibration dampers at certain locations where dampers could not be installed in 2021 due to supply chain issues which emerged in the wake of the global Covid-19 pandemic. Please see the WMP supporting documents on www.sce.com/safety/wild-fire-mitigation for a list of those locations. SCE plans to complete installation of vibration dampers at those locations by May 19, 2024.

Apart from SCE's work to install vibration dampers at the locations identified above, SCE's distribution inspection process (IN-1.1), which uses risk prioritization to determine the frequency of inspections in HFRA, includes criteria to identify the presence or absence of vibration dampers. If an inspection determines a vibration damper is not present at a location where covered conductor had previously been installed, that information is documented for further evaluation and remediation if warranted. SCE further notes that covered conductor's wildfire mitigation effectiveness is not impacted in the short term by the presence or absence of a vibration damper. If left unaddressed, vibration may reduce the covered conductor's useful life from 45 years to an average of 25 years in locations designated as high and medium vibration susceptibility areas. SCE began installing covered conductor through its Wildfire Covered Conductor Program in late 2018, meaning that the earliest installations of covered conductor are only approximately six years old.

Aeolian vibrations may occur when smooth, non-turbulent wind passes across the conductor. Wind speeds that induce Aeolian vibrations range from 2 to 15 mph. Aeolian vibrations are more likely to occur in flat and open terrain. Based on these criteria, SCE used terrain and wind conditions to analyze vibration susceptibility of covered conductor installations. SCE focused on installations 3,000 feet and below, which is consistent with SCE's standard vibration damper requirements under the GO 95 definition of light loading areas (e.g., no weight from snow anticipated). SCE used three categories for vibration susceptibility (high, medium, and low).

SCE used wind data from its weather stations and performed an analysis based on factors including the average daily duration of wind speeds from 2 to 15 mph and the wind direction. SCE accounted for wind direction and only counted durations when the wind was flowing perpendicular to the conductor.

For terrain, SCE used terrain categories defined in CIGRE[33] 273: Overhead Conductor Safe Design Tensions with Respect to Aeolian Vibration. The terrain categories are defined as follows:

Table ACI SCE-08a: Aeolian Vibration Terrain Categories

Category	Description
Terrain 1	Near large bodies of water or flat desert. No obstruction.
Terrain 2	Flat farmland. Small agriculture is fine. No obstruction (limited number of buildings, etc.). If building is not an obstruction & there is perpendicular wind path to circuit, this is fine.
Terrain 3	Flat open land with few obstacles. Undulating terrain with no obstacles. Hilly area, but line is at top of hill with clear perpendicular with path.
Terrain 4	Residential suburbs, small town, some trees and obstacles, small buildings, woodland.

SCE conducted a mapping review and assigned a terrain category at the covered conductor locations based on satellite and street view images.

[33] Global International Council on Large Electric Systems for sharing of end-to-end power system expertise. The community features thousands of professionals from over 90 countries and 1250 member organizations.

A combination of the average daily duration of wind speeds between 2-15 mph and terrain categories were used to determine the vibration susceptibility. The table below provides the guidelines used. Wind condition is defined as the average daily duration of wind speeds from 2 to 15 mph flowing perpendicular to the conductor.

Table ACI SCE-08b: Aeolian Vibration Susceptibility Categories

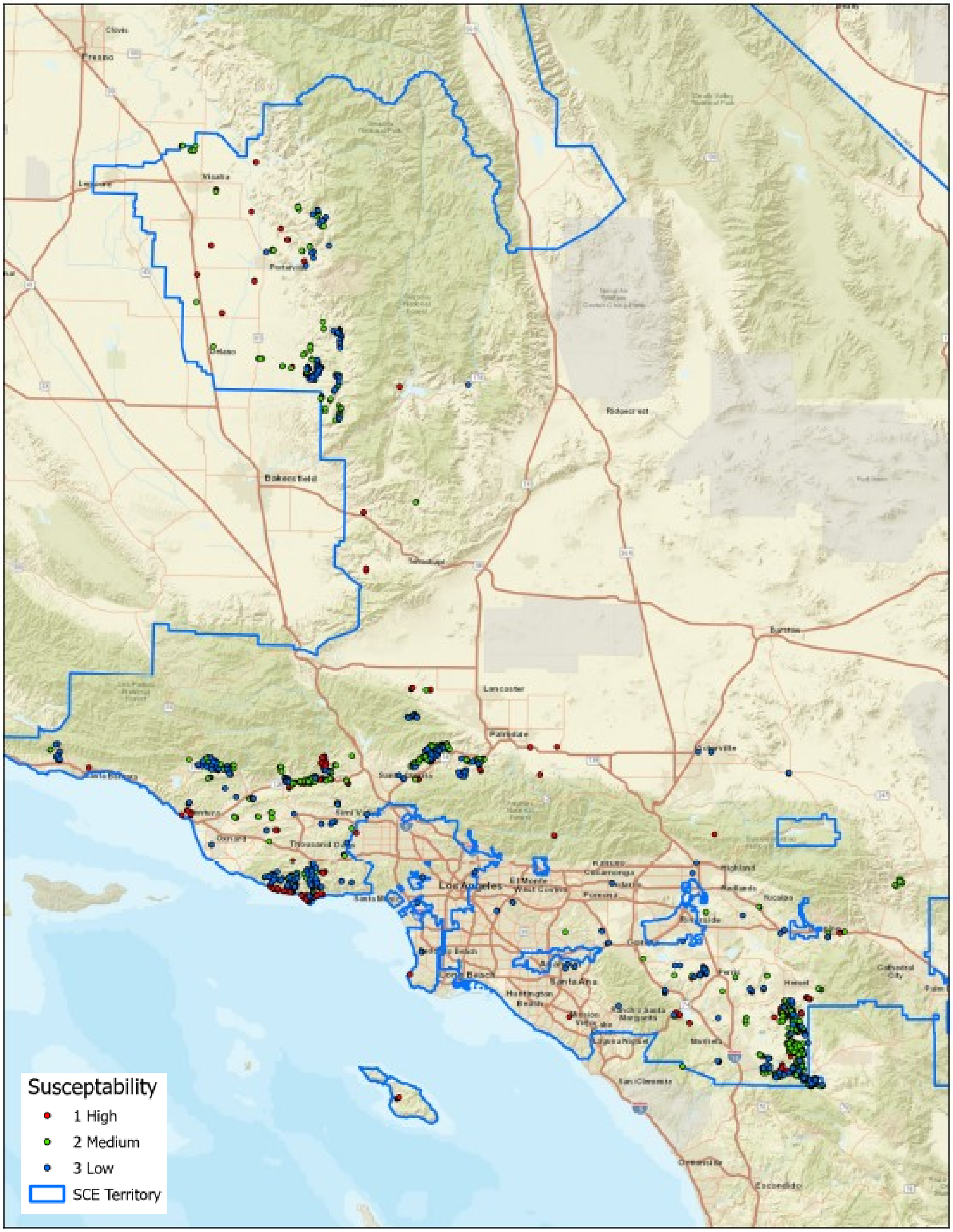
Vibration Susceptibility	Terrain	**Wind Frequency**
High	Terrain 1	All Wind Condition
	Terrain 2	Wind Condition ≥ 20%
	Terrain 3	Wind condition > 60%
Medium	Terrain 2	Wind Condition < 20%
	Terrain 3	20% < Wind condition < 60%
	Terrain 4	Wind Condition > 80%
Low	Terrain 3	Wind condition < 20%
	Terrain 4	Wind condition < 80%

Required Progress #2b: Provide additional analysis demonstrating prioritization of vibration damper retrofits and installations in areas of highest susceptibility to Aeolian vibrations. This must include, at a minimum:

- *A map designating areas as high, medium, or low Aeolian vibration susceptibility categories.*

The following map provides the vibration susceptibility category for approximately 3,850 structures. These structures were part of SCE's initial vibration susceptibility analysis for the vibration damper retrofit program. Because SCE's category assignment is based on specific covered conductor locations, it is not performed for the entire service territory.

Figure ACI SCE-08a: Vibration Damper Retrofit Scope Vibration Susceptibility Categorization



SCE-23-09. Hardening Severe Risk Areas

Description: For facilities in its SRA that have not undergone covered conductor installation, SCE does not perform adequate analysis of alternative mitigation plans and instead is often prioritizing undergrounding over other mitigations.

Required Progress: In its 2025 Update, SCE must:

- *Demonstrate adequate risk reduction for any areas planned for undergrounding via interim mitigation strategies, accounting for all ignition risk drivers.*
- *Provide an analysis demonstrating its process for the selection of undergrounding projects, which must include:*
    - *Location-specific ignition driver analysis.*
    - *Location-specific undergrounding effectiveness compared to combinations of mitigations (such as covered conductor, early fault detection, falling conductor protection, other advanced protection, and sensitive relay profile).*
    - *Developing an estimate of the cumulative risk exposure of its mitigation initiative portfolio taking into account the time value of risk as part of mitigation comparisons.*
    - *PSPS risk when choosing mitigations and locations, including supporting materials for how PSPS risk was calculated (such as frequently de-energized circuits selected for undergrounding).*
- *If applicable, adjust SCE's hardening scope to account for the above evaluation. If SCE is not adjusting its hardening scope, it must provide an explanation as to why adjustments are not necessary.*

Required Progress Item #1: Demonstrate adequate risk reduction for any areas planned for undergrounding via interim mitigation strategies, accounting for all ignition risk drivers.

Targeted undergrounding has significant and lasting impacts on mitigating wildfire risks (at least 45 years of near-total wildfire risk elimination). However, given its expense, SCE prudently targets Severe Risk Areas, which have the highest absolute risk levels and potential for extreme and catastrophic wildfires, for undergrounding.

For areas where SCE plans to implement targeted undergrounding, SCE has a suite of interim wildfire mitigation activities to identify and remediate risk while the targeted undergrounding is being planned, designed, and constructed. SCE performs risk-prioritized inspections to identify any maintenance issues that may lead to equipment failure at the highest frequency (at least once a year) of anywhere in its service area, significantly surpassing the minimum General Order 165 required frequency of once every five years. SCE also performs vegetation management (e.g., line clearing, pole brushing, hazard tree management) to address the largest drivers of contact-from-object faults. Similar to asset inspections, for certain vegetation management activities, Severe Risk Areas receive more frequent treatment compared to the rest of SCE's service territory. For example, Severe Risk Areas receive an annual Hazard Tree inspection and many receive annual expanded structure brushing. SCE also uses its Areas of Concern (AOC) program to identify specific areas with heightened short-term potential for wildfire risk, and to schedule additional or accelerated inspections and/or vegetation management activities.[34]

In addition to more frequent asset and vegetation inspections, SCE also employs fast curve settings, often paired with fast acting current limiting fuses certified by CAL FIRE, to quickly reduce the energy released during a fault, should one occur. Finally, as a last resort, SCE also employs Public Safety Power Shutoffs to de-energize lines if winds and fire potential present too dangerous of conditions to operate the grid.

Required Progress Item #2: Provide an analysis demonstrating its process for the selection of undergrounding projects, which must include:

- *Location-specific ignition driver analysis.*
- *Location-specific undergrounding effectiveness compared to combinations of mitigations (such as covered conductor, early fault detection, falling conductor protection, other advanced protection, and sensitive relay profile).*
- *Developing an estimate of the cumulative risk exposure of its mitigation initiative portfolio taking into account the time value of risk as part of mitigation comparisons.*
- *PSPS risk when choosing mitigations and locations, including supporting materials for how PSPS risk was calculated (such as frequently de-energized circuits selected for undergrounding).*

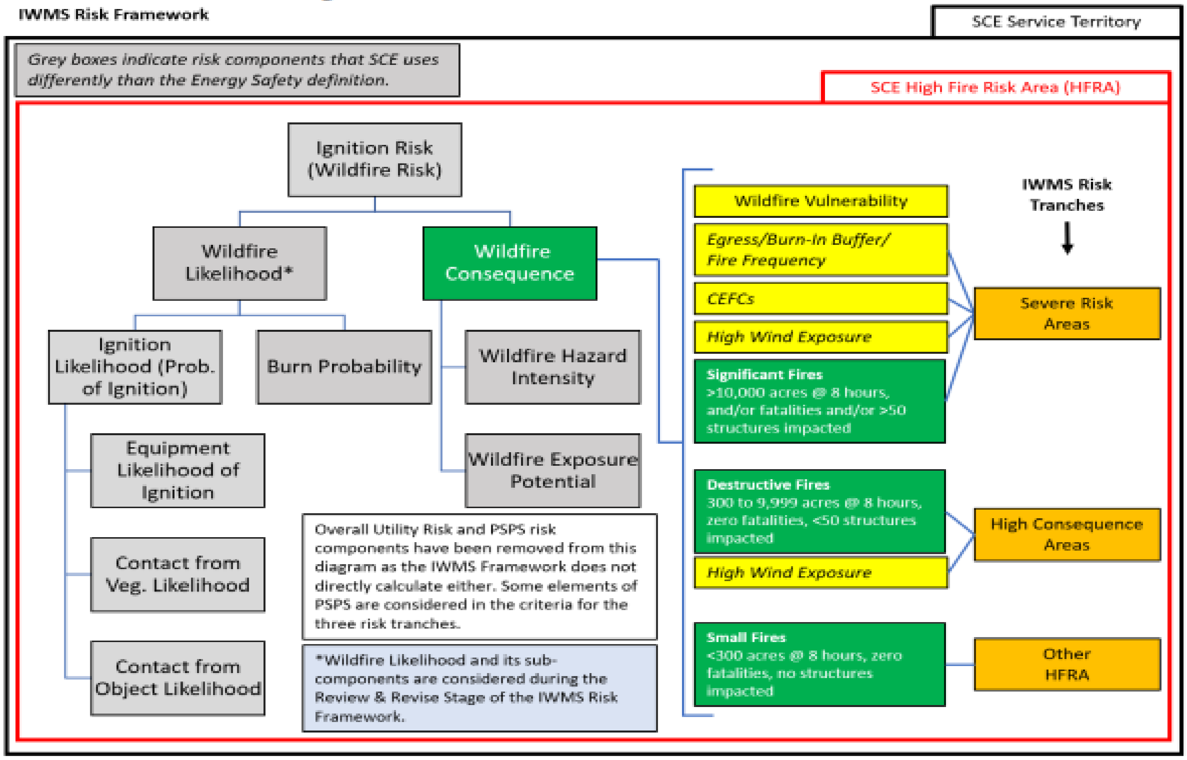
SCE presents below further analysis demonstrating that its process for selecting undergrounding projects takes into account location-specific drivers, location-specific comparison to alternatives such as covered conductor, time value of risk, and PSPS risk. The conclusions of this further analysis reinforce the conclusions SCE arrived at through its IWMS process.

SCE's IWMS is a framework that initially uses a variety of components to classify SCE's HFRA into three risk tranches, which then correspond to preferred mitigation portfolios based on the level of absolute risk present in those tranches. In Severe Risk Areas, SCE has determined that the absolute risk levels and potential for extreme and catastrophic wildfires is such that targeted undergrounding ("TUG") is merited if feasible. Figure SCE 6-03, from page 102 of SCE's 2023-2025 WMP (copied below), details the considerations to initially assign circuits to various tranches.

[34] For representative examples, see SCE's 2023-2025 WMP, pages 284 and 424-425. AOCs are also mentioned numerous other times in the 2023-2025 WMP.

Figure ACI SCE-23-09a: SCE's IWMS Risk Framework

Figure SCE 6-03 - SCE's IWMS Risk Framework



Following the initial tranche assignment, a team of SMEs from SCE's Wildfire Safety, Fire Science, Enterprise Risk Management, and Engineering groups reviews, refines, and revises the initial output from the previous step using inspection photographs, satellite imagery, maps, and other data sources to consider local conditions and features that may alter the initial designation. During this process, they review local ignition drivers such as vegetation, windspeeds and equipment, and also consequence drivers such as fuel load, population proximities, and terrain. Please see the WMP supporting documents on www.sce.com/safety/wild-fire-mitigation for an example of such an assessment.

Although SCE believes its IWMS framework is sound, pursuant to this ACI, SCE conducted an analysis of the process to select undergrounding projects. SCE examined both ignition and PSPS risk at each of the circuits that it identified as Severe Risk and where it selected TUG as the mitigation over covered conductor and REFCL ("SRA sites").[35] For ignition risk, SCE leveraged its POI models, which take into account local factors such as historical wind and number of customers; historical risk drivers such as vegetation; and available asset attributes and condition data (i.e., age, voltage, inspection results, etc.). SCE also used its Technosylva-based consequence model, which incorporates granular model inputs (e.g., buildings, assets, fuels, population), advanced fire propagation techniques (e.g., urban encroachment), and direct

[35] In this analysis, SCE looks at the circuit segments planned for TUG between 2025 and 2028. SCE then rolled up the segments to the circuit level.

mapping of consequence scores to individual assets, to estimate the natural unit consequences (e.g., structure burned, acres burned, and population impacted) from individual ignition simulations. These natural units were translated into MARS units to incorporate safety, financial and reliability impacts due to wildfire. SCE then multiplied the POI with the consequence score of all the circuit segments at each TUG site to determine a wildfire risk value.

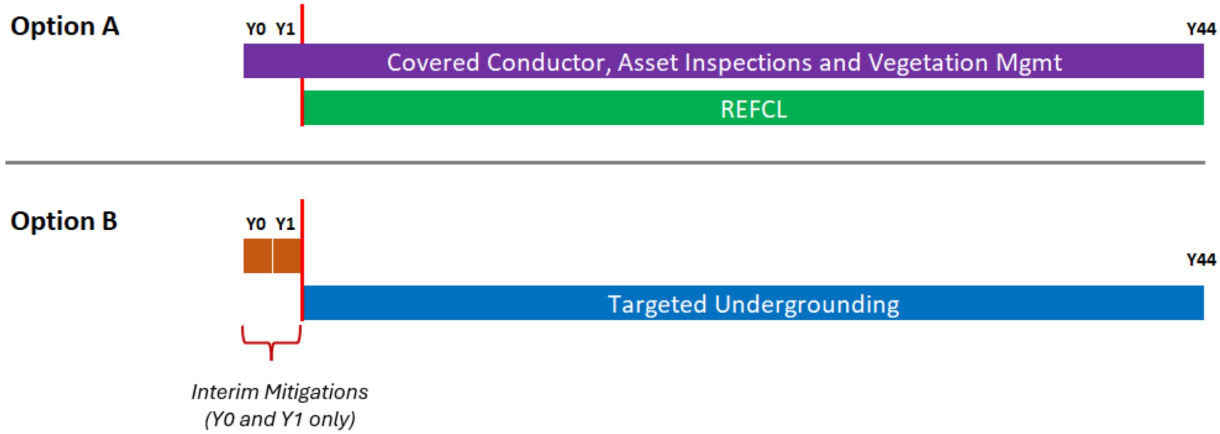
For PSPS risk, SCE first estimated the baseline probability of de-energization (POD) of each circuit using a 10-year historical back-cast of weather, wind, fuel dryness conditions using the current Fire Potential Index, and fuel de-energization thresholds. The consequences of de-energization are derived by estimating the associated frequency and duration of those events and multiplying them by the resulting consequences in natural units (e.g., Customer Minutes of Interruption) and then converted into MARS units. SCE then multiplied the POD and the consequences at the circuit level, to estimate a baseline risk score for PSPS.

SCE then compared the amount of risk (both wildfire and PSPS risks) reduced at each circuit under two different mitigation portfolios: a) covered conductor, REFCL, asset inspections and remediation, and vegetation management ("CC/REFCL++") and b) TUG, over a period of 45 years. SCE used the combined mitigation effectiveness of each portfolio for each specific ignition risk driver to reduce the total risk each year.

To take into account the time value of risk, SCE made the following assumptions.[36] First, given the average lead time for the different mitigations, SCE assumed that covered conductor can be deployed two years earlier than REFCL or TUG. For example, if a circuit is planned for 2025 and if CC/REFCL++ is the mitigation choice, then the years 2023 and 2024 would have the benefits of covered conductor, asset inspections, and vegetation management, and the next 43 years (2025-2068) would have the benefits of CC/REFCL++. Note that year 45 marks the end of the useful life of CC. If TUG is the mitigation choice, then during the years 2023 and 2024 SCE would mitigate the total risk at SRA sites with interim mitigations such as asset inspections, vegetation management, and fast curve settings and the next 43 years (2025-2068) would have the benefits of TUG. Figure ACI SCE-23-09 below illustrates the two mitigation portfolios, the mitigation deployment, and the cumulative risk reduction over the 45 years of service life for covered conductor. This analysis shows that for all SRA sites combined, TUG has a higher risk reduction than CC/REFCL++ even though TUG's 45 years of useful life is not fully realized. Despite that TUG's useful life benefits are not fully realized in this comparison, TUG still has a higher risk reduction in over 90% of the SRA sites.

[36] For this analysis, SCE assumed that REFCL was feasible for all SRA sites, which may not be the case.

Figure ACI SCE-23-09b: Mitigation Portfolio Comparison



The Net Present Value of the risk reduction for Option A and B are 1.4 and 1.6 respectively.

As described above, the key assumptions used to derive POI and POD include historical ignitions, ignition drivers, historical de-energization events, wind, weather, fuel conditions, mitigation effectiveness assumptions, and fuels or high wind conditions in proximity to SCE overhead distribution and assets in HFRA. If anything, this analysis could be conservative, as climate change is likely to exacerbate extreme weather in the future.

This analysis took into account location-specific risk drivers and mitigation effectiveness. Further, SCE's analysis took into account the time value of risk and PSPS risk. After considering these factors independently from its IWMS framework, SCE was able to validate its selection of TUG for its SRA sites. Please see the WMP supporting documents on www.sce.com/safety/wild-fire-mitigation for a document with additional explanation of for details on the calculation methodology and results.

Required Progress Item #3: If applicable, adjust SCE's hardening scope to account for the above evaluation. If SCE is not adjusting its hardening scope, it must provide an explanation as to why adjustments are not necessary.

As described above, for Severe Risk Areas, SCE's analysis of local ignition risk drivers—and taking into account the value of time—concludes that targeted undergrounding reduces more absolute risk than a comprehensive portfolio of alternatives.

SCE-23-10. Transmission Conductor Splice Assessment

Description: SCE has identified a high rate of high and medium priority issues during its X-rays of splices performed in 2022 and created notifications to correct these issues. SCE commits to more proactive mitigations if rates remain high. Energy Safety expects SCE to closely monitor and report splice assessment rates/findings, and to conduct further analysis on root cause of splice issues.

Required Progress: In its 2025 Update, SCE must commit to extending this program beyond 2023 and consider increasing the sample size. SCE must provide further analysis on its splice issues including:

- *ID number and age of splice.*
- *Date of X-ray.*
- *Date of most recent detailed inspection prior to X-ray.*
- *Date of most recent infrared inspection prior to X-ray.*
- *Circuit.*
- *Issue category.*
- *Failure mode (why the P1, P2, or P3 notification was generated).*
- *Root cause.*
- *Potential systemic causes.*

SCE plans to continue the transmission conductor and splice assessment program through 2025. Below SCE provides further explanation of its findings and approach, in addition to providing the required details on individual inspection findings as a WMP supporting document on www.sce.com/safety/wild-fire-mitigation.

a. ID number and age of splice: SCE does not have the age of splices in our system of record because the work is routine and uses B materials[37], and as such is not typically documented to the same degree as larger capital projects or programmatic work. Individual splices can be identified by the underlying asset functional location and the installation location on the asset.

b. Date of X-ray: Please refer to the ACI-SCE-23-10 Attachment at the link provided above.

c. *Date of most recent detailed inspection prior to X-ray*: Please refer to the ACI-SCE-23-10 Attachment at the link provided above.

d. Date of most recent infrared inspection prior to X-ray: Infrared inspections are completed from a distance and may not capture the same types of issues found by an X-Ray inspection. Please refer to ACI-SCE-23-10 Attachment at the link provided above.

[37] B materials are minor miscellaneous items used as part of remediation work activities, including cross arms, fuses, insulators, bolts, nuts, pins, etc. These materials are not purchased directly for specific work orders the way larger assets (such as poles) are kept in lay down yards and other material supply stations and used by crews as needed for assigned work. Because of the nature of B material and its use in small amounts for thousands of active work orders associated with SCE's construction and maintenance activities, it is not realistic to track these items on an individual basis.

e. Circuit: Please refer to the ACI-SCE-23-10 Attachment at the link provided above.

f. Issue category: Please refer to the ACI-SCE-23-10 Attachment at the link provided above for the issue category (P1, P2, P3, and none). The "none" category was determined after further investigation revealed that the reported potential issue did not exist on an inspected splice.

g. Failure mode (why the P1, P2, or P3 notification was generated): Please refer to the "identified splice issues" and "issue priorities" sections below.

h. Root cause: Please refer to the "root cause" section below.

i. Potential systemic causes: Please refer to the "potential systemic causes" section below.

Identified Splice Issues

The identified splice issues can be grouped into six categories:

1. Steel conductor not fully inserted into the steel sleeve: According to manufacturers, the steel conductor should be fully inserted into the steel sleeve, within a tolerance of .25 inches.
2. Steel sleeve off-centered: Manufacturers allow a 0.75 inch off-centered tolerance.
3. Steel sleeve compression issues: Uneven compression where some compressions look deeper than others or are not fully compressed.
4. Steel core directly contacting aluminum strands: This can allow current to flow through the steel core, causing the deterioration of the steel sleeve.
5. Lack of filler compound/grease within the aluminum cavity.
6. Aluminum strands not fully inserted into aluminum sleeve compression sections or slippage of aluminum strands. These conditions can lead to a crack in the aluminum sleeve, and/or indicate deterioration and need for replacement.

Issue Priority

SCE applies a P1, P2, or P3 designation consistent with CPUC GO 95, Rule 18 criteria and internal practices for other inspection programs.

Root Cause

Based on the age of splices and given that they operate fully exposed to the elements with expected wear-and-tear over time, it is not possible for SCE to conclusively determine the root cause of each of the identified splice issues. SCE has used a variety of splice kits and materials over the years from multiple manufacturers. A variety of different causes and conditions could conceivably have led to the issues SCE observed based on these inspections. For example, a lack of grease could be due to the type or quantity of grease that came with the splice kit, due to environmental and operating conditions of a particular splice, or simply due to the passage of time since the grease was originally installed.

Because of the challenge of tracing back conditions found in the present day to a root cause potentially decades in the past with sufficient confidence, SCE is instead focusing on proactive measures to address the identified splice issues going forward (see following section).

For these reasons, SCE has not speculated on a potential root cause for the individual findings as documented in the attachment available at www.sce.com/safety/wild-fire-mitigation.

Potential Systematic Causes

Given the high find rate, SCE determined that splices with potential issues may be addressed more comprehensively and more expeditiously by forgoing the inspection and moving straight to remediation. SCE is evaluating the scope and scale of a proactive approach, as well as the cost and benefit, and plans to refine its strategy over the course of 2024 and 2025. Subject to that analysis and field learnings, SCE will be in a position to determine if a more formalized splice replacement program should be included in the 2026-2028 base WMP. SCE anticipates its determination on a potential future transmission splice program would be part of its analysis of its transmission hardening strategy, which is one of its 3-year objectives that is due by December 2025.[38]

For these reasons, SCE has not speculated on a potential systematic causes for the individual findings as documented in the attachment available at www.sce.com/safety/wild-fire-mitigation.

[38] "Perform assessments of transmission hardening options and develop potential pilots/programs (contingent upon results of assessments)", completion date of December 2025. SCE's 2023-2025 WMP, Table 8-1, page 231.

SCE-23-11. Covered Conductor Inspection and Maintenance

Description: Although SCE has incorporated some checks into its inspection and maintenance procedures to address failures specific to covered conductor, such as identifying areas with exposed conductor, it has not adequately updated its inspection and maintenance procedures to properly cover potential failure modes for covered conductor.

Required Progress: In its 2025 Update, SCE must discuss how failure modes unique to covered conductor will be accounted for in its inspections, including:

- *Water intrusion.*
- *Splice covers.*
- *Surface damage.*

If SCE determines no changes to its inspection and maintenance procedures are necessary, then it must discuss how its current inspection and maintenance procedures adequately address covered conductor failure modes.

SCE's current inspection and maintenance procedures, combined with SCE's planned Covered Conductor Inspections Pilot, adequately address potential failure modes unique to covered conductor. As an initial matter, SCE's inspection and maintenance procedures call for detailed visual inspections of SCE's distribution facilities for signs of equipment degradation or other wear and tear due to external factors such as weather or damage caused by third-parties. Pursuant to SCE's "360 inspection" program, SCE's distribution detailed inspections consist of a combined ground and aerial inspection of a structure, including structures where covered conductor has been installed.

General Order (GO) 95 sets forth overhead electric line construction standards, and GO 165 sets forth minimum timing requirements for inspections. SCE performs inspections of distribution assets in High Fire Risk Areas (HFRA), including covered conductor, beyond the relevant GO 95 and GO 165 requirements. For example, between compliance cycles, SCE conducts more frequent, risk-based inspections in HFRA to identify equipment degradation which could lead to a potential ignition risk.

As explained below, SCE's inspection procedures and updates to inspection criteria account for potential failure modes unique to covered conductor, including surface damage, water intrusion, and splice covers. SCE also plans to conduct a covered conductor inspections pilot beginning in 2024 to identify potential opportunities to further strengthen its inspections and maintenance procedures specific to covered conductor.

Surface Damage

SCE's inspectors utilize a distribution inspection form, which SCE updated in November 2023, to include questions relating to potential covered conductor conditions. In particular, the inspection form directs inspectors to identify surface damage to covered conductor. Surface damage may include abrasion damage from vegetation contact with the covering or a covering puncture produced from the high voltage effects of lightning. SCE's design and maintenance approaches attempt to avoid these issues through vegetation management and application of surge arresters, respectively. However, if surface damage is identified, inspectors are instructed to report the damage, and the damaged portion may be replaced as part of covered conductor maintenance.

Water Intrusion

Joint utility testing for water intrusion showed that locations where the covering on covered conductor is removed may be a source for water intrusion into the conductor stranding. Testing also showed that moisture blocking covered conductor designs can prevent moisture ingress into the covered conductor sections when the covering is removed, offering the potential for improved performance compared to that of bare conductor. SCE is evaluating the potential use of moisture blocking covered conductor designs as an option for future use, though this does not influence inspection and maintenance of existing conductors without these design features.

As noted above, SCE updated its distribution inspection form criteria to specifically include identification of corrosion of covered conductor. If inspectors observe impacts from water intrusion, such as signs of corrosion of covered conductor, they are instructed to report that observation. Such observations are assessed by Gatekeepers, who are Qualified Electrical Workers (QEWs), for remediation as necessary.

Splice Covers

SCE applies splice covers to cover the metallic splice body, re-establishing a continuous covering through the conductor span. Splice covers are not used with bare conductor and are uniquely applied to SCE covered conductor applications. SCE inspects splice covers in the same way that it inspects the insulating material on the covered conductor, and inspectors may report observed splice cover issues for remediation. SCE's splice covers are typically installed as part of the initial splice installation to avoid re-splicing the conductor. SCE is evaluating options which may simplify splice cover maintenance, should it be required, to eliminate the need to re-splice the conductor.

Covered Conductor Inspections Pilot

In 2024, as part of a covered conductor inspections pilot, SCE also plans to perform targeted inspections of certain covered conductor installations throughout SCE's service territory to evaluate whether additional inspection, maintenance, or design improvements may be beneficial in those areas based on their unique environmental conditions. Subject to lessons learned through this pilot, SCE will evaluate whether supplements or refinements to the distribution inspection form or inspection procedures may further improve SCE's inspections and maintenance of covered conductor, including to account for issues relating to surface damage, water intrusion, or splice covers.

SCE-23-12. Asset Maintenance and Repair Maturity Level Growth

Description: SCE does not outline a plan or set any targets that indicate how it will consider both PSPS risk and equipment utilization when establishing maintenance frequency by 2025.

Required Progress: In its 2025 Update, SCE must:

- *Discuss how its maintenance programs will account for PSPS risk, including how the PSPS risk assessment will alter the frequency of maintenance.*
- *Discuss how its maintenance programs will account for asset usage, including how increased usage will alter the frequency of maintenance.*

Required Progress Item #1: Discuss how its maintenance programs will account for PSPS risk, including how the PSPS risk assessment will alter the frequency of maintenance.

SCE defines the following terms used in its response:

PSPS risk: SCE quantifies PSPS risk based on the probability of circuit de-energization due to PSPS operations and the impacts to customers due to the events. PSPS Risk = Probability of De-energization x Impacts (reliability, financial and safety) x AFN (Access to Functional Needs) Multiplier.

Asset Usage: SCE utilizes the following parameters when considering asset usage: age of asset, historical operations such as loading, connected customers, and count of operations for switching devices. Since the inception of SCE risk-informed inspections and asset maintenance programs, SCE has factored in asset usage to determine inspection frequency, which informs remediation or maintenance due to identified conditions. In 2017, SCE commenced utilization as asset usage data as a variable in its wildfire risk machine learning models. The model then produces results for the Probability of Ignition (POI) that are used in many of SCE's wildfire mitigation programs.

SCE's maintenance[39] and inspection program currently accounts for PSPS risk in three different ways.

The first is how SCE determines its maintenance and inspection scope, which is driven primarily by two elements: IWMS risk tranche and POI. The structures that fall into Severe Risk Area and High Consequence Area IWMS tranches scope have a relatively higher consequence and are inspected the most frequently. In addition, Severe Risk Areas include consideration of potential PSPS de-energization wind and gust considerations.

Second, SCE's PSPS thresholds account for wind/gust speeds and Fire Potential Index (FPI) as well as any pending maintenance items (e.g., P1 or P2s) that may cause ignition risks. The pending maintenance items are applied as a discount factor in the wind/gust thresholds for PSPS operations. SCE's notification remediations are prioritized based on wildfire risk scores that are closely aligned with the scores used for PSPS operations where pending maintenance

[39] SCE is interpreting maintenance to be the remediation of notifications created against its assets. As such, for transmission and distribution assets, SCE conducts inspections to identify conditions that need to be remediated.

items are applied as discount factors to the wind/gust thresholds. SCE's maintenance program also considers PSPS risks by effectively adjusting the probability or frequency and/or duration of PSPS events, relative to maintenance activities.

Third, in 2023, SCE began to include PSPS risks in the prioritization of AOCs that were created through inspections in those areas. The PSPS risk was an added component to identify which AOC remediations should be accelerated.

Required Progress Item #2: Discuss how its maintenance programs will account for asset usage, including how increased usage will alter the frequency of maintenance.

As described above, SCE uses POI to determine inspection frequency and remediation prioritization. SCE's POI calculation considers the asset condition by utilizing EFF (Equipment and Facility Failure) machine learning models. These models account for asset usage, in addition to a variety of other factors such as asset age, loading, etc. (e.g., the switch model uses the number of switch operations as a feature in the model). For instance, when asset usage increases, the POI for that asset would likely be impacted, which is factored into the inspection scope that informs our remediation efforts.

SCE-23-13. Addressing Backlogged Work Orders

Description: SCE does not have a detailed plan to address its current and growing backlogged work orders in a timely manner.

Required Progress: In its 2025 Update, SCE must provide a detailed plan, including associated resource and workforce plans, to address overdue work orders at a speed greater than work orders being added. This must include at a minimum:

- *How SCE plans to prioritize and address its existing backlog, particularly work orders that have been open for longer than five years.*
- *How SCE plans to allocate workforce resources to address its backlog.*
- *SCE's procedures and documentation for determination of ignition-risk tags. This should include, but not be limited to:*
  - *Any criteria used by SCE for determining ignition risk, such as modeling output (including both ignition and consequence risk), equipment type, and equipment age.*
  - *The process for prioritizing the closure of tags based on the calculated ignition risk.*
- *How SCE plans to timely address the potential increase in work order tags resulting from improvement to routine inspections as well as additional inspections as part of its plan to address its backlog. This must include:*
  - *Estimates on the number of new work orders broken down by additional inspection type.*
  - *How SCE will integrate additional inspection findings into its prioritization.*
  - *Resource allocation plans in order to timely close tags.*

Consistent with CPUC General Order 95 (GO 95), Rule 18, SCE classifies notifications[40] using the P1/P2/P3 categories based on their location, type of finding or condition, and risk. SCE also schedules remediations of conditions consistent with the timelines set forth in GO 95, Rule 18.

SCE achieved its 2023-2025 WMP targets for its P2 backlog but recognizes that certain notifications have remained open due to various constraints, and that new notifications have been added, which is the scope of SCE's response to this ACI. P3 notifications represent the lowest priority ranking, do not pose ignition risk, and have a due date of five years.

From 2020-2022, SCE completed approximately 88% of its P1 and P2 notifications on time, despite significant increases in inspection volume, scope, and findings. The overall number of notifications due between 2020-2022 increased by 14% from the years 2017-2019 due to changes in SCE's inspection processes, such as inclusion of aerial inspections, increased inspections in HFRA, and enhanced detailed inspections.

As SCE stated in its 2023-2025 WMP[41], SCE groups its P2 backlog into four categories:

[40] In the context of this ACI response, SCE uses the terms "notifications" and "work orders" interchangeably.
[41] SCE 2023-2025 Wildfire Mitigation Plan, page 757.

1) A **pending late/other** notification signifies a notification that is past due and does not fall within the three categories defined below (i.e., GO 95 exception, notify third-party, or inactive equipment and/or FLOC issues).
2) A **GO 95 exception** applies when an external constraint prevents SCE from completing work within a compliance timeframe. There are several scenarios which qualify for GO 95 exception: (1) permitting, (2) third party refusal, (3) no access, and (4) system-wide emergency. While resolution of GO 95 exceptions is largely outside of SCE's control, SCE includes GO 95 exceptions in its backlog reporting. SCE also reviews notifications within the GO 95 Exceptions category to assess whether the notification was still constrained and could be remediated.
3) A **notify third party/third party issue** notification occurs when SCE finds that a third party (either customer or a communication infrastructure provider) has created an issue that requires remediation on an SCE asset. Although SCE cannot force the third party to remediate, SCE notifies them of the outstanding issue.[42]
4) An **inactive equipment/FLOC** notification occurs due to a latency in updating the system of record related to: (1) inactive equipment or FLOC; and/or (2) reject notifications. Inactive Equipment or FLOC notifications stem from errors with dispositioning inactive equipment or FLOCs in our system of records. For example, when poles and equipment are replaced or deactivated in the system of record during emergency conditions such as storm work or fire restoration, open notifications may not be promptly updated once the asset is re-activated or replaced. Reject Notifications occur when a notification is no longer needed because the issue has been resolved, but the notification is not yet closed for administrative reasons.

Required Progress Item #1: How SCE plans to prioritize and address its existing backlog, particularly work orders that have been open for longer than five years

SCE inspects assets to identify safety and reliability issues and resolve them in a timely manner in compliance with GO 165 timeframes and GO 95 construction standards when performing remediations. SCE prioritizes notifications that pose ignition risk over work orders without an ignition risk.

Below, SCE discusses P2 notifications that have been open for longer than five years as of February 29, 2024. SCE identified 270 transmission and 1,810 distribution past-due notifications that met these criteria and were aged beyond five years. The notification backlog has grown over time due to more findings from increased inspections in high-fire risk areas. In addition, external constraints on categories such as "GO 95 exception" and "third party Issues" have contributed to the backlog growth.

[42] Pursuant to GO 95, Rule 12.6, on third party nonconformance, the utility "shall be allowed reasonable time to address the condition by pursuing appropriate corrective action and/or notification procedures."

Figure ACI SCE-23-13a: Distribution Notification Backlog Greater than Five Years (as of 2019 calendar year and Prior)

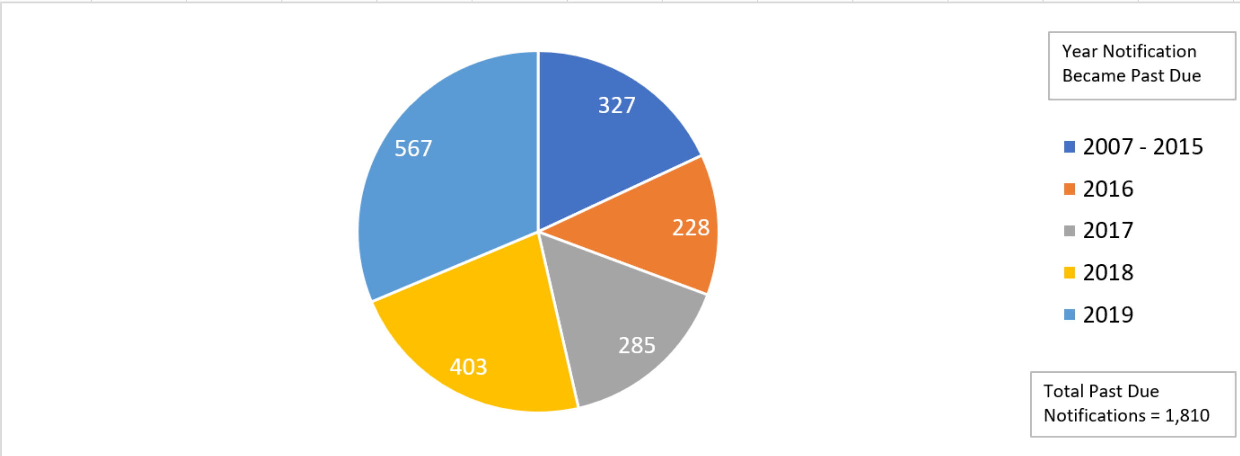
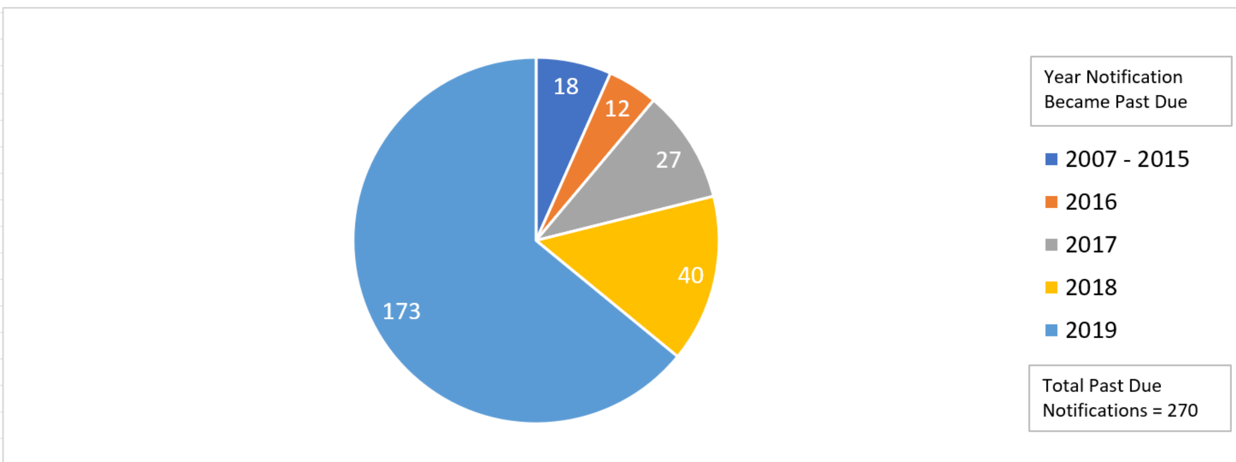


Figure ACI SCE-23-13b: Transmission Notification Backlog Greater than Five Years (as of 2019 calendar year and Prior)



To facilitate the completion of overdue notifications, SCE has established the following plans below.

PAST-DUE PLAN #1 (>5 Years Aged):

For past-due notifications aged greater than five years[43] as of February 29, 2024, SCE commits to the following plans specific to each scope category and aims to achieve these plans by December 31, 2024:

- Other and Inactive Equipment/FLOC: SCE will strive to close up to 70% of notifications that are classified as Pending/Other and Inactive Equipment/FLOC.
- GO 95 Exceptions and Notify Third-Party/Third Party Issues: SCE will review notifications classified as GO 95 Exceptions and Notify Third-Party/Third Party Issues to confirm whether the externally-caused issues or constraints are cleared and take the appropriate steps to remedy the findings and/or update the notification status.

Table ACI SCE-23-13a: Distribution Notification Backlog Greater than Five Years (as of 2019 calendar year and Prior)

Year Notification Became Past Due	3rd Party Issues	GO95	Inactive Equipment/ FLOC	Other	Grand Total
2007 - 2015	134	11	182	0	327
2016	109	30	88	1	228
2017	115	74	86	10	285
2018	113	152	115	23	403
2019	138	270	133	26	567
Grand Total	**609**	**537**	**604**	**60**	**1,810**

Table ACI SCE-23-13b: Transmission Notification Backlog Greater than Five Years (as of 2019 calendar year and Prior)

Year Notification Became Past Due	3rd Party Issues	GO95	Inactive Equipment /FLOC	Other	Grand Total
2007 - 2015	0	14	0	4	18
2016	0	10	0	2	12
2017	0	27	0	0	27
2018	0	28	2	10	40
2019	0	147	8	18	173
Grand Total	**0**	**226**	**10**	**34**	**270**

Below, SCE discusses past-due P2 notifications that are aged less than five years as of February 2024.

[43] These notifications are aged greater than five years from the date they were created.

PAST-DUE PLAN #2 (<5 Years Aged):

For past-due notifications aged less than five years as of 2/1/2024, SCE commits to the following plans specific to each scope category:

- Other: SCE will strive to close up to 70% of other notifications by December 31, 2024, unless the notifications are found to be constrained.
- Inactive Equipment/FLOC: SCE will strive to close up to 70% of Inactive Equipment/FLOC notifications by December 31, 2024.
- Third Party Issues: For notifications within this category that, (1) represented the top 50% of risk based on risk scoring performed for each notification, and (2) are in Severe Risk Areas or High Consequence Areas, SCE will review the notification to determine if the externally-caused issue still exists by December 31, 2024.
- GO 95 Exceptions: Similar to its risk approach with Third Party Issues, SCE will review the top 50% of its riskiest GO 95 exception notifications located in Severe Risk Areas and High Consequence Areas and evaluate if the external constraints still exist and make efforts to correct the issues by December 31, 2024.

As mentioned earlier, third party issues and GO 95 exception notifications have external dependencies, and SCE works with those stakeholders to monitor these notifications until closure.

Required Progress Item #2: How SCE plans to allocate workforce resources to address its backlog

SCE regularly assess wildfire work priorities and allocates resources as needed. As indicated above, most overdue notifications that SCE is responsible for remediating are delayed due to external constraints. Accordingly, SCE is shifting internal resources to focus on minimizing constraints in 2024, and will also allocate personnel as needed to meet our commitments discussed above.

Moreover, the vast majority of past due notifications pose low ignition risks. In 2024, SCE will continue to monitor new and past-due notifications in the “inactive FLOC/reject” and “other” categories which comprise approximately 25% of all past-due notifications.

Required Progress Item #3: SCE’s procedures and documentation for determination of ignition-risk tags. This should include, but not be limited to: a. Any criteria used by SCE for determining ignition risk, such as modeling output (including both ignition and consequence risk) equipment type, and equipment age; b. The process for prioritizing the closure of tags based on the calculated ignition risk

Required Progress Item #3a: Any criteria used by SCE for determining ignition risk, such as modeling output (including both ignition and consequence risk) equipment type, and equipment age

SCE considers several criteria to determine a notification’s ignition risk:

- Whether the location is within HFRA
- Wildfire consequence score (based on how many acres and structures would burn)
- Areas of Concern (AOC) identifier
- PSPS identifier

- Compliance due date assigned dependent upon location of the notification
- Problem statement identifies the condition of the asset (i.e. Repair broken insulator)
- Probability of Ignition (POI) (which includes factors such as equipment type and age)
- Age of the notification

SCE weighs these criteria, as well as compliance due dates, to determine when a notification should be scheduled for remediation or considered to have an ignition risk.

Required Progress Item #3b: The process for prioritizing the closure of tags based on the calculated ignition risk

Compliance due dates consider ignition risk by using the location of the notification, in HFRA or non-HFRA, to determine whether remediation must occur in 72 hours (as a Priority 1), 6 to 12 months (as a Priority 2) or up to 5 years (as a Priority 3).

Since the 2023-2025 WMP filing, SCE has updated its prioritization formula to rank all of its open notifications, not just past-due notifications. This formula uses factors including wildfire consequence score, POI, AOC, and whether it is located on a circuit with a history of PSPS activity.

When SCE performs summer and fall remediations in Areas of Concern (AOC), it utilizes its prioritization formula to determine the top 10% of risk that must be mitigated before a particular date.

Required Progress Item 4: How SCE plans to timely address the potential increase in work order tags resulting from improvement to routine inspections as well as additional inspections as part of its plan to address its backlog. This must include: a. Estimates on the number of new work orders broken down by additional inspection type; b. How SCE will integrate additional inspection findings into its prioritization; c. Resource allocation plans in order to timely close tags

Required Progress Item 4a: Estimates on the number of new work orders broken down by additional inspection type

In 2022 and 2023, SCE's distribution find rate from HFRA 360 inspections was approximately 27%[44]. In 2024, SCE is planning 187,000 distribution inspections, with a strive up to 217,000 inspections, as indicated in Table 8-4 of the 2023-2025 WMP, which would result in approximately 58,600 new notifications assuming a 27% find rate.

In 2022 and 2023, SCE's transmission find rate from HFRA ground and aerial inspections was approximately 9%. In 2024, SCE is planning 28,000, with a strive up to 29,500, transmission HFRA inspections, as indicated in Table 8-4 of the 2023-2025 WMP, which would result in approximately 2,600 new notifications assuming a 9% find rate.

[44] This find rate includes all work types, including e-crew, third party issue, focus areas (e.g., guy anchor repair/replacement), and non-focus areas (e.g., animal guard repair/replacement).

Required Progress Item 4b: How SCE will integrate additional inspection findings into its prioritization?

SCE prioritizes a balance of both its compliance-driven and riskiest remediations before performing lower-risk remediations. SCE's prioritization model is discussed above in response to Required Progress Item #1. Additional inspection findings would be integrated into this prioritization framework.

SCE will continue to deploy its accelerated AOC remediations in both summer and fall.

Required Progress Item 4c: Resource allocation plans in order to timely close tags

As stated above, with respect to work within SCE's control, the past-due notifications classified both as "other" or "inactive FLOC/rejects" comprise approximately 30% of the total backlog.

At this time, SCE anticipates that its current workforce, subject to normal transitions and employee turnover, is sufficient to meet the P2 backlog reduction goals as defined in SCE's response to this ACI.

SCE-23-14. Modification of Work Order Due Dates Based on Risk Assessment

Description: SCE Gatekeepers disagreed with the risk assessments performed by field inspectors in 31.9 percent of evaluated Priority 2 notifications in 2022. The root cause of the difference in risk determination should be identified.

Required Progress: In its 2025 Update, SCE must analyze risk assessment disparity between Gatekeepers and inspectors. This analysis must include:

- *Evaluating the consistency of any risk assessment training provided to Gatekeepers and inspectors.*
- *Auditing inspector risk assessments on notifications with modified due dates.*
- *Auditing Gatekeeper due date modifications (both extensions and advances).*
- *Conclusions regarding root cause.*

SCE must also clarify if incorrect due date assignment is evaluated in the QA/QC process for distribution detailed inspections, and, if it is, why the QA/QC pass rates for distribution detailed inspections do not appear to align with the percentage of due dates modified by Gatekeepers.

Required Progress Item #1: Analyze risk assessment disparity between Gatekeepers and inspectors. This must include: a. evaluating the consistency of any risk assessment training provided to Gatekeepers and inspectors; b. auditing inspector risk assessments on notifications with modified due dates; c. auditing gatekeeper due date modifications (both extensions and advances); d. conclusions regarding root cause.

1a) Evaluating the consistency of any risk assessment training provided to Gatekeepers and Inspectors

Both Gatekeepers and Electric System Inspectors (ESIs) go through training that involves a review of GO 95 requirements and SCE's Distribution Inspection and Maintenance Program (DIMP). SCE applies a consistent risk assessment training for Gatekeepers and ESIs as outlined in the DIMP[45]. In addition, ESIs complete an instructor-led new hire training that includes guidelines on writing notifications and undergo QC checks on identified issues prior to generating actual notifications in the field.

1b) Auditing Inspector risk assessments on notifications with modified due dates

A change in the due date does not indicate that the initial due date was incorrect. The ESI who performs the initial assessment identifies conditions in the field that need repair or replacement and completes an Inspection Questionnaire which pre-populates notification due dates based on CPUC regulatory guidelines and SCE's standards. If a Gatekeeper reviews an initial assessment and determines the condition does not pose an ignition risk, the due date can be moved out. Conversely, in situations where the risk is more imminent, the due date is moved in.

The Gatekeepers have the authority to make updates to the due dates based on GO 95, Rule 18 guidelines, applicable SCE procedures, knowledge of SCE's system and relevant experience in

[45] Page 15 – 17 of the Distribution Inspection and Maintenance Program (DIMP) – https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/Distribution%20Inspection%20and%20Maintenance%20Program%20(DIMP).pdf

the field. Typically, Gatekeepers are also distribution or transmission field workers trained to perform the gatekeeping function as one of their day-to-day functions of operating and maintaining the electric system.

As part of SCE's Overhead Detailed Inspection (ODI) Quality Control Program, the SCE QC Inspector assesses the ESI's work to assure the inspected asset meets the applicable GO 95 requirements and that no potential GO 95 infractions exist. Under this program, any unidentified or misidentified items (GO infractions) or safety/reliability issues will result in a nonconformance finding relative to GO 95 requirements.

SCE utilized a separate QA/QC program to evaluate Gatekeeper performance, including the approval or re-assignment of appropriate due dates, as previously discussed above. The Gatekeeper QA/QC program found that the Gatekeepers have a conformance rate exceeding 99%, which indicates that Gatekeepers are making correct decisions, including determination of compliance due dates. Since the Gatekeeping function serves as the final step to review and approve or reject a notification submitted by an ESI, SCE's review of the Gatekeeping function in essence serves as a review of the final step in the notification process as the ESI and Gatekeepers perform specific roles in the same process of creating and resolving notifications.

1c) Auditing Gatekeeper due date modifications (both extensions and advances)

SCE's Gatekeepers are typically QEWs that have several years of field and operational experience and have the authority to reassess timeframes as stated in SCE's procedures in the DIMP[46]. Within the notification process, the Gatekeeping function is downstream of the Inspector function and serves as the final check to review all P2 notifications and validate the details of the notifications submitted by the ESI.

SCE's QA/QC program evaluated the distribution notification gatekeeping program from May 2020 to March 2022. The QA/QC evaluation involved reviewing Gatekeeper determinations of compliance due dates and ensuring consistency with GO 95 compliance and SCE standards. Over the two-year period, 7,755 notifications were selected at random and reviewed for consistency. As noted above, the findings from this review show a conformance rate exceeding 99%.

[46] Page 10 of the Distribution Inspection and Maintenance Program (DIMP) – https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/Distribution%20Inspection%20and%20Maintenance%20Program%20(DIMP).pdf

1d) Conclusions regarding root cause

SCE's notification process requires the Gatekeepers to review, approve, modify, or reject notifications submitted by an ESI. As previously discussed, a change in the due date does not indicate an incorrect assessment from the ESI as the notification due date is pre-populated based on responses to the inspection questions. In addition, ESIs tend to be conservative and apply an abundance of caution when completing inspection questionnaires, knowing that the Gatekeepers will make the final determination based on several years of relevant field and operational experience. As described in the response to (1c) above and (2) below, the quality review of the gatekeeping process determined that this activity is functioning in accordance with program guidelines and procedures.

Required Progress Item #2: Clarify if incorrect due date assignment is evaluated in the QA/QC process for distribution detailed inspections, and, if it is, why the QA/QC pass rates for distribution detailed inspections do not appear to align with the percentage of due dates modified by Gatekeepers.

As mentioned in the responses to (1b) above, SCE's Overhead Detailed Inspection Quality Control Program focuses on assessing the ESI's work for potential GO 95 infractions and ensuring compliance with applicable requirements. Due date assignment by ESIs is not evaluated under this QC program. SCE has utilized a separate QA/QC program to evaluate Gatekeeper performance, including proper due date assignment. As previously noted, Gatekeepers have a conformance rate of over 99%, indicating accurate and compliant decisions regarding due dates.

SCE-23-15. Continued Monitoring of Fast Curve Settings Impact

Description: SCE needs to continue monitoring potential reliability impacts from use of fast curve settings.

Required Progress: In its 2025 Update, SCE must provide the following information for 2023 outages that occurred while fast curve settings were enabled:

- *Circuit impacted by outage.*
- *Circuit segment impacted by outage.*
- *Cause of outage (in line with Quarterly Data Report (QDR) Table 6 drivers).*
- *Number of customers impacted.*
- *Number of customers belonging to vulnerable populations (such as customers with access and functional needs and Medical Baseline customers) impacted.*
- *Duration of outage.*
- *Response time to outage.*
- *Customer minutes of interruption.*

In 2023, on circuits that had fast curve settings enabled, SCE had 188 outages affecting 262,299 customers, which resulted in approximately 18.8M customer minutes of interruption (CMI).

Please see the WMP supporting documents on www.sce.com/safety/wild-fire-mitigation for a list of all 2023 SCE outages where fast curve settings were enabled, including customer counts, duration, CMI and other key information.

SCE notes the following caveats as it relates to the outage data found at the above link:

- *Circuit segment impacted by outage:* SCE's outage data does not have a universally tracked definition of circuit segment and therefore this cannot be provided.
- *Number of customers belonging to vulnerable populations impacted:* SCE's vulnerable customer data is tracked at the circuit level, and therefore SCE is not able to distinguish how many of that circuit's vulnerable customers were impacted by each outage. Instead, SCE provides the entirety of the vulnerable population for each circuit for each outage.
- *Response time to outage:* SCE does not collect response times for all outages as crews are focused on customer restoration efforts rather than documentation of when they arrive.
- *Distribution Outage ID:* This is a unique identifier for each outage. In some cases, a Distribution Outage ID could be associated with more than one circuit due to, but not limited to the following: the impacted circuit(s) were fed from the same circuit that was the source of the outage; the circuits shared some of the same structures (e.g., overhead poles, underground vaults) and an outage on one circuit may have potentially impacted the other circuit; the circuit(s) may have been in an abnormal configuration that led to an outage impacting customers from multiple circuits; or the circuit(s) may have experienced an outage in an attempt to restore power via using multiple circuits to reduce customer outage duration.

5.4 Vegetation Management and Inspections

SCE-23-16. Implementation of SCE's Consolidated Inspection Strategy, Use of Its Tree Risk Index, and its Satellite-Based Inspection Pilot

Description: SCE is developing these programs and pilot over the course of the 2023-2025 WMP cycle. As these programs and pilot mature, Energy Safety will evaluate their quality and execution.

Required Progress: In its 2026-2028 Base WMP, SCE must report on progress, outcomes, and lessons learned related to the development, implementation, and use of its:

- *Consolidated Inspection Strategy.*
- *Tree Risk Index.*
- *Satellite-based inspection pilot.*

SCE will respond to this ACI in its 2026-2028 Base WMP, as directed.

SCE-23-17. Continuation of Effectiveness of Enhanced Clearances Joint Study

Description: The large IOUs have jointly made progress addressing the Progression of Effectiveness of Enhanced Clearances Joint Study 2022 area for continued improvement (SDGE-22-20, PGE-22-28, and SCE-22-18). Energy Safety expects the large IOUs and their contracted third party to continue their efforts and meet the requirements of this ongoing area for continued improvement.

Required Progress: In its 2025 Update, SCE, along with PG&E and SDG&E, must report on the progress and outcomes of the third-party contractor's analysis and evaluation of the effectiveness of enhanced clearances. This must include:

- *A list of the aligned variables related to vegetation risk events.*
- *A description of the chosen database type and architecture to warehouse the data.*
- *A description of how the third-party contractor incorporated biotic and abiotic factors into its analysis.*
- *The third-party contractor's assessment of the effectiveness of enhanced clearances including, but not limited to, the effectiveness of enhanced clearances in reducing tree-caused outages and ignitions.*

Additionally, SCE-22-18 established the expectation that the large IOUs make incremental progress and update their analyses with each WMP submission through at least 2025. With its 2026-2028 Base WMP, SCE, along with PG&E and SDG&E, must attach a white paper which discusses:

- *The IOUs' joint evaluation of the effectiveness of enhanced clearances including, but not limited to, the effectiveness of enhanced clearances in reducing tree-caused outages and ignitions.*
- *The IOUs' joint recommendations for updates and changes to utility vegetation management operations and best management practices for wildfire safety based on this study. This may include the IOUs' recommendations for updates to regulations related to clearance distances.*

Furthermore, SCE must, as a result of this study and white paper:

- *Assess the effectiveness of enhanced clearances combined with other mitigations including, but not limited to, covered conductor and protective equipment and device settings (e.g., EPSS, fast curve)*
- *Provide a plan for implementing the results and recommendations of the third- party contractor analysis and the white paper. This plan must include trackable milestones and timelines for implementation. SCE must also provide a list of recommendations it is not implementing and why it is not selecting them for implementation.*

EPRI Information for ACI Response

The Joint Investor-Owned Utility (IOU) Study on Enhanced Vegetation Clearances for Wildfire Mitigation technical work started in November 2022 and is scheduled to be completed by June 2024. The study is being completed by a third-party contractor, Electric Power Research Institute (EPRI). The study is divided into four phases: Database Evaluation; Database Development; Data Analysis; and Discussion of Options. Currently, the third-party contractor is finalizing the common database and plans to populate it in the first quarter of 2024. Analysis is anticipated to begin in March 2024.

Required Progress Item #1a: A list of the aligned variables related to vegetation risk events.

Immersive discussions revealed significant differences between the databases from the three utilities (i.e., the Joint IOUs, or Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric). There were thousands of variables across the three different databases, only a subset of which were similar in terms of definition and methods of recording. The research team and IOU SMEs discussed and selected the variables which were the most instructive for understanding the effects of enhanced clearance on wildfire mitigation.

EPRI examined a wide range of aligned variables from the three companies related to vegetation risk events. These were included in the common database, i.e., the joint IOU database, built from the individual IOU databases. Variables included are the definition of clearance levels/line clearances, timing of clearances, tree growth rates, event outages, trim codes, types of disturbances, weather at the time of the outage, distance to line of tree caused outage, definition of high fire risk area, date and time of tree caused outage, tree numbering system, tree species, ignition events, tree condition, and tree height, among other variables.

EPRI has streamlined the joint IOU database to include approximately 25 variables for the overall analysis. The IOUs have supplied the desired time series data to support the project that includes over a decade of time series data for some variables. EPRI has built out a SQL database that contains tables for the common variables as well as individual IOU-specific tables. These datasets contain all the original data variables from the individual IOUs to understand the unique characteristics of vegetation management practices more fully from each utility. There are plans to conduct individual analyses as well as the combined analysis of the datasets.

The database schema in the next section shows common variables used in the study. There are currently 10 individual tables housing the common variables. The tables are:

DataSet

Field	Data Type and Size	Definition
[DataSetID]	[tinyint]	Database table identification ID
[UtilityID]	[tinyint]	Utility (foreign key)
[Source]	[varchar](50)	Utility data set name

Utility

Field	Data Type and Size	Definition
[UtilityID]	[tinyint]	Database table identification ID
[Utility]	[varchar](200)	Utility name

Channel

Field	Data Type and Size	Definition
[ChannelName]	[varchar](50)	Data point
[ChannelUnit]	[varchar](10)	Data unit
[DataType]	[varchar](10)	Data type
[DataSetID]	[tinyint]	Source data set (foreign key)
[SourceDataUnit]	[varchar](10)	Source data unit
[SourceName]	[varchar](50)	Source data name
[SourceFilePosition]	[smallint]	Source data position in source data set

Outage

Field	Data Type and Size	Definition
[RadialClearanceCategoryID]	[tinyint]	Database table identification ID
[DistanceTreeCausingOutage]	[real]	Distance between circuit and tree causing outage
[LastVegManDate]	[datetime2](0)	Last date of vegetation management activity
[LatDamage]	[float]	Latitude of the tree that incurred damage
[LonDamage]	[float]	Longitude of the tree that incurred damage
[HighFireRiskAreaCombined]	[bit]	Did outage occur in a High Fire Risk Area? (Y/N)
[HighFireThreatDistrict]	[bit]	Did outage occur in a High Fire Threat District (Y/N)
[DateTreeCausedOutage]	[datetime2](0)	Date of outage caused by tree
[TreeID]	[varchar](20)	Tree ID
[IgnitionRelatedToOutage]	[bit]	Is the ignition related to the outage? (Y/N)
[Species]	[varchar](200)	Tree species
[TreeInInventory]	[bit]	Is tree in SCE's tree inventory? (Y/N)
[TreeGrowthRateID]	[tinyint]	Tree Growth Rate (foreign key)
[ESA]	[bit]	Did outage occur an Environmental Sensitive Area (ESA)? (Y/N)
[DBHCategoryID]	[tinyint]	DBH Category (foreign key)
[OutageCauseID]	[tinyint]	Outage Cause (foreign key)
[TreeConditionID]	[tinyint]	Tree Condition (foreign key)
[TreeHeightCategoryID]	[tinyint]	Tree Height Category (foreign key)
[ForesterInspectionComments]	[varchar](max)	Comments from Forester Inspection
[DistributionSystem]	[bit]	Did outage occur in Distribution System? (Y/N)
[Circuit]	[varchar](20)	Circuit name
[DeadDyingTreeBranch]	[bit]	Did Dead and Dying tree branch cause outage? (Y/N)

[UtilityID]	[tinyint]	Utility (foreign key)

Outage Cause

Field	Data Type and Size	Definition
[OutageCauseID]	[tinyint]	Database table identification ID
[OutageCause]	[varchar](200)	Description of cause of outage

Radial Clearance

Field	Data Type and Size	Definition
[RadialClearanceCategoryID]	[tinyint]	Database table identification ID
[RadialClearanceMin]	[int]	Radial Clearance lower boundary
[RadialClearanceMax]	[int]	Radial Clearance high boundary

Diameter-at-Breast Height (DBH)

Field	Data Type and Size	Definition
[DBHCategoryID]	[tinyint]	Database table identification ID
[DBHMin]	[int]	DBH low boundary
[DBHMax]	[int]	DBH high boundary

Tree Condition

Field	Data Type and Size	Definition
[TreeConditionID]	[tinyint]	Database table identification ID
[TreeCondition]	[varchar](50)	Description of tree condition

Tree Growth Rate

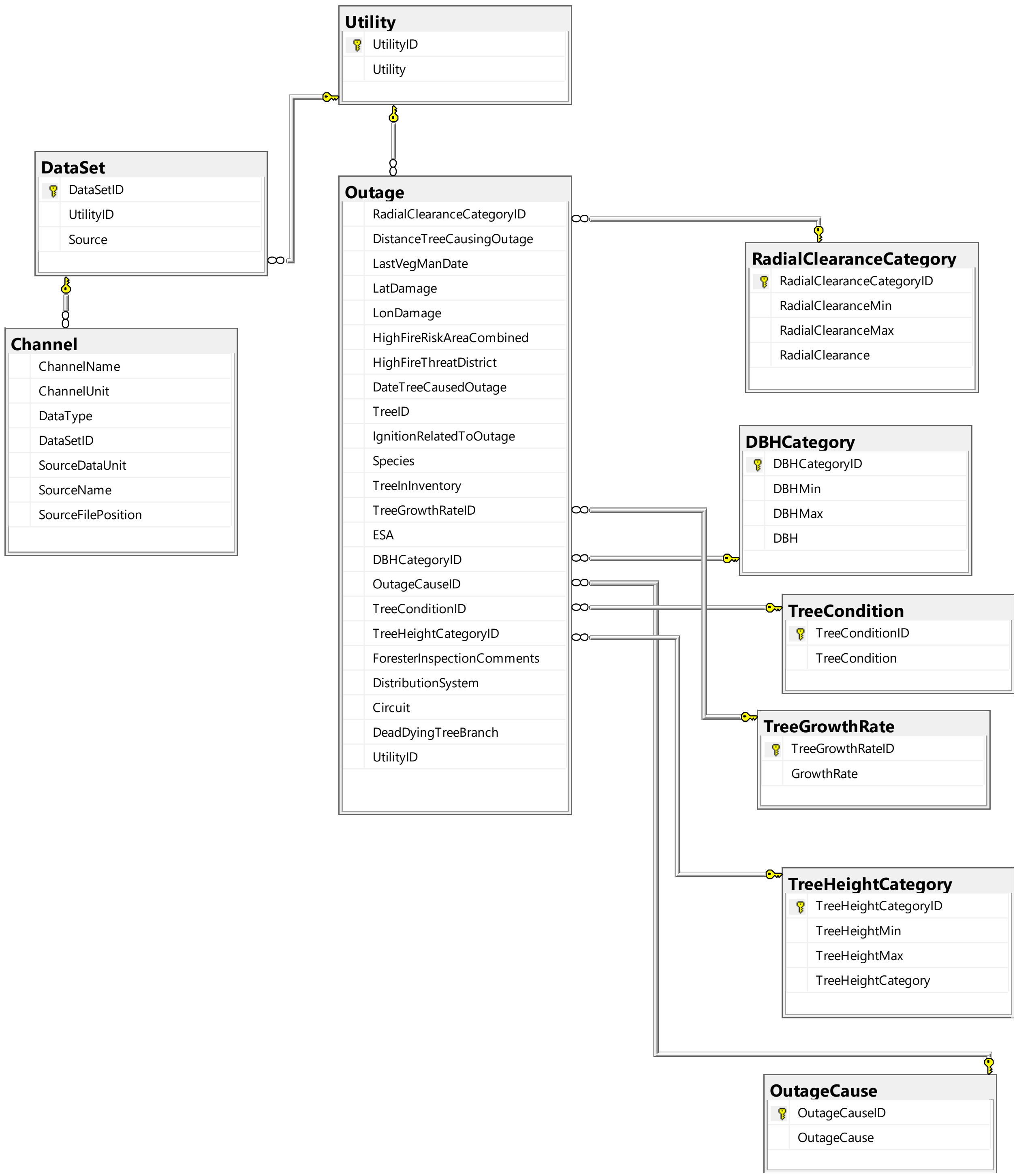
Field	Data Type and Size	Definition
[TreeGrowthRateID]	[tinyint]	Database table identification ID
[GrowthRate]	[varchar](10)	Tree growth rate ??

Tree Height Category

Field	Data Type and Size	Definition
[TreeHeightCategoryID]	[tinyint]	Database table identification ID
[TreeHeightMin]	[int]	Tree Height low boundary
[TreeHeightMax]	[int]	Tree Height high boundary

Required Progress Item #1b: A description of the chosen database type and architecture to warehouse the data.

The SQL database sits on the EPRI Data Science Platform, a secure platform located on the EPRI-owned and -managed server that will be accessible to the Joint IOUs for querying the supplied data. The data was ingested into the joint IOU database in its raw form (e.g., as Comma Separated Values (CSV), Excel, and/or spatial format file types). A subset of each IOU's original data was incorporated into the common database. Below is the database scheme for the common database.



The database includes a joint dataset as well as individualized databases for each IOU so that each IOU's subject matter experts (SME) would be able to conduct separate, individual, and confidential analyses if they would like to further explore the processed data. EPRI will provide access to the Data Science Platform for the SMEs at each IOU. Additionally, virtual machines with applications specified by each IOU will be created within the Data Science Platform allowing the data to remain within the secure EPRI environment.

See above for the list of common variables to be included in the analysis.

Required Progress Item #1c: A description of how the third-party contractor incorporated biotic and abiotic factors into its analysis.

EPRI is finalizing the common database and plans to populate it in the first quarter of 2024. Analysis is anticipated to begin in March 2024. EPRI will be determining how to use abiotic factors, and wind speed in particular, in the analysis in a way that is standard across the utilities. EPRI will likely use a publicly available dataset for the joint IOU analysis. Discussions are underway to determine how best to approach the abiotic factors with the EPRI climate researchers and utility SMEs.

See above for the list of common variables to be included in the analysis.

Required Progress Item #1d: The third-party contractor's assessment of the effectiveness of enhanced clearances including, but not limited to, the effectiveness of enhanced clearances in reducing tree-caused outages and ignitions.

EPRI is finalizing the common database and plans to populate it in the first quarter of 2024. Analysis is anticipated to begin in March 2024. At this time, an assessment of the effectiveness of enhanced clearances in reducing tree-caused outages and ignitions or for other outcomes has not been finalized.

Additionally, SCE-22-18 established the expectation that the large IOUs make incremental progress and update their analyses with each WMP submission through at least 2025. With its 2026-2028 Base WMP, SCE, along with PG&E and SDG&E, must attach a white paper which discusses:

- *The IOUs' joint evaluation of the effectiveness of enhanced clearances including, but not limited to, the effectiveness of enhanced clearances in reducing tree-caused outages and ignitions.*
- *The IOUs' joint recommendations for updates and changes to utility vegetation management operations and best management practices for wildfire safety based on this study. This may include the IOUs' recommendations for updates to regulations related to clearance distances.*

Furthermore, SCE must, as a result of this study and white paper:

- *Assess the effectiveness of enhanced clearances combined with other mitigations including, but not limited to, covered conductor and protective equipment and device settings (e.g., EPSS, fast curve)*
- *Provide a plan for implementing the results and recommendations of the third- party contractor analysis and the white paper. This plan must include trackable milestones and timelines for implementation. SCE must also provide a list of recommendations it is not implementing and why it is not selecting them for implementation.*

SCE will respond in its 2026-2028 Base WMP, as directed. The topics to be included in the white paper include:

- The IOUs' joint evaluation of the effectiveness of enhanced clearances including, but not limited to, the effectiveness of enhanced clearances in reducing tree-caused outages, and ignitions;
- The IOUs' joint recommendations for updates and changes to utility vegetation management operations and best management practices for wildfire safety based on this study. This may include the IOUs' recommendations for updates to regulations related to clearance distances;
- SCE's assessment of the effectiveness of enhanced clearances combined with other mitigations including, but not limited to, covered conductor and protective equipment and device settings (e.g., EPSS, fast curve); and SCE's provision of a plan for implementing the results and recommendations of the third- party contractor analysis and the white paper. This plan must include trackable milestones and timelines for implementation. SCE must also provide a list of recommendations it is not implementing and why it is not selecting them for implementation.

5.5 Situational Awareness and Forecasting

SCE-23-18. Weather Station Maintenance and Calibration

Description: SCE reports having over 1600 weather stations in its network that collect weather data. Frequent calibration and maintenance of weather stations is crucial for ensuring accurate, reliable, and high-quality data. As SCE's performs its annual weather station maintenance and calibration, Energy Safety will need SCE to report on the following to verify the integrity of the data collected from its weather station network.

Required Progress: SCE must:

- *Continue to maintain and keep a log of all the annual maintenance calibration for each weather station, including the station name, location, conducted maintenance, in compliance with SCE Weather Stations Calibration Checklist. The log must include the length of time from initiation of a repair ticket to completion and the corrective maintenance performed to bring the station back into functioning condition.*
- *In its 2025 Update, provide documentation indicating the number of weather stations that received their annual calibration and the number of stations that were unable to undergo annual maintenance and/or calibration due to factors such as remote location, weather conditions, customer refusals, environmental concerns, and safety issues. This documentation must include:*
    - *The station name and location.*
    - *The reason for the inability to conduct maintenance and/or calibration.*
    - *The length of time since the last maintenance and calibration.*
    - *The number of attempted but incomplete maintenance or calibration events for these stations in each calendar year.*

Required Progress Item #1: Continue to maintain and keep a log of all the annual maintenance calibration for each weather station, including the station name, location, conducted maintenance, in compliance with SCE Weather Stations Calibration Checklist. The log must include the length of time from initiation of a repair ticket to completion and the corrective maintenance performed to bring the station back into functioning condition.

SCE will continue to maintain and keep a log of all the annual maintenance calibration for each weather station. SCE's log includes the station name, location, and the date of the calibrations. SCE maintains a separate weather station maintenance log that tracks the date a repair was initiated, completion date of repair and any necessary corrected maintenance needed.

Required Progress Item #2: In its 2025 Update, provide documentation indicating the number of weather stations that received their annual calibration and the number of stations that were unable to undergo annual maintenance and/or calibration due to factors such as remote location, weather conditions, customer refusals, environmental concerns, and safety issues. This documentation must include:

- *The station name and location.*
- *The reason for the inability to conduct maintenance and/or calibration.*
- *The length of time since the last maintenance and calibration.*
- *The number of attempted but incomplete maintenance or calibration events for these stations in each calendar year.*

In 2023, SCE performed annual calibrations on 1,618 weather stations that were installed prior to 2023. 2023 new installed weather stations will be added to the 2024 calibration checklist. SCE did not calibrate one weather station that was located on a remote Transmission tower because the road became inaccessible due to a collapsed cliff side above. SCE made one attempt to calibrate this weather station because it was not financially prudent to attempt a second visit without confirmation that the road had been repaired. As of March 2024, SCE has not attempted a second visit because we have not received confirmation that the road has been repaired. This weather station received its previous calibration in May 2022.

Please see the WMP supporting documents on www.sce.com/safety/wild-fire-mitigation for SCE's 2023 Weather Station Calibration log, which includes the eligible weather stations to receive calibration, the name and location of the weather station, and relevant calibration dates.

SCE-23-19. Early Fault Detection Implementation

Description: SCE plans to expand its early fault detection technology at 300 locations during the WMP cycle. As SCE's EFD deployment program matures, Energy Safety needs SCE to report on its performance and effectiveness.

Required Progress: In its 2025 Update, SCE must:

- *Provide an overview of the installation progress, including the number of circuits equipped with early fault detection.*
- *Provide analysis of using EFD in combination with other hardening efforts, such as covered conductor and traditional hardening to maximize possible risk reduction.*
- *Document the performance of deployed EFD in identifying incipient faults, including the number of potential incipient faults detected and their accuracy.*
- *Document any instances where the EFD successfully prevented or mitigated a potential ignition.*
- *Provide additional details on any maintenance requirements related to EFD.*
- *Provide any lessons learned or recommendations for improving EFD installations, maintenance, installation challenges, or any other aspects based on the experiences described above.*

Required Progress Item #1: Provide an overview of the installation progress, including the number of circuits equipped with early fault detection.

As of 1/1/24, SCE has 42 distribution circuits equipped with 260 EFD sensors, and three subtransmission or transmission circuits equipped with 16 EFD sensors.

Required Progress Item #2: Provide analysis of using EFD in combination with other hardening efforts, such as covered conductor and traditional hardening to maximize possible risk reduction.

SCE continues installation of EFD for both covered conductor and bare wire systems. SCE expects the same mitigation effectiveness from EFD for bare and covered conductor systems. EFD cannot be applied to underground networks directly, but monitored circuitry between the sensors may also have underground cable between the overhead sensor installations. EFD has also been applied to locations with REFCL technology, with expected benefits at this point appearing similar to non-REFCL applications.

Required Progress Item #3: Document the performance of deployed EFD in identifying incipient faults, including the number of potential incipient faults detected and their accuracy.

EFD technology has proven to be capable of identifying and providing locations of undesirable conditions and degraded assets with a high degree of sensitivity and precision. A pair of sensors monitor around 3-5 miles of circuitry, and SCE has applications ranging from 12kV to 115kV. The distribution system applications have also detected issues on low volage systems. EFD may identify conditions which are temporary in nature, which can create additional challenges attempting to identify the electric system component which may be responsible for producing an RF signal, or alternating a temporary event may be from mylar balloon which may break free from conductors on their own. An intermittent detection event, among other issues, does not impact accuracy of the EFD detection system, however, it may influence SCEs ability to identify the cause of an electrical discharge anomaly.

SCE inspection's methods and actions continue to improve as we gain experience with EFD. At present we are seeing approximately a 55% find rate from inspection efforts by EFD – meaning that when a field inspection is triggered by EFD, 55% of those inspections result in a finding of some type of incipient failure. To date, EFD has a total of 41 finds[47] accredited to the system. Inspections where SCE did not find any system defects are not false positives per se. Rather whatever detection is occurring was not able to be located during the inspection. This can be for a variety of reasons, such as the issue not being visible from ground level, the issue not having progressed enough to be identifiable either visually or with inspection tooling, or detection location accuracy. On a handful of structures, the first visit did not produce findings, but a follow-up visit produced findings after the failure had progressed such that it was identifiable.

Required Progress Item #4: Document any instances where the EFD successfully prevented or mitigated a potential ignition.

EFD monitors the electric system for early signs of degradation by detecting high frequency discharges. The performance results of EFD are provided in the previous section, though SCE is not able to determine which if any of the preceding events may have progressed to an electric system related ignition event.

Required Progress Item #5: Provide additional details on any maintenance requirements related to EFD.

EFD device maintenance is expected to be similar to other related electronic devices. At this time, SCE is anticipating requirements to replace the integrated batteries on a periodic maintenance cycle. Additional electronic hardware components may also require replacement for various reasons including lightning or other surges, component defects, or upgrades for additional capabilities/improvements. External factors like car hit poles and vandalism may also create maintenance or complete replacement requirements for EFD hardware. In addition, EFD relies on accurate circuit connectivity data. As circuits are expanded or reconfigured, ongoing maintenance work is required to manage the EFD sensor pair connections.

Required Progress Item #6: Provide any lessons learned or recommendations for improving EFD installations, maintenance, installation challenges, or any other aspects based on the experiences described above.

During 2023 installation scope development, SCE expanded the transmission applications to 66kV installations. This expansion provided new developments for the product application which had not been encountered in previously completed installations. For example, SCE had previously included new cellular carrier signal strength tooling into the site selection process as part of the planning phase for EFD installation locations. SCE previously started using the cellular signal strength monitoring tool to select the best carrier based on existing connectivity at a potential installation structure before 2023. In using the tool SCE found sites that had

[47] 6 P1 findings, 28 P2 findings, and 7 P3 findings.

insufficient communication in some areas where EFD needed to be installed. To solve this SCE did the following: (1) incorporated a directional antenna as an option for installation rather than the omni-directional antenna previously used, allowing the wireless signal reach greater distance in one direction rather than shorter reach in all direction; (2) selected sites whenever practical at the highest altitude area to improve signal quality.

These 66kV applications required new construction design options to attach EFD sensors to tubular steel poles and lattice towers. Equipment mounting options for EFD were selected based on existing practices for welding of attachments to the steel pole, which can be challenging to schedule, particularly in high fire locations where sparks may be produced during the installation/welding process. The lightweight components (sensors and associated cabling) associated with the EFD may be able to be attached using other methods which may be more efficiently installed, such as application of band clamps to the pole. SCE may revisit equipment mounting options for tubular steel poles to explore options that may improve construction efficiencies for the EFD sensor equipment.

5.6 Community Outreach and Engagement

SCE-23-20. Evaluation of and Plan to Address AFN Needs

Description: SCE should provide more information on its evaluation of the needs of its AFN customer base and its plans to address them.

Required Progress: In its 2025 Update, SCE must provide details on its evaluation of the specific needs of its AFN customer base identified through its annual PSPS Tracker Survey. In addition to describing any challenges identified, SCE must also provide detailed plans and a narrative on how the plans will be implemented to address these specific needs. These details must be provided within the 2025 Update.

Required Progress Item #1: In its 2025 Update, SCE must provide details on its evaluation of the specific needs of its AFN customer base identified through its annual PSPS Tracker Survey.

SCE's PSPS Tracker Survey is one of several ways that SCE collects information and feedback from AFN customers and other stakeholders. Please see Section 2.3.2, Market Research & Survey, of SCE's 2024 Access and Functional Needs (AFN) Plan, where SCE discusses annual market research of AFN households to better understand their needs and experiences. SCE also discusses findings from its PSPS surveys in Section 2.9.4, Customer Surveys. Within these sections[48], SCE discusses the PSPS Tracker Survey and the findings from that survey, as well as other findings from other research and studies.

SCE evaluates the information collected through the PSPS Tracker Survey and other methods mentioned above to assess the availability of a PSPS mitigation measure to meet the need identified. SCE's AFN Plan provides an overview of the mitigation measures selected to address relevant PSPS Tracker Survey feedback utilizing the key findings. SCE discusses its AFN Plan in quarterly meetings with the AFN Statewide and Coordinating Councils to receive feedback on the measures available to the AFN population and identify any opportunities for improvement. SCE is continuously evaluating, evolving, and improving its efforts to address customer feedback.

Required Progress Item #2: In addition to describing any challenges identified, SCE must also provide detailed plans and a narrative on how the plans will be implemented to address these specific needs. These details must be provided within the 2025 Update.

Section 2.4, AFN Programs and Resources, within SCE's 2024 AFN plan, provides details on key findings and SCE's progress in providing mitigation measures to address feedback received through the annual PSPS Tracker Survey. 2022 PSPS Tracker Survey results, completed in Q2 2023, included customer feedback and insights on PSPS notifications and PSPS activations, as summarized below:

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[48] *See* Southern California Edison Company's Access and Functional Needs Plan for Public Safety Power Shutoff Support Pursuant to Commission Decision in Phase Two and Phase Three of R.18-12-005, at pp. 20-22 and pp. 67-70, available at https://www.sce.com/sites/default/files/AEM/Supporting%20Documents/2023-2025/AFN%20Plan.pdf (accessed February 27, 2024)

- Many comments confirm SCE's marketing, outreach, and communication strategies as an effective method of informing customers (e.g., "Emails and text messages from SCE are a top source of PSPS awareness, with text messages growing in popularity"; "AFN customers are satisfied with the cadence and number of PSPS alerts they receive, and in 2022, even more satisfied with the content's clarity and helpfulness")
- Other comments provide valuable insights that will help enhance support or bring greater awareness of resources for customers with AFN (e.g., "Awareness of AFN resources remains generally low among customers with AFN, yet interest in support is still high"; "De-energized customers with AFN continue to be the most interested in food delivery service through SCE partnerships").

SCE provides detail in Section 2.4 of its AFN Plan on how it has implemented plans to address these needs. For example, SCE has increased outreach efforts through partnerships with CBOs,[49] launched the AFN Self-Identification Survey to better identify individuals and households with AFN,[50] and enhanced support for customers with AFN by helping AFN customers with resiliency planning, food, lodging, and transportation.[51] Additionally, SCE has increased focus on providing information and resources through the accessible statewide website prepareforpowerdown.com and sce.com/afn.[52]

Through SCE's involvement with external stakeholders via the Joint AFN Council, SCE can discuss feedback and evaluate both existing and new methods of enhancing or improving support for individuals with AFN. Feedback from the Joint AFN Council ensures that SCE is providing meaningful and accessible solutions inclusive of the diverse perspectives represented by the Council. Any new methods of support are included in SCE's annual AFN plan which is jointly reviewed by the statewide IOUs and the Joint AFN Council.

SCE will continue to track and provide updates to Key Findings provided through the PSPS Tracker Survey and will utilize the Joint AFN Council to evaluate, on an ongoing basis, both current and future support for individuals with AFN.

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[49] See Section 2.6.3 CBO Outreach of SCE's 2024 AFN Plan.
[50] See Section 2.6.4 Marketing Campaigns of SCE's 2024 AFN Plan.
[51] See Sections 2.4.1 Overview of 211, 2.4.2 Disability Disaster Access and Resources (DDAR) pilot, and 2.4.5 Community Food Bank Support of SCE's 2024 AFN Plan.
[52] See Sections 2.6.6 Dedicated AFN Webpage on SCE.com and 2.6.7 Statewide Website for AFN Solutions of SCE's 2024 AFN Plan.

SCE-23-21. Community Outreach 3- and 10-Year Objectives - Verification Methods.

Description: SCE's verification methods for some of its community outreach objectives are vague and do not readily demonstrate what specifically will be used to verify progress on and achievement of the objective.

Required Progress: In its 2026-2028 Base WMP, SCE must include all methods used to verify progress on objectives within the tables describing its 3-year and 10-year community outreach objectives. SCE must clearly articulate its verification methods to demonstrate the effectiveness in verifying progress on, and achievement of, each objective.

SCE will respond to this ACI in its 2026-2028 Base WMP, as directed.

5.7 Public Safety Power Shutoffs

SCE-23-22. Consideration of PSPS Damage in Consequence Modeling

Description: SCE is in the early stages of improving its modeling methodology and has not fully evaluated whether and/or how PSPS event damage information is considered in PSPS decision-making.

Required Progress: In its 2026-2028 Base WMP, SCE must report on progress it has made in incorporating observed PSPS event damage information into its PSPS consequence modeling. If SCE has come to a conclusion on whether and/or how PSPS event damage information is considered in its PSPS decision making by its 2026-2028 Base WMP submission, SCE must include an explanation of findings that led to the conclusion.

SCE will respond to this ACI in its 2026-2028 Base WMP, as directed.