BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018).	R.18-10-007

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) REPLY COMMENTS

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INTRODUCTION

Pursuant to Commission Rule of Practice and Procedure 14.3(d), and the December 7, 2018 Assigned Commissioner's Scoping Memo and Ruling, as further clarified by ALJs Thomas and Allen at the February 26, 2019 Prehearing Conference, SCE respectfully submits these Reply Comments responding to the 19 sets of timely-filed party Comments submitted on March 13, 2019. Given the space constraints for these Reply Comments, and because many parties' Comments substantially overlap, SCE has necessarily limited its responses to the most salient comments on particular subjects.[1] SCE's silence on any particular party proposal should not be interpreted as acceptance, agreement, or acquiescence with that proposal.

I. MEANING OF PLAN APPROVAL

Many of the parties in this proceeding filed Comments focused on the general claim that SCE and the other large electric IOUs are seeking carte blanche authority from this Commission to make large investments in infrastructure and otherwise spend customer dollars on wildfire mitigation programs, with corresponding guaranteed cost recovery and without a meaningful retroactive reasonableness review, a position those parties believe is inconsistent with SB 901.[2] To start, the Joint Utilities are seeking nothing of the kind here. The Joint Utilities have insisted that this proceeding should **not** be about cost recovery.[3] Instead, as the Joint Utilities have repeatedly made clear,[4] the Joint Utilities are seeking a Commission determination that substantial compliance with the Commission-approved metrics of the proposed utility programs and activities set forth in the WMPs should constitute a finding that SCE complied with the "prudent manager" standard, as it relates to the operation of the utilities' facilities and wildfire risk mitigation. Moreover, that determination should then inform and facilitate a future Commission reasonableness review of the costs incurred to achieve that compliance and to fund the infrastructure and costs of the programs and activities associated therewith.

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1 In the body of these Reply Comments SCE has used the parties' preferred acronyms in lieu of their extended names, and has defined all acronyms used in Appendix A.

2 SB 901 is codified at P.U.C. Sections 451.1 and 8386, *et seq.*

3 *See, e.g.*, January 3, 2019 Joint Utilities Report on November 27, 2018 Webinar to Discuss Southern California Edison Company (U 338-E), Pacific Gas and Electric Company (U 39-E) and San Diego Gas & Electric Company (U 902-E) Proposed Wildfire Mitigation Plan Outline and Recommendations from Parties at p. 2, FN 5.

4 *See, e.g.*, SCE's 2019 WMP at p. 8; February 25, 2019, Joint Response of Southern California Edison Company (U 338-E) and Pacific Gas and Electric Company (U 39-E) to Motions For Evidentiary Hearings by TURN and POC; and oral comments by Joint Utilities' representatives at February 26, 2019 workshop.

The Joint Utilities' position is entirely sensible. It represents a reasonable middle ground approach between "guaranteed cost recovery" on the one hand, and the position of many parties that this proceeding should essentially be a meaningless "check-the-box" exercise on the other hand, an exercise that provides no guidance to the utilities about which programs and activities they should pursue, at what levels, and at what estimated amount of investment and spend. Not only is that latter position inconsistent with SB 901, it would also have made these last several months of intense regulatory work and activity by the Commission, its staff, the utilities, and the dozens of other parties to this proceeding a largely hollow endeavor.[5] This is not what the Legislature envisioned. More importantly, however, such an approach would put the Joint Utilities in an untenable and unreasonable position: SB 901 mandates that the Joint Utilities propose WMPs with specific programs and activities, and specific performance metrics, compliance with which they will be held accountable. These programs and activities must be designed to achieve the "*highest* level of safety, reliability and resiliency."[6] Moreover, the Commission required the Joint Utilities to set forth the estimated costs associated with those programs and activities.[7] Having now done so, it is unreasonable for parties to now claim that the Commission should not in any way authorize a scope of reasonable work necessary to achieve compliance, nor indicate that such a scope of work (and the costs associated therewith) is generally appropriate.

The Joint Utilities' middle ground approach is far from a "guaranteed cost recovery," "blank check" request; rather it is a reasonable request for some measure of regulatory certainty, namely that prudently-incurred costs associated with Commission-approved programs will be eligible for future cost recovery, and substantial compliance with Commission-approved WMP requirements should mean that the utilities are acting as prudent managers of their systems. It is also consistent with the long-standing regulatory compact between the Commission and utilities. Further, the Joint Utilities' position is consistent with both the language in SB 901, as well as the Commission's plenary authority to implement that statutory language. The statutes specifically contemplate that compliance with the

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5 For example, what would have been the point of the all-day Technical Workshop on February 27, 2019, and the hundreds of discovery questions (many incredibly technical) the utilities responded to on mandated three-day turnarounds, if a decision in this proceeding will merely determine "whether the Plans include all of the information SB 901 requires"? *See* EPUC Comments at p. 3.

6 P.U.C. Section 8386(c)(12) (emphasis added).

7 *See* January 17, 2019 Administrative Law Judge's Ruling on Wildfire Mitigation Plan Template, and Adding Additional Parties as Respondents at p. 2.

performance metrics should inform a future reasonableness review of certain costs,[8] and also authorize memorandum accounts to track costs for future cost recovery.[9]

Here, SCE is recommending the Commission develop an upfront approach that appropriately takes into account the fact that many of the factors listed in Section 451.1 substantially overlap with the content of the utilities' WMPs. Furthermore, under SCE's proposed framework, the Commission would use several of the remaining factors listed in Section 451.1 to apportion disallowances if a utility fails to substantially comply with its WMP and that non-compliance is linked to a wildfire ignition. This is an appropriate approach that holds utilities accountable for managing wildfire risk without subjecting them to uncertain and prolonged cost recovery. Further, as the Joint Utilities have made clear, while the statutory language does not explicitly mandate that substantial compliance with the approved WMP is equivalent to a finding that the utilities met the "prudent manager" standard, neither does it preclude such an interpretation. It is well within the Commission's inherent authority to interpret the statute in a common-sense manner to make that determination.

The Joint Utilities are neither seeking to weaken the traditional standard, nor create a new one. The prudent manager standard has always meant that the Legislature passes laws, the Commission implements them through interpretation and the promulgation of regulations, and the utilities follow those rules and regulations in conjunction with sound management judgment informed by good utility practices. Nothing the Joint Utilities have proposed in this proceeding is inconsistent with that traditional process. The Legislature passed SB 901, which required the use of performance metrics to implement wildfire mitigation plans and activities that would inform a future reasonableness review of the costs associated therewith. The Commission opened this Rulemaking to consider which specific metrics, programs, and activities were necessary and appropriate to best reduce wildfire risk associated with utility infrastructure. The Joint Utilities proposed a suite of varied programs and activities to accomplish those goals and provided the Commission-required cost estimates associated with them. When the Commission approves the WMP, to the extent that the Joint Utilities execute on them consistent with sound management judgment informed by good utility practices, and also demonstrate substantial compliance with the requirements set forth therein, they should be judged to have been

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8 *See* P.U.C. Section 451.1(9).
9 *See* P.U.C. Section 8386(j).

prudent managers of their systems. This is not a "radical change"[10] to the "prudent manager" standard; rather it honors its traditional embodiment. Below, given the page-limit constraints applicable to these Reply Comments, SCE responds to some but not all of the applicable party Comments on this issue.

CFBF states the Commission's review of the costs associated with the programs and activities "should require a demonstration both of the need for and reasonableness of the programs themselves and that the approach for the programs is the most cost-effective method available to the utility."[11] To the contrary, Commission approval of the WMP and the specific programs and activities set forth therein should itself constitute a determination of the need for and reasonableness of those specific programs and activities, and there should be no hindsight-driven analysis in a GRC about whether there was some theoretical more "cost-effective method available" to reduce wildfire risk.

CLECA argues that "[t]he costs shall be reviewed without limitation – meaning that the scope, the pace and the cost-effectiveness of the new programs in the plans are all fair game" in future GRC reviews.[12] That standard – which is nowhere to be found in the statutory language of SB 901 that CLECA goes at great lengths to dissect – would put the utilities in the untenable position of having a scope of work approved in the WMP that they will be held to comply with, only to be second-guessed in a later GRC for doing exactly that. That is not reasonable, especially considering that CLECA correctly notes the statute prohibits the diversion of "revenues authorized to implement the plan to any activities or investments outside of the plan."[13]

SBUA points out that Section 451.1 directs the Commission to consider the utilities' "compliance with regulations, laws, commission orders, [as well as] its wildfire plans,"[14] when considering cost recovery. The Joint Utilities do not disagree, and have merely asserted that compliance with the WMP should inform and facilitate a future reasonableness determination. SBUA also asserts that "approval of the Plans should not mean that the utilities have met the Prudent Manager Standard."[15] That is correct: The utilities' *substantial compliance* with the approved plans should equate to that determination.

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10 *See* TURN Comments at p. 11.
11 CFBF Comments at p. 5.
12 CLECA Comments at p. 5.
13 P.U.C. Section 8386(i).
14 P.U.C. Section 451.1(9).
15 SBUA Comments at p. 4.

CEJA argues that Section 451.1 requires "that the Commission must consider and balance [12 factors] when judging whether a utility was reasonable and prudent in relation to a wildfire."[16] That is incorrect. Instead, Section 451.1 requires that the Commission must consider those enumerated factors "[i]n evaluating the reasonableness of the costs and expenses" if a utility applies "to recover costs and expenses arising from a catastrophic wildfire occurring on or after January 1, 2019." The statute does not limit the Commission's longstanding authority to define its own "prudent manager" standard.[17] Further, CEJA's request that the Commission limit "new programs" proposed by the Joint Utilities in their respective WMP to "pilot programs" and/or otherwise delay their implementation is inconsistent with the urgent wildfire-mitigation actions the State must take and SB 901's unambiguous requirement that the WMP must be designed to achieve the "*highest* level of safety, reliability, and resiliency."[18] Finally, CEJA's proposed narrow focus on "situational performance and harm because a utility's response is a critical factor in whether an ignition leads to catastrophe"[19] ignores that no amount of "situational performance" can avert every catastrophic event associated with ignitions under certain weather, climatological, and other conditions outside of the utilities' control.[20] While situational awareness is necessary, it alone is insufficient to address the existing and growing wildfire risk. SCE's WMP appropriately focuses on reducing ignitions proactively through existing programs, new system hardening efforts, and enhanced operational practices supplemented by situational awareness and response capabilities.

Malibu urges the Commission to find that SCE's WMP should serve only "as a planning level document" and its approval should not "mean that any new or expanded programs proposed in the plan … are approved."[21] That proposal is not grounded in the statutory requirements, and is impractical

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16 CEJA Comments at p. 3.

17 In fact, Section 451.1(12) recognizes the Commission's discretion to consider "[o]ther factors the commission finds necessary to evaluate the reasonableness of the costs and expenses, including factors traditionally relied upon by the commission in its decisions."

18 P.U.C. Section 8386(c)(12) (emphasis added). On March 22, 2019, Governor Newsom declared an official statewide State of Emergency due to the increased risk of wildfires. See https://www.gov.ca.gov/wp-content/uploads/2019/03/3.22.19-Wildfire-State-of-Emergency.pdf.

19 CEJA Comments at p. 7.

20 *See also* P.U.C. Section 451.1(7) and (8): Mitigating factors for utility cost recovery associated with catastrophic wildfires should include "[t]he extent to which the costs and expenses were in part caused by circumstances beyond the electrical corporation's control [and] [w]hether extreme climate conditions at the location of the wildfire's ignition, including humidity, temperature, or winds occurring during the wildfire, contributed to the fire's ignition or exacerbated the extent of the damages."

21 Malibu Comments at pp. 2-3.

considering the Commission will be approving the specific programs and activities set forth in the WMP (including in some cases "new or expanded" programs").

While acknowledging that "SB 901 does not illuminate the precise nature of the Commission's review," EPUC nevertheless argues for the narrowest potential interpretation of what Commission approval of the WMPs should mean: A simple check-the-box exercise "to determin[e] whether the Plans include all of the information SB 901 requires."[22] EPUC then claims the utilities are "attempt[ing] to set the bar of performance as low as possible… ."[23] SCE respectfully disagrees, and posits that it is EPUC's interpretation of what the Commission will accomplish in this proceeding that sets a very low bar indeed.[24] Finally, EPUC's ratemaking/cost-tracking proposals are both outside of the scope of this proceeding, and also moot in light of the specific statutory provision for cost-tracking mechanisms and the Commission's existing approvals of the Joint Utilities' proposed memorandum accounts in compliance therewith.[25]

GPI takes a more balanced approach to this issue, stating that "[a]pproval of the WMP should not guarantee cost recovery for any or all actions included in this plans, but there is no reason why specific authorizations should not be able to be considered within the context of the overall plans"; and that approval of the plans "does provide the framework for the utilities to pursue the activities… ."[26] SCE generally agrees.

Despite acknowledging that the "basic framework of" the Joint Utilities' WMPs "is sound," and that "the current plans are quite an improvement" from previous FPPs required by D.12-01-032,[27] MGRA still maintains the inquiry for the meaning of plan approval should be the following: Utility compliance with the approved plans should mean absolutely nothing for regulatory certainty purposes, and utility non-compliance should result in fines and penalties. That proposed approach is unbalanced and inequitable. As discussed above, SCE also flatly disagrees that it is attempting to "replace" or "eliminate" the prudent manager standard, as MGRA claims.[28]

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22 EPUC Comments at pp. 3-4.
23 EPUC Comments at p. 9.
24 SCE agrees with EPUC's position that "[d]eviations from a work plan may be prudent in certain circumstances … [and] then changes in direction would be prudent." EPUC Comments at p. 9.
25 *See*, *e.g.*, SCE's Advice Letters 3936-E and 3936-E-A (approved by the Commission on 03/12/2019).
26 GPI Comments at p. 2.
27 MGRA Comments at p. 3.
28 *See* MGRA Comments at p. 7.

SCE agrees with OSA that "[t]he Commission's approach to approving the WMP and the utilities' compliance with those plans should consider the dynamic nature of risk … [and that s]ome degree of flexibility with WMP implementation and compliance is necessary to accommodate for new information learned about utility assets, risk and effectiveness of all mitigation efforts."[29] SCE disagrees that "[a]pproval of a plan should not be interpreted as a checklist of work that must now be implemented in order to achieve compliance."[30] The statute requires measurable, auditable "metrics;"[31] and that is what SCE has set forth in its WMP.

POC's proposal that "[t]he utilities' performance targets should not be treated as compliance requirements for new programs that have not been addressed and found reasonable in a rate case"[32] would render this entire proceeding moot and meaningless.

Cal Advocates asserts that the Joint Utilities' proposal that substantial compliance with the Commission-approved WMP requirements be equivalent to a finding that the utilities were "prudent managers" of their systems is inconsistent with the fact-specific nature of that inquiry. SCE respectfully disagrees: Here, the Joint Utilities have set forth in their WMP up-front, fact-specific, risk-informed mitigation measures based on the "factors that were known (or should have been known) at the time."[33] Being held to those standards is completely consistent with the Commission's traditional prudent manager inquiry, which importantly rejects any hindsight-informed application. SCE also disagrees that it has not provided sufficient financial information for proposed activities and programs in this proceeding, which should help inform a future Commission reasonableness determination.[34]

TURN proposes an ineffective definition of what WMP approval should mean: "[T]he Commission should designate 'approval' for purposes of Section 8386(b) as being its determination that the WMP has sufficiently addressed each of the specified [statutory] elements, and can serve to guide and coordinate regulatory and investment policy toward minimizing the risk of utility-caused catastrophic wildfires."[35] But more than "guidance and coordination" is necessary to provide the utilities with some modicum of regulatory certainty – including for ultimate cost recovery – especially

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29 OSA Comments at p. 3.
30 OSA Comments at p. 4.
31 P.U.C. Section 8386(c)(4).
32 POC Comments at p. 3.
33 Cal Advocates' Comments at p. 2 (citing D.87-06-021).
34 *See* SCE's 2019 WMP Section 7.1 and SCE's response to Data Request Set CalPa-SCE-001, Question No. 1, attached hereto in Appendix B.
35 TURN Comments at p. 3.

considering the level of investment that the statute implicitly requires by mandating the WMPs be designed to achieve the "*highest* level of safety, reliability, and resiliency."[36]

TURN's argument that denying any regulatory cost recovery assurance as it proposes the Commission do is no different than the "risk that utilities routinely face in rate case reviews"[37] is simply incorrect. Utility GRCs generally propose prospective capital spending that the Commission can either approve or not. If the Commission does not approve that proposed capital spending, the utilities can in most cases simply choose not to make the investment. Here, on the other hand, the utilities must comply with SB 901's strict statutory requirements to reduce wildfire risk to the utmost extent possible.

SCE also disagrees that for its proposed target metrics it has not "define[d] with sufficient specificity the work that will be done, in which locations, and to what degree of quality."[38] SCE's WMP and its data request responses are replete with those details.[39] Confusingly, TURN also proposes that "the utility-specified targets should not be treated as compliance requirements triggering the potential for violations and penalties."[40] What should the utility compliance requirements be then, other than the check-the-box exercise proposed by TURN?[41] SCE respectfully submits that is not what the Legislature intended when it passed SB 901. Moreover, TURN's argument that the Joint Utilities' proposed compliance metrics are illegitimate because they are "self-determined" is ill-informed. As TURN and other parties repeatedly point out, the Commission has the statutory (and other regulatory) authority to "modify" the proposed WMPs. As such, while the WMP targets may be have been initially "utility-proposed," they ultimately will be "Commission-determined."

II. OBJECTIVES AND STRATEGIES

SCE's 2019 WMP includes a suite of programs and activities to protect public safety, address and mitigate the threat of electrical infrastructure-associated ignitions that could lead to wildfires, further harden the electric system against wildfires, enhance wildfire suppression efforts, and effectively communicate with customers, community groups and other stakeholders about how to prepare for, prevent, and mitigate wildfires in SCE's HFRA. The Commission should acknowledge that SCE's

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36 P.U.C. Section 8386(c)(12) (emphasis added).
37 TURN Comments at p. 8.
38 TURN Comments at p. 9.
39 *See* SCE's 2019 WMP activities on p. 55 for example of work to be done, SCE's Response to SED-SCE-001 Question No. 9 for an example of the work locations (prioritized list of circuits for covered conductor), and Section 4.2.3.2 of SCE's 2019 WMP's for example of degree of work quality.
40 TURN Comments at pp. 9-10.
41 TURN Comments at pp. 1-3.

objectives and strategies, described in its 2019 WMP, including its focus on targeting the highest-risk drivers for potential wildfire-causing ignitions are appropriate and paramount to ensuring SCE's electric system achieves the highest level of safety, reliability, and resiliency.

TURN, CEJA, and Cal Advocates recommend the Commission focus on near-term measures such as protection schemes, situational awareness and PSPS, and direct the utilities to concentrate resources on these measures. TURN, however, acknowledges SCE's 2019 WMP does include objectives to implement CLFs and fast curve settings prior to the start of the 2019 fire season while at the same time commencing hardening activities. SCE agrees with TURN's conclusion that SCE should continue to deploy covered conductor to its highest-risk circuits. SCE asserts that the Commission should endorse an increased deployment of system hardening activities in 2019 to the extent practicable.

Contrary to MGRA's assertions, as discussed in Chapter 3 of SCE's WMP, SCE's hardening programs were developed using risk-informed data such as HFRA locations in SCE's service area where there is an elevated hazard for the ignition and rapid spread of fires associated with electrical equipment due to strong winds, abundant dry vegetation, and other environmental conditions.[42] SCE's WMP also describes its plans to improve its risk analyses (see Section 3.2.1.5). As such, MGRA's recommendation that SCE's 2019 WMP should describe how foreseeable meteorological conditions are used to inform their hardening programs should be rejected. Similarly, MGRA's request that SCE should provide more specific data on its sectionalization, remote control capabilities, and weather station deployment over the 2019-2020 period is misplaced as SCE provides specific, detailed 2019 goals for each of these activities in its 2019 WMP. While 2020 situational awareness details will be provided in SCE's 2020 WMP and further informed by work completed in 2019 and subsequent risk analyses, SCE addresses MGRA's request for further 2020 details in Section IV.E below.

Several parties argue that the main objective of the WMP should be to reduce catastrophic wildfires and emphasize the importance of situational awareness tools and PSPS. While SCE's 2019 WMP describes its plans to rapidly build out its situational awareness tools and its criteria and plans to trigger PSPS events, the Commission should emphasize that prevention of ignitions as opposed to reducing the spread of catastrophic wildfires should be the utilities' primary objective. During the February 27 workshop on conductors, CAL FIRE, in response to a question from Cal Advocate's

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[42] *See also* SCE's Circuit Deployment Prioritization and Covered Conductor Scope workpapers from its GSRP filing, included in Appendix C, that describe SCE's circuit prioritization risk-analysis including additional local wind data.

attorney requesting their expert opinion addressing the risk of catastrophic wildfires versus preventing ignitions generally, explained that in this environment (working with the utilities), its primary focus is on ignitions management as opposed to fire behavior.[43] CAL FIRE went on state that the basic premise is that reducing the number of ignitions is the best practice for avoiding the potential for catastrophic wildfires. Large wildfires are influenced by a number of factors: climate, local weather, topography, fuels, population density, and the availability of fire-fighting resources, many of which are difficult to predict or control. CAL FIRE's basic (and correct) point is that given limited fire-fighting resources, reducing the number of ignitions that have the potential to grow into catastrophic wildfires is crucial. It is only in hindsight that an ignition becomes a catastrophic wildfire; in this proceeding, the Commission must proactively address the risk drivers that are associated with the controllable ignitions that lead to that possibility.

III. RISK ANALYSIS AND DRIVERS

TURN's assertion that the Joint Utilities' WMPs should be more focused on preventing catastrophic wildfires rather than reducing ignitions is belied by CAL FIRE's expert opinion and ignores three key details of SCE's WMP. First, SCE's risk analysis, as memorialized in RAMP, assessed the consequences of a broad set of ignitions, including major wildfires as reported by CAL FIRE.[44] Second, consequence factors are a key consideration that is incorporated into SCE's covered conductor prioritization methodology.[45] Third, specific elements of SCE's WMP are directly focused on ignition avoidance in HFRA and under extreme weather conditions that are conducive to catastrophic wildfires. SCE's RFW and PSPS are focused on operating practices under elevated fire risk conditions.[46] SCE's risk assessment includes analysis of all ignitions in HFRA, and considers a broad range of potential consequences. Prioritization methodologies used for both asset hardening and operational practices incorporate factors specific to geography and extreme conditions.

TURN's assertion that the utilities failed to evaluate the effectiveness of past mitigation practices ignores fundamental practical and logical realities. There are considerable limitations to the availability

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[43] Please reference the February 27, 2019 workshop WebEx recording (see Cal Advocates question beginning around 04:40:20 and CAL FIRE's response beginning around 04:42:29), available on the Commission's website.

[44] *See* SCE's RAMP Workpaper, p. 10.1, attached hereto in Appendix C.

[45] *See* GSRP Workpaper Section (IV)(B)(e)(1), as well as SCE's response to TURN's GSRP Data Request Set TURN-SCE-003, Question No. 17b-c, dated November 6, 2018, both attached hereto in Appendices C and B, respectively.

[46] *See* SCE's 2019 WMP, Sections 4.1 and 4.6, respectively.

of meaningful historical ignition data predating the mitigation practices referred to by TURN. As such, it is not practical to estimate the effectiveness of past ignition avoidance, since there is no reasonable way to track ignitions that were "avoided." TURN states that "the utilities should already have done exactly these types of analyses, at a minimum using 2014-2018 data, to evaluate the efficacy of existing programs and asset investments." While analysis of 2014-2018 ignition data can give insights into residual risk in the presence of control activities, it cannot draw definitive conclusions regarding the mitigation effectiveness of these control activities themselves. This is why SCE's risk analysis within RAMP and its WMP require two steps – a "baseline risk analysis" (*i.e.*, formal analysis to establish how much risk is on the system today) and a "mitigation effectiveness analysis" (*i.e.*, how much of this established baseline risk is estimated to be reduced with various forward-looking mitigation options).

SCE agrees that utilities can – and should – analyze the efficacy of future practices and investments included in the WMP. But this is only possible because the utilities have quantified the present level of wildfire risk through baseline risk analysis.

SCE agrees with GPI's comment that resiliency to fires (regardless of ignition) is important; for example, SCE has updated its design standards to use composite poles and composite crossarms in HFRA, as well as the implementation of resiliency tools such as enhanced situational awareness, and overall Emergency Preparedness and Response.[47]

Regarding EPUC's comments, SCE filed its 2018 RAMP report in November 2018, in a manner that was largely consistent with the risk assessment principles adopted in the Commission's S-MAP decision, and to which utilities are required to adhere to in future RAMP filings. In SCE's RAMP report, it quantifies the risk associated with wildfires, the effect of specific mitigations on that risk, and contemplates future monitoring activities to evaluate mitigation performance.

Regarding OSA's recommendation that SCE request transmission data from other utilities to enhance their data set, SCE plans to review this data as it becomes available, and will analyze to what extent it is relevant and applicable to SCE's system and service area. SCE will consider incorporating this into its future risk assessments.

In response to CEJA's comment to prioritize communities that face a higher risk due to socio-economic factors, SCE references its prior response to CEJA.[48] The grid hardening activities and

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[47] *See* SCE's 2019 WMP, Chapters 4 and 5 for additional detail.
[48] *See* SCE response to CEJA-SCE-001 question 1, attached hereto in Appendix B.

programs in SCE's 2019 WMP are focused on prioritizing the highest fire-risk areas in SCE's service territory as those risks pertain to electrical infrastructure. In that sense, the risk analysis described in SCE's WMP is agnostic to the particular socioeconomic conditions in any individual HFRA; SCE is committed to protecting public safety irrespective of those differences. However, SCE's WMP describes in detail in Chapter 5 how SCE communicates with and assists vulnerable customers during emergencies (*e.g.*, wildfires), including those customers with lower socioeconomic status.

IV. WILDFIRE PREVENTION STRATEGY & PROGRAMS

A. Operational Practices

SBUA opposes the use of recloser shutoff and power shutoff as a standard practice as it believes they may "elevate the risk of catastrophic wildfires" upon re-energization while in contact with vegetation.[49] SCE disagrees; SCE's operational practices for restricting automatic reclosing for circuits or circuit segments that traverse SCE's HFRA directly mitigates the increased risk of catastrophic wildfires that SBUA notes. As described in Section 4.1.1 of SCE's WMP, SCE utilizes remote automatic reclosers (RAR) that can be remotely configured to prevent reclosing during times of elevated fire risk. This configuration provides the benefit of avoiding the repeated energization of potential faulted conditions. Additionally, if a line or line section relays during a RFW or other elevated fire weather condition, the line will not be re-energized until a visual check of all overhead conductors and equipment is completed to further ensure re-energization does not create an ignition risk.

In its comments, SBUA also expresses a preference for undergrounding of power lines over reclosers, yet acknowledges the "significant upfront investment" to underground lines. SBUA believes undergrounding produces the "greatest reduction of wildfire risk" and should reduce customer power interruptions.[50] SCE disagrees; SBUA misunderstands the relationship between the risks associated with reclosing events and underground relocation of overhead lines. Reclosing events occur only after an initial fault has occurred and SCE's operational practices for blocking reclosers directly mitigates these events. Undergrounding, like covered conductor, aims to mitigate the occurrence of the initial faults but is generally far more costly, sometimes infeasible, and much slower to implement than covered conductor.

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[49] SBUA Comments at p. 5.
[50] SBUA Comments at p. 5.

B. Infrastructure Inspections

CEJA's and TURN's Comments on SCE's EOI program imply that because SCE is conducting additional inspections of its HFRA, that its previous inspections were somehow "inadequate." But, as explained in SCE's WMP, EOI is different from the ODI program mandated by General Order 165. EOI is fundamentally a risk-based approach; ODI is a prescriptive regulatory-compliance-based program. As the wildfire threat continues to evolve, inspecting facilities in HFRA more frequently and pursuant to a risk-based approach is paramount to safeguarding public safety.

OSA stated in part that SCE should investigate topography within its service territory to develop targeted inspections. SCE agrees that topography can affect the wind in certain areas and may influence fire risk. However, SCE believes other factors beyond topography should be used to determine targeted inspections. SCE's EOI program prioritizes inspection areas based on the estimated probability of a wire down event in its Tier 2 and Tier 3 fire areas using system data (*e.g.*, conductor segment length, short circuit duty). Tier 2 and Tier 3 fire areas were developed from CPUC's Fire Map 1, which is an agnostic map that depicts areas of California where there is an elevated hazard for the ignition and rapid spread of powerline fires due to strong winds, abundant dry vegetation, and other environmental conditions. Through its use of system data and Tier 2 and Tier 3 fire areas, SCE considered topography and other critical factors in its prioritization of inspections.

CEJA stated that "the Commission should require SCE and PG&E to perform inspections in this cycle consistent with SDG&E's current best practices." SCE's current inspection practices are consistent with SDG&E's practices. For example, both SDG&E and SCE inspection programs follow the requirements of General Orders 95 and 165 and additionally both programs conduct patrols inspections annually and document all conditions that require repair.

C. System Hardening

TURN recommends the prioritization of recloser disabling and the installation of protection schemes and additional equipment and staff to increase situational awareness in 2019.[51] SCE agrees with TURN's recommendations; SCE began widespread deployment of fast curve settings on CB and RAR protecting OH circuitry within HFRA as well as installing CLF on unfused branch lines in 2018 to minimize fault energy and expects to complete these efforts by mid-2019. Also, SCE has added weather and fire expertise to its staff and is further installing situational awareness equipment.

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[51] *See* TURN's Comments at p. 27.

TURN's argument that SCE "did not include in their WMPs or data responses the showing necessary to evaluate their prioritization models in this review" is false. SCE's circuit prioritization workpaper has been available to TURN since September 2018 through its active participation in SCE's GSRP proceeding.[52] As such, TURN has had ample time to evaluate SCE's circuit prioritization scope of work. TURN also recommends that any deployment of covered conductor in 2019 should focus on Tier 3 areas.[53] SCE has outlined its prioritization methodology that includes HFRA Tier considerations as well as specific circuit characteristics that further account for wildfire risk in its GSRP proceeding.[54] SCE began deploying covered conductor across HFRA in 2018 and will continually ramp up deployment over the next five years to meet risk-reduction goals.[55] To date, SCE has installed over 160 circuit miles of covered conductor, the vast majority in Tier 3.[56] As explained in its WMP, SCE endeavors to expand its covered conductor program across all Tier 3 over multiple years, starting in 2019.[57]

Cal Advocates states SCE has not explained how alternative technology programs were developed. SCE continuously looks at improving safety, reliability, and resiliency associated with implementing new schemes/equipment successfully deployed by other utilities, investigates new technology offerings from industry vendors, and/or adopts existing technologies in new ways. SCE is still considering the 12 items listed in the Alternative Technology section of the WMP; they are still under evaluation for future application on SCE's system.

OSA states small conductor should not be used for primary voltage and SCE should prioritize its replacement in HFRA as well as partner with manufacturers around the world to accelerate material production for covered conductors and poles. SCE agrees that small conductor should no longer be used for primary voltages and accordingly revised its overhead conductor standards in 2015 to eliminate small conductor for new installations, and is actively replacing small conductor across its system via multiple programs since then. Presence of small conductor in the HFRA is one of the factors in the WCCP prioritization model. SCE has qualified three manufacturers of covered conductor (two domestic

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52 *See* GSRP Workpaper Ch. 10, pp. 10.43-10.46 (*Circuit Deployment Prioritization*), attached hereto in Appendix C.
53 *See* TURN's Comments at p. 28.
54 *See also* Appendix C.
55 *See also* Appendix C.
56 67 circuit miles were part of SCE's post-Woolsey rebuild effort.
57 *See* SCE's 2019 WMP at p. 52.

and one foreign) and is confident it can secure an adequate supply to support planned grid hardening efforts. Additionally, SCE is currently working with multiple pole manufacturers to evaluate different designs of fire resistant poles.

CEJA asserts that covered conductor has not been proven to be effective and is not well understood. That is incorrect. Covered conductor has been used extensively on the east coast for decades to mitigate vegetation contact faults in heavily-wooded areas and in South Korea for reliability purposes with great success. More recently, Australia has also begun to use covered conductor specifically for wildfire risk mitigation purposes. Overall, the benefits of covered conductor (*e.g.*, avoidance of contact from object faults, prevention of ignitions, reduced potential for wire down events) far outweigh the increased expense of covered conductor (compared to bare conductor), and the modest increase in wind loading forces.[58]

POC incorrectly asserts wood poles are being replaced prematurely for wildfire risk reduction purposes. SCE is not proposing premature replacement of all wood poles with fire resistant poles, only replacement of poles that would otherwise be replaced for other reasons, such as pole loading considerations, line clearances, etc. SCE is moving towards increased use of composite, steel, and FR wrapped wood poles in HFRA not primarily to reduce ignition risk, but rather to increase the survivability of its infrastructure when wildfires occur. This increased resiliency will require an incremental cost of material but will facilitate SCE's ability to restore service more quickly after a fire. Additionally, downed poles can cause evacuation and fire-fighting navigation challenges as explained by CAL FIRE at the February 13, 2019 workshop. The Commission should affirm SCE's plans to harden the grid with these important benefits.

D. Vegetation Management

TURN recommends the IOUs collect data on the efficacy of the CPUC's new clearance requirements and determine the effectiveness of removing "healthy" hazard trees especially in the vicinity of covered conductor. SCE intends to follow the recommended clearances of Appendix E (Guidelines to Rule 35), in GO 95 in HFRA where achievable. SCE will continue to evaluate whether healthy trees should be removed when they pose a risk of falling into power lines. Also, as explained in

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[58] *See* SCE's 2019 WMP at pp. 51-52.

SCE's response to Data Request Set TURN-SCE-006, Question No. 29d, both covered conductor and enhanced vegetation practices are complementary to each other.[59]

MGRA explained that utilities collect data on tree species responsible for outages, and recommend IOUs follow the practice performed by SDG&E to keep track of the total fraction of trees that pose potential conductor risk and to prioritize vegetation management based on such data instead of just the raw number of outages. SCE's vegetation management practices are robust, and supplemental inspections/patrols are prioritized by risk. With regards to collecting data on vegetation caused events, SCE will continue to collect data on tree species that cause vegetation related outages. Moreover, as part of HTMP, SCE will assess trees found in the utility strike zone for tree conditions or site attributes that pose potential conductor risk.

GPI is concerned with the conditions of the lands adjacent to the rights-of-way as a result of biomass material that has not been removed in a timely manner, particularly should an ignition occur, or when a wildfire sweeps through a powerline right-of-way. When SCE's contractors clear vegetation to maintain the required clearances, as a general rule, all vegetation is removed.[60]

CFBF states the programs presented by the IOUs can be broadened to consist of activities such as prescribed fire, mechanical and manual thinning, grazing and the targeted ground application of herbicides. Additionally, CFBF states that when parameters and programs for vegetation management are established and maintained for a number of years, a concerted effort must be made to explain significant changes to these programs. Furthermore, CFBF asserts that communications and procedures used by the utilities regarding vegetation management on all types of property must be considered a key element in the program, including the willingness to explain the underlying reasons for the actions taken. SCE is in the initial program development stages of its IVMP which supports targeted ground applications, including the use of herbicides, and practices such as "right tree right place." SCE agrees that communication and public outreach is essential in educating and informing the public when the status quo changes and for providing the underlying reasons for the actions being taken. As such, SCE has been and will continue to conduct public outreach to discuss and educate customers on the latest vegetation management practices and underlying reasons (*e.g.*, regulations) driving the changes.

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[59] *See* Appendix B for GSRP data request response.

[60] There are limited instances where SCE has agreements with specific customers and/or municipalities to leave the trimmed vegetation at the location for use by the customers or others requesting it. SCE believes leaving vegetation behind by customer request is relatively low as it relates to wildfire risk.

CEJA states that further information and evidence is necessary before thousands of healthy trees are removed or utilities prune trees to maintain a significantly larger clearance. SCE believes that in order to maintain the clearances specified by the regulator, healthy trees will be required to be removed to reduce potential conductor risk. Additionally, SCE's HTMP assesses the trees found in the utility strike zone for tree conditions or site attributes that may cause the tree to fail and strike the utility power lines. Trees without defects (healthy trees) but which are associated with site attributes that may cause the tree to fail are evaluated based on risk of failure and appropriately mitigated. SCE considers these trees "reliability trees" under HTMP.

E. Situational Awareness

The majority of parties support enhanced situational awareness programs, such as weather stations, HD cameras, use of an FPI, as well as PSPS during extreme weather conditions. SCE agrees with the majority of these comments as situational awareness is an integral part of threat and emergency management. As explained in its 2019 WMP, SCE is focused on accessing more detailed information about wildfire risk at the individual circuit level, to better understand how weather conditions might impact public safety and utility infrastructure in HFRA. SCE addresses a few party comments below.

As highlighted in Section II above, MGRA requests that SCE provide more specific data on its sectionalization, remote control capabilities, and weather station deployment over the 2019-2020 period. Notwithstanding the fact that 2020 details will be provided in SCE's 2020 WMP, to date, SCE has installed over 130 weather stations and plans to install up to 720 more in 2019 and 2020, resulting in a total network of 850 weather stations. The objective of the weather station program is to create a network of strategically-placed weather stations to cast a comprehensive mesonet that will provide high fidelity, localized weather data in the unique HFRA topographies. SCE's current plan will achieve a majority of the circuits within HFRA having a weather station within one mile of these circuits.

CEJA incorrectly asserts that SCE has not included all the elements that SDG&E has in its plan and urges the Commission to require SCE to develop SDG&E's basic framework of weather stations, camera networks, fire detection and wireless fault indicators as a best practice. As described in its WMP, SCE's framework includes weather stations, HD cameras, and fire detection tools. SCE plans to install up to 160 HD cameras on 80 towers by the end of 2020. Installing HD cameras in HFRA will enable rapid 911 confirmation, accurate wildfire localization and to observe fire propagation, and enhanced situational awareness to reduce wildfire suppression response time, improve public safety, mitigate risk to property and infrastructure, and to protect the environment. SCE's framework also includes MADEC

technology which leverages smart meter data to detect downed energized wires. Furthermore, SCE has wireless fault indicators on its distribution infrastructure to enable operational personnel to identify current magnitude, direction, and temperature in addition to fault location remotely and in real-time. Additionally, SCE will continue to evaluate fire detection technology and may consider future pilot programs to assess the capabilities.

F. PSPS / De-Energization

In its comments, GPI suggests that IOUs may de-energize portions of their systems during periods when RFW conditions are declared. SCE clarifies that RFW is only one criteria considered when assessing the need for PSPS. Specifically, SCE considers a number of variables in determining the risk factors associated with wildfire such as SCE's FPI which measures, among other things; relative humidity, live fuel moisture, dead fuel moisture, relative greenness of fuels; forecast wind speed as well as forecasts for wind gusts and the SAWTI. The interpretation of these models by SCE's experienced meteorologists and fire scientist, taken together, form the basis of a risk prediction which informs SCE's decision to activate emergency response structures and a precursor activity to decide to de-energize.

Multiple parties indicate their desire to be notified as early as possible prior to de-energization. SCE makes every effort to provide as much notice to public safety agencies and customers as possible. Today, when possible, SCE notifies local governments, agencies, first responders, essential service providers and any potentially impacted customers of a potential de-energization event at a cadence of: 48 hours prior to shut off, 24 hours prior to shut off, shut off / avoided shut off, and restoration. Details of SCE's PSPS notification strategies will be decided in the PSPS OIR, and addressed in SCE's forthcoming March 25, 2019 Comments in that separate proceeding.

CEJA is urging the commission to require SCE to establish stationary CRCs to assist communities during extreme weather events, including providing transportation to these facilities. Although SCE is partnering with emergency management agencies to improve the resiliency of the communities it serves, the responsibility for providing emergency shelter locations to the public during emergencies rests with our local and state emergency management partners. SCE is currently piloting a program targeted at increasing the resilience of our communities with affordable and clean energy options to help augment emergency management efforts. Furthermore, SCE will be working closely with county OEMs to deploy mobile Community Outreach Vehicles equipped with back-up power, water, snacks, etc. to assist customers in staying connected to receive information/updates about the outage, listen for public safety broadcasts, and/or connect with friends and family during PSPS events.

These community outreach vehicles will, when possible, be pre-deployed and staged prior to PSPS de-energization. SCE has a multifaceted outreach program to educate customers, county OEM, local and tribal governments, public safety agencies and community members (including selected groups through specialized workshops) on the importance of community resiliency.

Malibu's comments about the importance of considering public safety officials' input in PSPS decision making are already implicitly incorporated in SCE's plans, and SCE welcomes collaboration with local jurisdictions for important public safety-related procedures. In fact, local public safety officials asked SCE to delay de-energization due to their public safety concerns on two occasions during SCE's November 2018 PSPS event. In one case, a line's protective device activated (de-energized the line) due to weather while SCE was engaged in discussions with LACoFD over whether to de-energize the line. In the other case, SCE delayed de-energizing a line for approximately 10 minutes while SCE discussed the matter with VCFD; ultimately, SCE de-energized a portion of this line. While these in-the-moment interactions are important to maintaining overall public safety, SCE's decision to de-energize specific lines will often be driven by near-real-time weather observations that indicate the immediate risk is present "right now," and SCE must be afforded the operational discretion and regulatory authority to make those "real-time" de-energization decisions when necessary. In the case where public safety officials make a clear and compelling case that SCE should not de-energize a particular line or lines, or convince SCE that delaying de-energizing a particular line or lines for some period of time is prudent, SCE should be held harmless if the power line(s) in question are subsequently associated with an ignition event due to public safety officials' guidance that the risk of keeping the lines energized supported a broader or more immediate public safety need. Malibu suggests that SCE must provide a generator, if possible, to essential service providers who might otherwise be unable to sustain critical life-safety operations during a power outage. SCE's highest priority is protecting the safety of its customers and the community. However, because power outages can happen for many reasons (*e.g.*, metallic balloons, animal contact, car-hit-pole, etc.) and electric utilities cannot guarantee uninterrupted service, the Commission should make it clear that essential service providers, especially those providing critical life-safety operations, need to be responsible and prepare for potential prolonged outages and have a backup plan in place, including obtaining their own backup generation that will support continuity of their operations during outages.

SCE generally agrees with TURN's position regarding increased use of PSPS as a near-term versus long-term risk mitigation strategy. Circuits that have 100% covered conductor will be

appropriately flagged on HFRA circuit lists and SCE anticipates the de-energization of these circuits will be further minimized under its PSPS protocol. However, there could be situations where a distribution circuit with covered conductor is de-energized to protect public safety. For example, in situations where extreme high winds could cause large trees to strike overhead lines or the wind speeds exceed design safety margins, damage to covered conductor and associated overhead equipment is still possible and could result in arcing that could lead to ignitions. These situations, while possible, are nonetheless expected to be significantly less frequent than instances where windborne debris or vegetation can come into contact with bare overhead line. Additionally, if a subtransmission line that feeds a downstream covered conductor distribution circuit is shut off and it is a single-feed substation or redundant lines are lost, that distribution circuit may be de-energized. Circuits that are partially covered may also be de-energized temporarily while bare segments are isolated (provided appropriate switches/reclosers are in place).

Although vegetation management is a critical pillar of wildfire mitigation, SCE disagrees with MGRA's argument that there is an opportunity to balance PSPS shutoff thresholds by increasing tree trimming and removal guidelines. During elevated fire weather conditions, vegetation and other debris can blow in from far distances and make contact with SCE infrastructure, including conductors. Aggressively reducing vegetation around powerlines does not entirely mitigate the risk of vegetation coming in contact with conductors during high-wind events to a level that would warrant increasing PSPS thresholds.

V. OUTREACH AND EMERGENCY RESPONSE

A. Emergency Preparedness and Response

GPI states in its comments that outreach and education related to emergency preparedness should not be focused solely in those areas indicated as Tier 2 and Tier 3.[61] SCE does not disagree with GPI and although SCE's 2018 targeted awareness campaigns about wildfire mitigation were focused largely in its HFRA, SCE also included broader communications to all customers through bill messaging, website content and outreach events. In 2019, SCE will continue executing a communication strategy to include customers throughout SCE's territory with emphasis on all wildfire mitigation activities.

CEJA states that SCE does not appear to have a notification system that can be used to provide timely alerts to customers impacted by wildfire, similar to the one used by SDG&E, and recommends

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[61] *See* GPI Comments at p. 7.

that the utilities be required to have a system such as this for widespread communications.[62] SCE has implemented a system that can be used for high volume communications, and described this system for use during PSPS events in its WMP.[63] This system will be used for other operational activities as appropriate, including communications to customers about wildfire activity, consumer protections and other emergency-related communications when needed.

Mr. Abrams states that the IOU Corporate Emergency Response Plans are activity-based as opposed to performance-based and should contain performance-based measures.[64] SCE disagrees given the inefficiency of performance-based measures to adequately measure emergency response efforts because they are emergent, and not planned events.

SBUA recommends that the Commission require all the utilities to specify how each utility will engage in notification activities that are tailored to small business customers and to report on challenges they observe. In particular, SBUA recommends prioritizing two groups for emergency preparedness, outreach, and response: (1) small health service providers including primary care physicians, emergency rooms, and veterinarian services and (2) critical small commercial centers.[65] SCE acknowledges the unique impacts that de-energization has on all customers and therefore aims to provide sufficient notice when power interruptions can occur. This is aligned with regular notifications when maintenance outages are necessary and advance notice is provided when possible so customers can take the necessary steps to implement their resiliency plans. SCE plans to include these types of customers in its focus group efforts in 2019 to understand impacts and assist with resiliency. Further, SCE aims to ensure that all customers, residential and businesses alike, receive education and awareness around the possibility of proactive de-energization and make resources available online, at community events, and in our call center to address the unique questions and needs of all customers.

B. Customer Outreach and Education

CEJA urges SCE to align with PG&E's WMP proposals in allowing customers to self-certify for the ESA program for low-income customers, and proposes that the standard and high-usage reviews for the CARE program should be frozen for all low-income customers in "impacted counties." SCE

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62 *See* CEJA Comments at pp. 23, 26-27.
63 *See* SCE's 2019 WMP at pp. 66-67.
64 Mr. Abrams Comments at pp. 10-11.
65 SBUA Comments at pp. 9-10.

disagrees with CEJA's proposal. Several of the counties served by SCE are geographically vast,[66] and CEJA's proposal would unnecessarily remove program eligibility requirements for customers when they have not been "impacted," thus creating inequity of treatment for customers. SCE will attempt to proactively identify customers in disaster areas using the CARE rate schedule as an identifier to implement the protections. Additionally, SCE communicates to community-based organizations who serve these customers, provides in-person support at the local assistance centers where these customers are served by county agencies and other providers of support, and proactively sends messages for awareness to areas impacted.

CEJA further requests that the Commission require development of protocols to assist customers whose employment was impacted by a wildfire. Specifically, CEJA requests that the options of payment plans and suspension of disconnection be applied to those whose place of employment was destroyed or damaged during a wildfire. SCE currently extends customer protections to all customers impacted by disasters. If a customer informs SCE that they are impacted, as described by CEJA above, SCE applies the protections to the customer's account, registers the customer for other eligible programs such as CARE, and informs them of other agency support programs that can aid them through recovery.

VI. METRICS & MONITORING

A. Performance Measurement

SB 901 mandates that utility WMPs be compliance-based documents. Compliance-based documents should not be based on potentially random outcomes. The most prevalent line of commentary from intervening parties related to Metrics and Monitoring calls for utilities to develop outcome-based metrics such as "injuries" or "acres burned resulting from utility-caused wildfires" to determine compliance and measure utility performance to WMP.[67] SCE's 2019 WMP identifies three outcome-based measures as indicators, including counts of faults, wire downs, and CPUC-reportable ignitions in HFRA. Tracking these measures as indicators of long-term trends for several years is expected to provide meaningful information about the effectiveness of WMPs, but results for a single year are subject to volatility from short-term uncontrollable factors. SCE will utilize the trends of the outcome-based measures to inform and calibrate future strategy, and adjust wildfire mitigation activities and

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[66] For example, San Bernardino County is the largest county in the continental United States, and is by itself larger than nine U.S. States.

[67] *See* TURN, OSA, MGRA, Green Power Institute, Abrams, EPUC, SBUA, and CEJA Comments.

programs.[68] Outcome-based measures are not appropriate for use as compliance metrics because they are partially dependent on uncontrollable random drivers. For example, unpredictable weather patterns during a year can result in low or high annual values for outcome-based measures. If selected as measures of compliance, outcome-based metrics could result either in utilities recording a compliant year simply as a result of favorable weather and not due to an effectively-executed WMP, or being found non-compliant if uncontrollable drivers lead to increases in outcome-based metrics despite prudent efforts to execute all mitigations outlined in the approved WMP.

Cal Advocates recommends that in future WMPs, utilities provide metrics to document what action is taken to mitigate wildfire risks and to demonstrate compliance with the activities and programs proposed in their previous WMP.[69] SCE has already developed this form of compliance-based metrics in this cycle of its WMP. MGRA supports limited use of WMPs as overarching documents detailing utility programs and goals with a set of auditable benchmarks against which utilities can be measured and fined if non-compliant.[70] MGRA's recommendations regarding fines for noncompliance is outside the scope of this proceeding.[71] SCE has submitted a set of auditable, performance-based, controllable, and quantifiable metrics with targets. These metrics will track progress to specific goals and provide objective evidence that SCE is executing on activities and programs planned for this year to mitigate wildfire risks.

Multiple parties point to the need for analysis that demonstrates risk reduction, risk spend efficiency, and selection of the right work in the WMP. In Chapter 3, SCE discusses the expected risk reduction from various mitigations, which is covered in detail in SCE's RAMP filing. SCE has also developed a covered conductor prioritization methodology based on risk to determine which circuits within HFRA to address first.[72]

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68 *See* March 8, 2019 SCE Response to March 5, 2019 ALJ Ruling Seeking Additional WMP Information.

69 *See* Cal Advocates' Comments at pp. 23-24.

70 *See* MGRA Comments at p. 1. MGRA does not define "limited use" in this introduction comment, but later in the "Meaning of Plan Approval" section explains that WMPs should not be used for any cost recovery purpose or as a liability shield (MGRA Comments at pp. 2-3). See the above "Meaning of Plan Approval" section of these reply comments for SCE's position on the appropriate meaning of plan approval.

71 *See* OIR at p. 5, FN 7, which states: "While SB 901 also addresses utilities' compliance with their approved wildfire mitigation plans and penalties for non-compliance, those issues will not be addressed in this proceeding at this time, but are likely to be part of a separate proceeding."

72 *See* Workpaper Ch. 10, pp. 10.43-10.46 (*Circuit Deployment Prioritization*), attached hereto in Appendix C.

SCE views the metrics used to determine compliance and measure WMP performance as an area for continuous improvement. Metrics submitted in this 2019 WMP align with the core activities and programs in scope for this year. SCE will continue to evaluate wildfire risk and risk reduction benefits for current and alternative programs. As further risk-based analyses inform changes to future WMPs, future Commission-approved compliance metrics may change.

B. Internal Monitoring & Performance

SCE intends to leverage its existing suite of processes, controls, and systems to monitor and manage performance to ensure compliance with its WMP. As described in Section 6.5, SCE will develop WMP-specific monitoring dashboards, report to SCE senior leadership to enable timely corrective actions, perform internal audits, and gather information from system events. For instance, SCE routinely performs root cause analysis on equipment that has not performed to expectations and utilizes the findings to improve designs or take other corrective actions as appropriate. While these existing systems are consistent with the framework OSA suggests utilities establish for managing wildfire risk, SCE strives to enhance its processes through continuous improvement.

Cal Advocates recommends that the 2020 WMP include evidence demonstrating compliance with the WMP and that they are working effectively to reduce wildfire risk. SCE believes this will be addressed through SCE's WMP compliance report described in Section 6.5.1 as well as the year-over-year inclusion of the indicators shown in Section 6.2.2. SCE does not agree with SBUA's suggestion that utilities track and report metrics associated with the number of small businesses damaged or destroyed by wildfires as this task is better suited for governmental entities, especially since wildfires associated with utility electrical infrastructure are only a subset of all wildfires in the state.[73]

SCE believes that the metrics CEJA recommends including to measure the effectiveness of WMP over time are captured within the indicators described in Section 6.2.2 and are not appropriate as metrics given the variability introduced by uncontrollable factors described in Section VI.A above.[74] The effectiveness of equipment inspections, vegetation management, and hardening measures should show longer-term downward trends in the faults, wire downs, and ignitions on circuits in HFRA.

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[73] Historically, only 10% of all California wildfires are associated with utility electrical infrastructure.

[74] CEJA's Comments at p. 29; CEJA's suggested metrics include: "1) Percentage of Tier 2/3 customers contacted about potential wildfire and de-energization risks, 2) how effective are inspections in identifying equipment prone to failure, 3) how effective are vegetation management measures in preventing fire risk, and 4) how effective are other hardening measures in preventing fire risk?"

Additionally, SCE already tracks faults associated with equipment and vegetation separately, which enables category-specific trend analysis.[75] For CEJA's recommended metric for Tier 2/3 customers contacted about potential de-energizations, SCE cautions that trends associated with this potential indicator may be heavily influenced by any changes to de-energization protocols over time and isolating the effects associated with the deployment of other WMP mitigations may be difficult.

C. Auditing & Compliance

TURN recommends that the Commission require the utilities to fund independent safety evaluators, managed by and answerable to the CPUC to among other things, perform spot checks of ongoing and completed WMP projects, in order to assess not just that the work is completed, but completed at an appropriate level of quality. SCE generally agrees with TURN that quality control is essential, and SCE regularly incorporates quality control activities into its field construction and inspection programs, and its internal audit function independently reviews high risk activities identified in its annual audit plan, such as wildfire mitigation, to verify they are achieving their objectives. In addition, the January 30, 2019 ALJ Ruling in this proceeding already requires SCE and other respondents to reimburse the Commission for up to $15 million over the next three years for an independent evaluator to review and inspect electrical facilities and operational practices for compliance with Commission GOs, statutory requirements and all other applicable decisions and orders. This independent evaluator will complement existing SED staff and provide new and specialized expertise in subjects that affect fire danger and increase the number of field inspections that can be conducted. TURN's recommendation is duplicative of the reviews SCE and SED will already be conducting and thus is unnecessary. Additionally, TURN's comments about compliance with existing requirements designed to reduce wildfire risk are misguided. SCE is already obligated to comply with existing rules, regulations, and standards designed to prevent catastrophic wildfires, and the Commission's SED Staff actively oversees compliance with those regulatory requirements. But, mere compliance with existing regulations may not be what the Legislature intended when it mandated that the utilities WMPs should be designed to achieve the "*highest* level of safety, reliability, and resiliency."[76] Accordingly, in this WMP, SCE has proposed additional activities that extend beyond the existing rules, regulations, and standards in an effort to further reduce the risk of wildfires that remain after current rules are followed.

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[75] *See* March 8, 2019 SCE Response to March 5, 2019 ALJ Ruling Seeking Additional WMP Information for additional detail on mitigation effectiveness monitoring.

[76] P.U.C. Section 8386(c)(12) (emphasis added).

Contrary to SBUA's recommendation that various specific employees be named in the WMP, it is appropriate for SCE to name a sole individual, in this case Senior Vice President of Transmission and Distribution Phil Herrington, as the person who has overall responsibility and accountability for SCE's 2019 WMP. This is consistent with both Commission Rule 1.8(c)(2) as well as SCE's internal corporate governance protocols, as Mr. Herrington has the legal authority to make binding commitments for SCE.

VII. RECOMMENDATIONS FOR FUTURE WMPS

Generally, SCE agrees with the comments of most parties that future WMPs should incorporate improvements and lessons learned from the 2019, and first, filing.

MGRA and CFBF argue that the WMP proceeding had "unreasonable time constraints" and propose that extended discovery and review time as well as "stagger[ed] compliance periods" for WMP would support a more substantive review.[77] Cal Advocates proposes a "Notice of Intent" type process which would, in essence, provide additional review time prior to a formal WMP filing. SCE respectfully disagrees; the existing timeline and review period is necessary to address the existing and rapidly growing wildfire threat in a timely manner. Adjusting and/or extending the WMP filing schedule or decision date timeline would add unnecessary uncertainty about which mitigation efforts are Commission-approved for utilities to pursue and would potentially delay implementation of critical wildfire mitigation work. At this time, SCE recommends maintaining the existing February WMP filing date and 90-day review/decision period in future years. If regulatory and other related circumstances sufficiently change in the future the Commission should consider revisiting the frequency and timing of future utility WMPs.

Cal Advocates suggests that each utility "list the evidence and metrics that will demonstrate compliance of each activity/program proposed in their WMP" and a common reporting template for this evidence.[78] SCE already lists the evidence and the goals and metrics that will demonstrate compliance for each activity. Additionally, as discussed above in Section VI also be addressed through the WMP compliance report described in Section 6.5.1 of SCE's WMP. Cal Advocates argues that "[d]etailed cost information was generally lacking."[79] Contrary to Cal Advocates' assertion, SCE provided detailed cost workpapers that show the assumptions and calculations for each of its programs and activities in Chapter

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77 *See* MGRA's Comments at pp. 24-25 and CFBF's Comments at p. 12.
78 *See* Cal Advocates' Comments at pp. 23-24.
79 *See* Cal Advocates' Comments at p. 24.

4 of SCE's WMP.[80] Notwithstanding this, when the utilities seek recovery of those costs in other appropriate Commission proceedings, Cal Advocates is free to make arguments it deems appropriate about reasonableness of costs. To the extent the costs for a specific program exceed the estimates provided in this proceeding, the utility should be able to offer evidence that the costs are reasonable.

OSA urges the Commission to require "utilities to establish a framework for managing wildfire risk that is based on best safety management practices for similarly complex industries."[81] SB 901 already prescribes that the WMP must set forth programs and activities designed to achieve the "highest level of safety."[82] SCE agrees with OSA that future WMPs should include QA Programs (which SCE's 2019 WMP already describes), Management of Change Controls, Incident Investigation and root cause analyses.

SBUA argues that the "Commission should require the utilities to file subsequent plans through the application process in a consolidated hearing" to allow for intervenor testimony and evidentiary hearings.[83] Consistent with the Joint IOU response to evidentiary hearings, the Scoping Memo noted that "[t]he majority of parties addressing the issue believed that hearings would not be necessary or desirable."[84] It remains true that evidentiary hearings are not necessary to develop a sufficient record to support a decision on the utilities' WMP. SCE firmly submits that such a result would be counterproductive, and inconsistent with the Legislative directive in SB 901 that annual plans be timely approved. Commission proceedings that include evidentiary hearings often take 18 months to reach conclusion (and sometimes materially longer), during which time much needed work will be inhibited.[85]

CEJA requests that future WMP consider "how best to consider communities that are more vulnerable to the impacts of wildfire, how to more effectively conduct outreach; how to reach customers in the event of a fire, and how to deploy resources such as CRCs in the event of de-energization."[86] As noted in Section III above, the grid hardening activities and programs in SCE's 2019 WMP are focused on prioritizing the highest fire-risk areas in SCE's service territory as those risks pertain to electrical infrastructure. Moreover, SCE's WMP describes in detail in Chapter 5 how SCE communicates with and

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80 *See* Response to CalPA-SCE-001, Question No. 1, attached hereto in Appendix B.
81 *See* OSA's Comments at p. 26.
82 P.U.C. Section 8386(c)(12).
83 *See* SBUA's Comments at p. 12.
84 *See* Scoping Memo at p. 3.
85 *See also* P.U.C. Section 8386(c)(20)(d) ("The commission shall accept *comments* on each plan from the public, other local and state agencies, and interested parties … .") (emphasis added).
86 CEJA Comments at p. 29.

assists vulnerable customers during emergencies (*e.g.*, wildfires), including those customers with lower socioeconomic status. Regarding CRCs, as noted in Section IV.F above, SCE disagrees with requiring utilities to stand-up CRCs for PSPS but is currently piloting a Community Resiliency Program and is working closely with county OEMs to deploy mobile Community Outreach Vehicles equipped with amenities for customers, such as back-up power, water, snacks, etc.

POC recommends that future WMP focus on strategies that provide the greatest fire danger mitigation effectiveness per dollar spent which would require an analysis with "fire ignition" and "wire down" event reports to adjust WMP to achieve maximum fire mitigation effectiveness and maximum value for ratepayers for the dollars being expended on the various WMP programs.[87] SCE agrees that cost-efficiency of risk mitigating strategies should be a contributing factor in selecting wildfire mitigations in WMPs. However, cost-efficiency should not be the only consideration. Utilities must evaluate several other factors in selecting mitigations to present in future WMPs. These can include funding, labor resources, technology, planning and construction lead time, compliance requirements, operational and execution considerations, scalability, and others.[88] This multi-factor approach to selecting risk mitigations was adopted by this Commission in D.18-12-014.[89] POC also suggests that future WMP include incentive programs for customer to transition to customer-owned solar and batteries, as a lower fire risk alternative to portable generators.[87] SCE disagrees; preferred resources customer incentive programs are out of scope of this proceeding and have been, are being, and will be comprehensively addressed in a variety of other decided, pending, and future Commission proceedings.

TURN argues that future WMP be more focused on preventing *catastrophic* wildfires, provide more analysis concerning the effectiveness of past and current investments and operational strategies in preventing catastrophic wildfires, quantify incremental catastrophic wildfire risk reduction if programs are proposed beyond existing requirements, and include a discussion to enable the Commission to verify whether the WMPs comply with all applicable rules, regulations, and standards (Section 8386(d)).[90] At a

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[87] POC Comments at p. 23.

[88] *See* I.18-11-006, SCE's Risk Assessment Mitigation Phase (RAMP) Report, Chapter 1 (Overview Chapter), pp. 6-8, 15-16; SCE's Amended RAMP Chapter 10 (Wildfire Chapter) pp. 43-44 (amended chapter filed and served on March 14, 2019).

[89] *See* Attachment A, Appendix A, p. A-14, Item 26 of the Commission's Phase 2 Decision Adopting S-MAP Settlement Agreement with Modifications, for further discussion on this multi-factor approach, which was jointly proposed by SCE, PG&E, SoCalGas, SDG&E, TURN, EPUC, Indicated Shippers, and Cal Advocates in their Settlement Agreement, and subsequently adopted by the Commission in D.18-12-014.

[90] *See* TURN Comments at p. 30.

high level, SCE agrees with TURN that the ultimate societal goal must be to reduce catastrophic wildfires. But whether a wildfire is catastrophic or not can only be ascertained after-the-fact, and such a conclusion is highly dependent on factors that are both, in many cases, random (*e.g.*, local wind speeds, relative humidity, population density, underlying drought conditions, local jurisdiction emergency preparedness, etc.) and also outside of SCE's reasonable control. Accordingly, SCE's WMP appropriately focuses on the factors that SCE can reasonably control, and is predominately focused on reducing the number of utility infrastructure-associated ignitions (supplemented by situational awareness and response capabilities). As discussed above in Section III, 1) SCE's RAMP analysis assessed the consequences of a broad set of ignitions, 2) consequence factors are a key consideration that is incorporated into SCE's covered conductor prioritization methodology, and 3) elements of the WMP directly focus on ignition avoidance under extreme conditions. Furthermore, RAMP conducted a "baseline risk analysis" and a "mitigation effectiveness analysis" which supported SCE's WMP incremental activities. Although SCE agrees that utilities can – and should – analyze the efficacy of future practices and investments included in the WMP, SCE urges the Commission to reject TURN's recommendation for analysis of the efficacy of past operational practices/investments in limiting ignitions due to the absence of historical ignition data.

TURN recommends future WMPs "provide more analysis on how the utilities will cost-effectively target investments and avoid duplicating reduction of the same risk with different technologies/investments."[91] As discussed in its 2019 WMP, SCE is working to further advance its risk analysis capabilities to better analyze wildfire risk and deploy targeted mitigation to specific parts of our system. As SCE gains additional experience with deployed wildfire mitigations, it expects to gain further insights into the effectiveness of an individual mitigation when deployed either by itself or in concert with other mitigations. While SCE evolves and refines its risk modeling approach in this space, SCE has employed the use of mathematical compounding as a way to avoid double-counting the absolute risk reduction of mitigations. This is discussed in more detail in Chapter 2 of SCE's 2018 RAMP report.

CLECA suggests that the WMP leverage a "common lexicon of standard terms" for the WMP to be developed in the "next phase of this proceeding" and require the use of the standardized terms in

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[91] TURN's Comments at p. iv.

future filings.[92] SCE agrees that a common set of terms for future filings can be useful; however, it disagrees that terms should be developed as a part of this proceeding. SCE believes such determination are more appropriately made in other venues.

EBMUD recommends this WMP "describe the mechanism that will allow the protocols approved in the [PSPS OIR] to be included in future WMPs" and that future WMPs "include the recommendations from the De-Energization Rulemaking."[93] SCE agrees.

VIII. OTHER ISSUES

The overarching theme of PCE/Sunrun's combined brief is that PG&E should "collaborate with CCAs and customer-sighted energy service providers in its efforts to increase [grid resiliency]."[94] The IOUs' WMP are appropriately focused on increasing distribution and transmission grid resiliency and safety, reinforcing situational awareness regarding that grid, and communicating with their customers about related issues. CCAs and behind-the-meter solar companies solely procure electrons for customers who have "chosen" that generation retail service option. That role is unrelated to utility wildfire mitigation efforts and is not appropriately within the scope of this proceeding.

CLECA proposes that "[t]he decision on approval of the initial set of [WMPs] should set a clear timeline for when the next round of annual [WMPs] is to be filed."[95] SCE agrees.

OSA recommends that this proceeding be kept open and that working groups be established to continue important work related to evaluating the effectiveness of the WMP. While SCE is always amenable to continued dialogue and collaboration with Commission staff and intervenors, SCE respectfully submits that the statute contemplates annual utility WMP, and that the Commission must reach a final decision for the 2019 WMP in this proceeding now.

SBUA recommends that the Commission reach a conclusion in this proceeding of what constitutes "vulnerable customers," while explicitly acknowledging that "SB 901 does not provide [such] a definition,"[96] and implicitly conceding that the PSPS OIR is likely the more appropriate venue to make such a determination.[97] SCE agrees with that latter position.

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92 CLECA Comments at pp. 12-13.
93 *See* EBMUD's Comments at p. 8.
94 *See* PCE/Sunrun's Comments at p. 2.
95 *See* CLECA's Comments at p. 13.
96 *See* SBUA's Comments at p. 12.
97 *See* SBUA's Comments at p. 13.

Respectfully submitted,

PATRICIA CIRUCCI
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/s/ Russell A. Archer

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March 22, 2019

Appendix A

List of Acronyms

ALJ	Administrative Law Judge
Cal Advocates	The Commission's Public Advocates Office
CAL FIRE	California Department of Forestry and Fire Protection
CARE	California Alternate Rate for Energy
CBs	Circuit Breakers
CCA	Community Choice Aggregator
CEJA	California Environmental Justice Alliance
CFBF	California Farm Bureau Federation
CLECA	California Large Energy Consumers Coalition
CLF	Current Limiting Fuses
CPUC	California Public Utilities Commission or Commission
CRC	Community Resource Center
EBMUD	East Bay Municipal Utility District
EOI	Enhanced Overhead Inspection program
EPUC	Energy Producers and Users Coalition
ESA	Energy Savings Assistance
FAA	Federal Aviation Administration
FPP	Fire Prevention Plan
GO	General Order
GPI	Green Power Institute
GRSP	Grid Safety and Resiliency Program
HFRA	High Fire Risk Areas
IOUs	Investor-Owned Utilities
IVMP	Integrated Vegetation Management Plan
LACoFD	Los Angeles County Fire Department
Malibu	The City of Malibu
Mendocino	The County of Mendocino
MGRA	Mussey Grade Road Alliance
Mr. Abrams	William B. Abrams
ODI	Overhead Detail Inspection
OEM	Office of Emergency Management
OH	Overhead
OIR	Order Instituting Rulemaking
OSA	The Commission's Office of Safety Advocates
P.U.C.	California Public Utilities Code
PCE	Peninsula Clean Energy
PG&E	Pacific Gas and Electric Company
POC	Protect Our Communities Foundation
PSPS	Public Safety Power Shutoff Program
RAMP	Risk Assistance Mitigation Plan
RAR	Remote Automatic Reclosers
RAWS	Remote Automated Weather Stations
RCA	Root Cause Analysis
RFW	Red Flag Warning
SAWTI	Santa Ana Wildfire Threat Index
SB	Senate Bill
SBUA	Small Business Utility Advocates

SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SED	The Commission's Safety and Enforcement Division
S-MAP	Safety Model Assessment Proceedings
Sunrun	Sunrun Inc.
TURN	The Utility Reform Network
UCSD	University of California San Diego
UNR	University of Nevada Reno
VCFD	Ventura County Fire Department
WMP	Wildfire Mitigation Plan

Appendix B

Data Request Reponses from SCE

Southern California Edison
R.18-10-007 – SB 901

DATA REQUEST SET C A L P A - S C E - 0 0 1

To: CalPA
Prepared by: Ryan Stevenson
Job Title: Senior Advisor
Received Date: 2/6/2019

Response Date: 2/23/2019

Question 01: Please provide all workpapers and supporting documents related to SCE's Wildfire Mitigation Plan
filing in searchable and original "live" format (spreadsheet, etc.).
Please send your response to the Originator, and a copy of your response to Project Coordinator and e-copies to the following Public Advocates Office representatives:
(none)
Please provide the above information as it becomes available but no later than the due date identified above. If you are unable to provide the information by this date, please notify the Originator at least 3 days before the data request is due and provide your best estimate of when the information can be provided. Please identify the person who provides the response and his/her phone number and email address.

Response to Question 01:

Please see attached zipfolder:

As discussed, please see the attached zip file that includes a few folders and a Reference Excel file for programs in SCE's 2018 GRC, GSRP Application, as well as accelerated/expanded and new activities included in SCE's 2019 Wildfire Mitigation Plan (WMP). Please review the notes sections in the referenced Excel file that explains additional costs beyond SCE's GSRP forecast not captured elsewhere. SCE also includes its cost workpapers for the accelerated/expanded and new activities included in its WMP. Further guidance regarding these items are provided below:

1. Reference Excel file has 3 tabs:
    a. One tab that includes GSRP workpapers references for SB 901 WMP programs/activities that are GSRP-based (as well as changes since that filing – see the notes section)
    b. One tab that includes 2018 GRC workpapers references for historical activities that are GRC-based (these should be considered irrelevant to this 901 WMP proceeding)
    c. One tab that identifies the new and incremental SB 901 WMP workpapers
2. A folder that contains multiple Excel files and represent SCE's cost workpapers for new and incremental activities included in SCE's SB 901 WMP.

Southern California Edison
R.18-10-007 – SB 901

DATA REQUEST SET S E D - S C E - 0 0 1

To: SED
Prepared by: Hunly Chy
Job Title: Manager
Received Date: 2/28/2019

Response Date: 3/4/2019

Question 9: 9. What is(was) the priority of the circuits being replaced in 2018, 2019 and 2020? Provide the following in the list in priority order: Circuit name, reference number, circuit miles, location, designated HFRA, and number of miles already re-conductored with Covered Conductor (CC) and number of miles planned for each fiscal year.

Response to Question 9:
SCE objects to the question to the extent it calls for information beyond the scope of SCE's 2019 calendar-year WMP. Notwithstanding the foregoing objection, SCE responds as follows: Regarding SCE's Wildfire Covered Conductor Program (WCCP), SCE employs a risk-based analysis to prioritize conductor replacement in HFRA on higher-risk circuits based on historical ignition data in combination with other risk-informed criteria. To gain efficiency in the work, SCE may also bundle additional circuits with those prioritized for WCCP. In 2018-2019, SCE has or plans to re-conductor the following circuits based on this risk-based prioritization analysis:

Region	Voltage	Circuit
San Joaquin	12	Jordan
North Coast	16	Thacher
North Coast	16	Galahad
Rurals	12	Cuddeback
San Joaquin	4	Trail
San Joaquin	4	Billy Creek
San Joaquin	4	Micro
North Coast	16	Davenport
North Coast	16	Buckhorn
North Coast	12	Bootlegger
Rurals	12	Cuddeback
Rurals	12	Viento
Rurals	12	Mettler
San Joaquin	12	Jordan
San Joaquin	4	Dinkey Creek
San Jacinto	12	Chawa

The completion of the full scope of this work is subject to both potential resource constraints and also potentially the Commission's guidance in this proceeding and/or SCE's pending GSRP application.

2020 wildfire mitigation activities, including those associated with WCCP, will be considered in the 2020 WMP proceeding, and are not within the scope of this proceeding. For 2020, SCE has not yet decided upon a final scope of grid-hardening work. That being said, SCE has compiled a list of high-priority circuits across its service territory (see attached), and its general intention is to complete re-conductoring work on the higher-priority circuits first, while also reserving the necessary flexibility to potentially re-prioritize certain circuits to take advantage of potential operational efficiencies should those opportunities arise.

Southern California Edison
Grid Safety and Resiliency Program Application

DATA REQUEST SET T U R N - S C E - 003

To: TURN
Prepared by: Robert J Tucker
Title: Senior Manager Dated: November 6, 2018

Q. 17.b- c:

At page 78 of SCE's workpapers (Exhibit No. SCE-01), SCE outlines the "deployment prioritization methodology for its Wildfire Covered Conductor Program (WCCP)."

b. Please provide the formula used to calculate the wildfire risk of each circuit.

c. Relying on the prioritization process outlined at page 78, please provide a prioritized list of all circuits SCE intends to mitigate as part of the WCCP using the wildfire risk analysis used by SCE. For each circuit please indicate whether it would be classified as Tier 1, 2 or 3 under the CPUC adopted definitions for High Fire Risk Area (HFRA) using numerical labels as follows: Tier 3 = 3, Tier 2 = 2, SCE HRFA = 1, non-HFRA = 0. If only a portion of the circuit is in a tier, please indicate the percentage in each Tier.

Response to Question 17.b-c:

b. For clarification, the discussion at page 78 of SCE's workpapers describes the process SCE used to calculate a circuit-level prioritization for covered conductor deployment, as opposed to a process for calculating "wildfire risk of each circuit."

SCE uses the term "Index Score" to refer to this calculation of circuit-level prioritization for covered conductor deployment. Each circuit's "Index Score" is based on the sum of circuit-level individual attribute scores multiplied by the attribute weights summarized in SCE's Circuit Prioritization work paper submitted in support of SCE-01A (A. 18-09-002) (Page 78 of the work paper document).

Individual attribute scores are the quantified attribute value for each individual circuit, expressed as a percentage of the maximum attribute value observed among all High Fire Risk Area (HFRA) circuits. For example, the longest HFRA circuit has 113 circuit miles in Tier 3, so a circuit with 40 miles of Tier 3 length would have an individual attribute score of 40/113 = ~0.354. This individual attribute score would be weighted with an attribute weight of 25%. The sum of all weighted individual attribute scores is the circuit's Index Score.

The following equation describes how the index score is computed. The variables in the equation correspond to selected columns identified by "Formula Variables" in the table to the response to part (c) of this question. Variables with the subscript "max" refer to the values in the "Max Observed" row corresponding to the respective column of the table.

$$Index\ Score = \left(\frac{T3}{T3_{max}}\right)(0.25) + \left(\frac{T2}{T2_{max}}\right)(0.15) + \left(\frac{HW}{HW_{max}}\right)(0.10) + \left(\frac{WD}{WD_{max}}\right)(0.10) + \left(\frac{SC}{SC_{max}}\right)(0.05) + \left(\frac{PMF}{PMF_{max}}\right)(0.20) + \left(\frac{VFC}{VFC_{max}}\right)(0.15)$$

c. Please see the tables below. The first table provides the prioritized list of circuits to be mitigated as part of the Wildfire Covered Conductor Program (WCCP) during the GS&RP filing period and corresponds to the circuits with the highest index scores of all circuits that traverse SCE's HFRA. The second table provides the percentage in each tier as requested by TURN, using TURN's requested labeling (Tiers 3, 2, 1 and 0).

	Attribute Weighting	25%	15%	10%	10%	5%	20%	15%	
	Formula Variable	T3	T2	HW	WD	SC	PMF	VFC	
OH Circuit Name	Total Circuit Length (OH Pri - Ckt Mi.)	Tier 3 Length (OH Pri - Ckt Mi.)	Tier 2 Length (OH Pri - Ckt Mi.)	High Wind in HFRA Length (OH Pri - Ckt Mi.)	Historical Wiredown Count	Small Conductor (Ckt Mi.)	Potentially Mitigated HFRA Fault / Total Ckt Length (OH Pri - Ckt Mi.)	HFRA Vegetation Fault Count	Index Score
THACHER	74.96	74.93	0.03	58.28	2	36.58	0.19	8	42.72
GALAHAD	51.60	50.87	0.73	33.64	5	32.92	0.23	7	35.11
CHAWA	92.72	91.60	1.12	58.31	1	44.91	0.09	0	32.29
JORDAN	159.19	0.00	159.19	34.51	2	151.23	0.06	2	31.08
DAVENPORT	65.76	65.76	0.00	62.80	4	27.10	0.06	0	29.91
METTLER	113.75	113.06	0.69	0.00	2	45.80	0.11	0	28.86
CUDDEBACK	83.78	81.98	1.80	0.00	2	29.46	0.08	4	28.21
CORSAIR	82.16	67.32	5.41	53.67	2	55.91	0.06	0	28.05
PATRICIA	34.82	34.82	0.00	21.86	4	16.06	0.29	7	27.98
Max Observed		**113.06**	**159.19**	**62.80**	**9**	**151.23**	**37.04**	**9**	

OH Circuit Name	Total Circuit Length (OH Primary - Ckt Mi.)	Tier 3 Length (OH Primary - Ckt Mi.)	Tier 2 Length (OH Primary - Ckt Mi.)	Tier 1 Length (OH Primary - Ckt Mi.)	Tier 0 Length (OH Primary - Ckt Mi.)	Tier 3 Percentage	Tier 2 Percentage	Tier 1 (i.e. SCE non-tier HFRA) Percentage	Tier 0 (i.e. non-HFRA) Percentage
THACHER	74.96	74.93	0.03	0.00	0.00	100%	0%	0%	0%
GALAHAD	51.60	50.87	0.73	0.00	0.00	99%	1%	0%	0%
CHAWA	92.72	91.60	1.12	0.00	0.00	99%	1%	0%	0%
JORDAN	159.19	0.00	159.19	0.00	0.00	0%	100%	0%	0%
DAVENPORT	65.76	65.76	0.00	0.00	0.00	100%	0%	0%	0%
METTLER	113.75	113.06	0.69	0.00	0.00	99%	1%	0%	0%
CUDDEBACK	83.78	81.98	1.80	0.00	0.00	98%	2%	0%	0%
CORSAIR	82.16	67.32	5.41	7.26	2.16	82%	7%	9%	3%
PATRICIA	34.82	34.82	0.00	0.00	0.00	100%	0%	0%	0%

Southern California Edison
R.18-10-007 – SB 901

DATA REQUEST SET C E J A - S C E - 0 0 1

To: CEJA
Prepared by: Russell Archer
Job Title: Senior Attorney
Received Date: 2/15/2019

Response Date: 2/22/2019

Question 1: 1. California Executive Order N-05-19 requires consideration of "socioeconomic factors and vulnerable populations that exacerbate the human toll of wildfires" when CAL FIRE develops a "[m]ethodology to assess which communities are at the greatest risk from wildfire and the projects within/nearby areas that would reduce the threat of a catastrophic wildfire if completed." When developing your prioritization for hardening the grid, have you considered "socioeconomic factors and vulnerable populations that exacerbate the human toll of wildfires"? If you have, please describe how these factors were considered in the evaluation of how to prioritize projects to harden the grid. If you have not, please describe why these factors have not been considered and any plans you may have to consider these populations in the future.

Response to Question 1:
California Executive Order N-05-19 requires CAL FIRE in consultation with other State agencies and departments, not the investor-owned electric utilities, to provide a report to the Governor, which among other things, should consider "socioeconomic factors and vulnerable populations that exacerbate the human toll of wildfires." The Executive Order contemplates that this effort will inform future "local grants [that] will focus on community engagement and public education in high-risk areas with an emphasis on public health and safety." SCE looks forward to reviewing that forthcoming report from CAL FIRE. The grid hardening activities and programs in SCE's 2019 Wildfire Mitigation Plan (WMP) are focused on prioritizing the highest fire-risk areas in SCE's service territory as those risks pertain to electrical infrastructure. SCE's WMP is agnostic to the particular socioeconomic conditions in any individual high fire risk area; SCE is committed to protecting public safety irrespective of those differences. Moreover, SCE's WMP describes in detail in Chapter 5 how SCE communicates with and assists vulnerable customers during emergencies (e.g., wildfires), including those customers with lower socioeconomic status.

Southern California Edison
A.18-09-002 – GS&RP

DATA REQUEST SET T U R N - S C E - 0 0 6

To: TURN
Prepared by: Andrew Garcia
Job Title: Senior Manager
Received Date: 2/11/2019

Response Date: 2/26/2019

Question 29d: 29. Regarding investments and expenditures in covered conductor, remote reclosers, fuses, and enhanced vegetation management please provide the following:
d. If covered conductor is installed on a circuit, does this mitigate the need to accomplish enhanced vegetation management on all or any portion of the circuit? Please explain, provide an example of how the technologies work together or are complementary during a fault, and include whether and how SCE has accounted for this overlap in its proposal. Please provide all relevant workpapers/sources.

Response to Question 29d:
No, the presence of covered conductor does not eliminate the need for enhanced vegetation management, nor does the application of enhanced vegetation management eliminate the need to install covered conductor.

As noted in Section (IV)(B)(1)(c)(page 51) of SCE-01A (A. 18-09-002), Contact from Object (CFO) faults have a higher probability of being associated with a fire event, therefore, SCE is deploying covered conductor to reduce the number of CFO faults experienced therefore reducing ignition risk. However, covered conductor is being deployed in conjunction with enhanced vegetation management to more fully reduce the volume of potential contacts.

As noted in Section (III)(A)(3)(page 35) of SCE-01A (A. 18-09-002), SCE's enhanced vegetation management aims to reduce the likelihood that vegetation will contact overhead lines by increasing clearances and removing more trees than the standard program. However, SCE has limited ability to increase clearances in certain areas and recognizes that wind can blow debris into lines from significant distances despite appropriate clearances to nearby trees. For these reasons, SCE believes a more robust approach to mitigate CFO risks is to deploy its enhanced vegetation management program in conjunction with covered conductor, both of which are independently necessary, and together are complementary

If SCE were to simply to install covered conductor on a circuit in a heavily wooded area and not increase the vegetation clearance as would be done with the enhanced vegetation program, SCE would lessen the number of faults experienced in normal weather conditions because of the insulation properties of the covered conductor. However, in high wind conditions large over hanging branches may be shed into the lines or worse, a hazard tree that would have been removed by the enhanced vegetation management program may be uprooted and fall into the lines ripping them down, potentially causing an ignition. Conversely, if SCE were to exclusively deploy enhanced vegetation management and continue to rely exclusively on bare conductors it would similarly see a reduction in fault events in normal weather conditions. However, in high winds, SCE may still experience faults from palm fronds that shed from trees hundreds of feet away, or have

wind-driven conductor-to-conductor contact potentially causing an ignition.

SCE believes covered conductor and enhanced vegetation management are complementary programs and are both necessary to achieve the greatest risk reduction.

Appendix C

Workpapers

Circuit Deployment Prioritization
Section (IV)(B)(e)(1)

Introduction

As discussed in Section (IV)(B)(e)(1), SCE developed a deployment prioritization methodology for its Wildfire Covered Conductor Program (WCCP) to guide the deployment of covered conductor in place of existing bare distribution primary conductor in high fire risk areas (HFRA). This methodology prioritizes deploying covered conductor on circuits posing the greatest wildfire risk, focusing on ignition consequence and ignition frequency. This methodology also took into consideration the mitigation effectiveness of covered conductor as deployed in specific areas of high fire risk. Within each factor category, individual attributes were selected and subsequently assigned a weighting, as shown below.

Category	Total Category Weighting	Attribute	Individual Attribute Weighting
Ignition Consequence Factors	50%	Circuit Length in Tier 3	25%
		Circuit Length in Tier 2	15%
		Circuit Length in High Wind within HFRA	10%
Ignition Frequency Factors	30%	Historic Vegetation Faults in HFRA	15%
		Historic Wire Down Events	10%
		Circuit Length of Vintage Small Conductor	5%
Mitigation Effectiveness Factor	20%	Estimated number of mitigated faults in proportion to circuit length in HFRA	20%

Development of Methodology

SCE conducted a comprehensive process to determine how best to prioritize covered conductor deployment within the HFRA. SCE initially considered deploying covered conductor on any circuit located in CPUC Tier 3 HFRA. This approach was rejected, however, in favor of a more nuanced analysis that took into account other contributing factors to wildfire risk in order to provide for a more effective and efficient deployment strategy.

Given the variety of circumstances that could lead to a fire, SCE considered how best to leverage additional datasets to develop a more sophisticated approach to its prioritization methodology. For this effort, SCE formed a cross-function team to assess attributes best representing the potential for wildfire risk. These internal stakeholders included representatives from SCE's Transmission and Distribution Engineering, Business Resiliency and Risk Management organizations. Three general categories were determined to best inform SCE's prioritization methodology: ignition consequence, ignition frequency and mitigation effectiveness.

In order to determine the relative value between each category, SCE used a comparative approach. When considering ignition consequence and ignition frequency, SCE recognized that not all ignitions result in catastrophic wildfires. Therefore, placing greater priority on high consequence areas of our system would likely address greater risk. As such, the ignition consequence attributes, in aggregate, were given greater value than ignition frequency attributes.

Similarly, in determining the relative value of mitigation effectiveness compared to the other two general categories, SCE recognized that this factor—while valuable—would place greater emphasis on deploying covered conductor in areas where it is likely to be most effective and efficient, as opposed to areas where there is the greatest fire risk. SCE therefore gave this category a lower value than the other two, in order to maintain appropriate emphasis on deploying covered conductor in high fire risk areas and recognizing that covered conductor provides overall substantial benefits for mitigating fire risk, as discussed in testimony.

Ultimately, an aggregate 50% weighting was assigned to ignition consequence, an aggregate 30% weighting was assigned to ignition frequency, and an aggregate 20% weighting was assigned to mitigation effectiveness.

Ignition Consequence Factors

In sum, the ignition consequence factors account for 50% of the total prioritization weighting. As noted in the table above, this category has three attributes. In determining how to divide this 50% among the three attributes, SCE relied on subject matter input to best inform the weightings of the individual attributes, with validating analyses to further confirm the relative weightings where possible.

Circuit length in Tier 2 and Tier 3: SCE has approximately 4,500 distribution circuits in its service area. Approximately 1,300 of these circuits have at least some portion located within HFRA, which includes CPUC Tier 2 and Tier 3 areas.[1] In prioritizing these circuits for the WCCP, SCE placed a weight of 25% to the circuit length in a Tier 3 area and a weight of 15% to the circuit length in a Tier 2 area to reflect the greater risk associated with Tier 3 areas relative to Tier 2. This means that circuits with the longest length in Tier 3 are generally given priority over circuits of comparable length in Tier 2. Under certain circumstances, however, circuits with considerable length in Tier 2 could be prioritized over circuits with a short length in Tier 3.

In order to further validate these relative weightings, SCE reviewed the 2015-2017 fire history as reported to the CPUC. A majority of fires at distribution voltages up to 33kV were determined to occur within the Tier 3 area, providing further justification for Tier 3 receiving a greater weighting than Tier 2.

Wind Load Considerations in HFRA: Wind plays an important role in many contact-related faults, including contact with tree limbs and palm fronds. In addition, high wind speeds are a known contributor to larger fires. SCE understands that wind loading is considered as part of the CPUC's Tier 2 and Tier 3 designations; however, SCE decided to undertake an additional review of wind conditions on its system to further inform its deployment of covered conductor. For this effort, SCE utilized GIS data mapping and existing data from its Pole Loading program to map the estimated wind load on the portions of its circuits in HFRA and has also used this data in prioritizing circuits for WCCP.

[1] As explained in SCE's supporting testimony, HFRA refers to areas designated as Tier 2 or Tier 3 in recent CPUC mapping proceedings or SCE HFRA not in CPUC Tiers.

This factor (wind load) was assigned a weight of 10% as part of SCE's WCCP circuit prioritization methodology. This means that circuits with greater exposure to high wind conditions within the HFRA are generally given priority over circuits with minimal high wind exposure. Because wind loading is also taken into account as part of the CPUC's Tier 2 and Tier 3 designations, SCE assigned this factor a lower relative value, comparatively, within this category of attributes.

Ignition Frequency Factors

In sum, the ignition frequency factors account for 30% of the total prioritization weighting. As noted in the table above, this category has three attributes. In determining how to divide this 30% among the three attributes, SCE relied on subject matter input to best inform the weightings of the individual attributes, with validating analyses to further confirm the relative weightings where possible.

Number of historic vegetation faults in HFRA: Vegetation is a known contributor to ignition events associated with SCE distribution equipment. During the 2015 to 2017 time period, approximately 8% of annual faults associated with HFRA circuits were related to vegetation, yet these faults were associated with approximately 17% of the annual fire events within the HFRA.[2] Since vegetation-related faults pose a heightened fire risk as compared to other fault types and covered conductor is an effective mitigation tool for vegetation driven faults, this attribute was assigned a weight of 15% as part SCE's WCCP circuit prioritization methodology. This means that circuits with a history of vegetation faults within the HFRA are generally given priority over circuits with other historical fault types.

Furthermore, from 2015 to 2017, vegetation represented the leading cause of ignitions associated with SCE distribution equipment within HFRA.[3] This provides further justification for this attribute receiving the highest individual attribute weighting within this category.

Number of historic wire down events: Wire down events in HFRA also pose an ignition frequency risk. Therefore, circuits with a history of wire down events are likely to indicate an area of outsized ignition risk. This attribute was assigned a weight of 10% as part SCE's WCCP circuit prioritization methodology. This means that circuits with a history of wire down events are generally given priority over circuits without a history of wire down events.

Similar to the above, from 2015 to 2017, conductor-related fires represented one of the leading cause of ignitions associated with SCE distribution equipment within the HFRA.[4] Historical wire down events are considered to be a proxy for conductor-related ignitions. This provides further justification for this attribute being included, albeit at a lower attribute weighting compared to vegetation.

[2] This analysis is described in detail within the Mitigation Effectiveness Comparison Workpaper. It refers only to ignition events recorded at voltage levels up to 33kV.
[3] This analysis refers only to those ignition events recorded at voltage levels up to 33kV.
[4] This analysis refers only to those ignition events recorded at voltage levels up to 33kV.

Circuit length of vintage small conductor: Vintage small conductor could be subject to damage under fault conditions and is at risk of a wire down event and posing an ignition risk. In addition, smaller conductor is likely to be older than other parts of our system, and potentially exposed to corrosive conditions and degradation for a longer period. Under normal operating conditions, however, vintage small conductor is considered to be of limited risk of leading to an ignition event. Consequently, this attribute was assigned a weight of 5% as part of SCE's WCCP circuit prioritization methodology. This means that circuits with longer lengths of vintage small conductor are generally given priority over circuits with less vintage small conductor.

Mitigation Effectiveness Factor

Mitigation effectiveness accounts for 20% of the total prioritization weighting. SCE relied on subject matter input to determine this weighting value, and whether additional attributes were necessary. No other attributes were determined to further assist in determining which areas covered conductor would provide the greatest benefits when deployed.

Estimated number of faults mitigated in proportion to circuit length in HFRA: In conjunction with the analysis of the 2015-2017 fault history in ODRM, SCE utilized the data on each circuit's fault history to estimate the relative mitigation effectiveness of installing covered conductor. More specifically, a comparative value was calculated by dividing the number of historical faults within the HFRA potentially mitigated by covered conductor by the circuit's length within the HFRA. This factor was assigned a weight of 20% as part of SCE's WCCP circuit prioritization methodology. This weighting, all else equal, prioritizes circuits with a greater recorded rate of potentially mitigated faults per circuit length, compared to circuits with faults not expected to be addressed by covered conductor.

Results and Review

This methodology resulted in a prioritized listing of approximately 1,300 HFRA circuits with overhead conductor exposure. Circuits intended to be remediated within the 2018-2020 time period generally have greater Tier 3 and Tier 2 exposure, indicators of potential concerns with overall asset health, such as the historical number of wire down events, and a history of faults that are likely to be mitigated by covered conductor.

The final prioritized results also underwent a review by stakeholders to ensure the areas selected for initial deployment of covered conductor were indicative of areas of highest risk. In particular, the reviews focused on ensuring areas historically affected by wildfires were highly prioritized relative to other areas, and yet recognizing that future wildfires may not occur in the same areas as the past.

Scope – Covered Conductor
Support for Section (IV)(B)(1)(e)

Objective Summary

This work paper describes the forecasting methodology used to determine the proposed scope estimate of 592 miles of replacement of existing bare overhead conductor with covered conductor as part of the Covered Conductor described within Section (IV)(B)(1)(e).

Introduction

SCE conducted two analyses to determine the forecasted covered conductor scope for the nine overhead primary circuits recommended for assessment in 2018-2020, shown below in Table 1.[1] These analyses focused on two categories that require conductor replacement with covered conductor: 1) vintage small conductor at risk of damage during fault conditions based upon a Short Circuit Duty (SCD) assessment; and 2) conductor with elevated risk of faults from vegetation-related contact.

Table 1
2018-2020 Circuit Prioritization

Overhead Primary		
Circuit (Rank Order)		Rank
~~THACHER~~	THACHER	1
~~GALAHAD~~	METTLER	2
~~CHAWA~~	CUDDEBACK	3
~~JORDAN~~	JORDAN	4
~~METTLER~~	HUGHES LAKE	5
~~CUDDEBACK~~	CHAWA	6
~~PATRICIA~~[2]	GALAHAD	7
~~DAVENPORT~~[2]	TITAN	8
~~CORSAIR~~[2]	TENNECO	9

Category 1: Vintage Small Conductor at Risk of Damage During Abnormal Fault Conditions Based on Short Circuit Duty Review:

The first category of scope identification for purposes of conductor replacement is conductor that could be at risk of damage during fault conditions. SCE used a methodology consistent with the approach used for the Overhead Conductor Program (OCP). This methodology centers on the

[1] SCE's circuit prioritization analysis is explained in the accompanying "Circuit Prioritization Workpaper".
[2] The circuit prioritization that defines the top ranked circuits is informed by geographic information system (GIS) data that has been updated due to an ongoing asset review. Additionally, SCE improved its methodology for querying system data. These updates changed circuit rankings: the Hughes Lake, Titan, and Tenneco replaced Patricia, Davenport, and Corsair circuits in the top nine circuits as shown above. Patricia is now ranked fourteenth, Davenport is now tenth, and Corsair is now fifteenth.

ability of conductor to withstand forecasted short circuit duty in the case of a fault. Generally, "vintage" conductor tends to be older and smaller in size due to historical industry standards and system demands. Smaller conductor usually has a lower current rating compared to larger conductor and is more likely to need replacement under OCP methodology.

In aggregate, the forecasted scope includes these smaller, vintage conductors that would be most susceptible to damage during fault conditions due to their lower SCD ratings. SCE arrived at the forecasted estimate for this category using two methodologies: A) Scope identified with detailed engineering for circuits that have started the scoping process; and B) Scope identified with desktop forecasting for circuits that will soon start the scoping process:

A. **Conductor identified using detailed engineering for circuits that have started the scoping process:** Given the critical nature of the Grid Safety and Resiliency Program, SCE began addressing the highest ranking circuits to reduce wildfire risk in March 2018, commencing work on ~~six~~ five[3] of the nine circuits listed above. The first step in this process is detailed engineering using OCP scoping methodology and recommending the use of covered conductor for all identified conductor replacement. The purpose of detailed engineering is to allow the Field Engineering organization to assess the need for conductor replacement while reviewing asset specific information. Detailed engineering defined initial scope by reviewing circuit-specific information like conductor material, conductor size, distance from substation, estimated impedance, circuit breaker settings, circuit configuration, splice type and count, and additional protection settings. Based on these factors, SCE identified the conductor to be replaced.

B. **Conductor identified using desktop forecasting for circuits that have not yet started the scoping process:** For the remaining circuits, SCE performed a desktop forecasting exercise to identify conductor that did not have sufficient SCD rating. SCE first examined the short circuit characteristics at nodes on the entire length of each circuit. In parallel, an analysis was performed to estimate each conductor segment's SCD rating utilizing multiple characteristics associated with each conductor segment, namely: conductor material, conductor size, distance from substation, estimated impedance, and circuit breaker settings and placement on the circuit. SCE then performed a comparison analysis: if a conductor segment's expected SCD exceeded its SCD rating during abnormal fault conditions for that particular point in the system (as indicated by the nodal analysis), it was selected for replacement. This desktop forecasting exercise was aligned with OCP scoping methodology, and SCE expects to perform detailed engineering on these circuits before beginning construction. Detailed engineering results may slightly differ from initial estimates. These differences are driven by the availability of information during detailed engineering not available for initial forecasting like splice count, which is not tracked in SAP.

[3] SCE previously started scoping six of the top nine circuits, including the Davenport circuit. SCE is continuing work on Davenport to help ensure full deployment of the targeted covered conductor scope identified for the 2018-2020 timeframe (see Table 2) and thus maximize its wildfire mitigation efforts.

At the completion of the SCD analysis, each of the segments qualifying for replacement were mapped to determine if they were located within high fire risk areas (HFRA) as defined in SCE's supporting testimony. Only segments within the HFRA were considered for the program.

Category 2: Conductor with Elevated Risks of Faults from Vegetation-Related Contact From Object (CFO)

SCE reviewed fault history from 2015 - 2017 and vegetation data to identify specific segments within HFRA that are most susceptible to contact-related faults.[4] SCE only considered the vegetation-related fault-history within the HFRA. Each circuit was assigned a vegetation fault count that represented the circuit's history of vegetation-related faults. The list of circuits was updated by removing circuits that would be most effectively mitigated by the expanded vegetation management effort proposed in this filing. This identification was performed by SCE's Vegetation Management organization. Circuits that had a relatively higher frequency of vegetation-related faults, defined as two or more vegetation-related faults over the 2015 - 2017 period, were identified to have all overhead conductor within the HFRA replaced with covered conductor.

In aggregate, these circuits have been identified to have elevated risks of vegetation-related contact from object (CFO) faults.

Results

The forecasting and scoping effort identified 596 circuit miles to be replaced in the 2018-2020 period. SCE is requesting funding for 592 circuit miles because, prior to submission of this filing, SCE was able to replace four of the 596 circuit miles identified. Identified miles by circuit and category are listed in Table 2 below. Final scope completed for 2018 - 2020 may differ from the scope identified in Table 2 due to a number of factors such as permitting challenges, storms and inclement weather, geographic resource availability, and variation between system data and actual field conditions. SCE is preparing for potential variances by scoping additional high ranked circuits beyond the top nine circuits, including the Davenport circuit which is now ranked tenth on the list of critical circuits.

In some instances, portions of circuits meet the criteria for both CFO-related scope and SCD-related scope. To avoid double counting, the quantities computed for CFO-related scope exclude overlapping areas that meet the SCD-related criteria.

[4]. This is the same dataset used for the Mitigation Effectiveness Comparison workpaper.

Table 2
2018-2020 Covered Conductor Scope

~~Recommended Replacement of Overhead Conductor (Circuit Miles)~~			
~~Circuit Name (Rank Order)~~	~~SCD~~	~~CFO~~	~~Total (SCD + CFO)~~
~~THACHER~~	~~0.0~~	~~75.0~~	~~75.0~~
~~GALAHAD*~~	~~0.0~~	~~51.6~~	~~51.6~~
~~CHAWA*~~	~~44.1~~	~~0.0~~	~~44.1~~
~~JORDAN*~~	~~0.4~~	~~158.8~~	~~159.2~~
~~METTLER*~~	~~47.2~~	~~0.0~~	~~47.2~~
~~CUDDEBACK*~~	~~0.2~~	~~83.5~~	~~83.8~~
~~PATRICIA~~	~~8.4~~	~~26.4~~	~~34.8~~
~~DAVENPORT*~~	~~43.9~~	~~0.0~~	~~43.9~~
~~CORSAIR~~	~~56.7~~	~~0.0~~	~~56.7~~
~~Total~~	~~201.0~~	~~395.3~~	~~596.3~~

Recommended Replacement of Overhead Conductor (Circuit Miles)			
Circuit Name (Rank Order)	SCD	CFO	Total (SCD + CFO)
THACHER	31.5	52.1	83.6
METTLER*	46.6	0.0	46.6
CUDDEBACK*	23.9	65.5	89.4
JORDAN*	41.6	122.4	164.0
HUGHES LAKE	0.0	89.6	89.6
CHAWA*	54.2	0.0	54.2
GALAHAD*[5]	4.7	32.7	37.4
TITAN[6]	0.0	0.0	0.0
TENNECO[7]	31.5	0.0	31.5
Total	234.0	362.3	596.3

* Circuits used detailed engineering results for SCD category

[5]As of November 25, 2018, SCE identified approximately 20 circuit miles of the Galahad circuit that were damaged by the Woolsey Fire and are being rebuilt using covered conductor. The rebuild will likely continue into January 2019 and may result in additional circuit miles being rebuilt on this circuit. Because this rebuild effort is being performed under storm conditions, associated costs may be recorded and subject to recovery under the Catastrophic Event Memorandum Account (CEMA) mechanism. SCE plans to reconductor the remaining circuit miles under the GSRP and record associated costs to the requested GSRP memorandum account and/or balancing account.
[6]The desktop analysis determined no scope was needed for the Titan circuit, but the circuit will undergo a detailed assessment by the Field Engineering organization to determine if a portion of the circuits reconductor under as SCD scope using OCP scoping criteria. As mentioned above, more information is available during the detailed engineering process and could lead to some scope identified.

[7] SCE estimates that approximately 100 circuit miles of the Tenneco circuit will be reconductored, with approximately 41 circuit miles being completed by year end 2020. The remaining 59 circuit miles will likely be completed after 2020.

(U 338-E)

Southern California Edison Company's Risk Assessment and Mitigation Phase

Workpapers

Chapter 10
Wildfire

2018 SCE Risk Assessment Mitigation Phase (RAMP)

Chapter 10
Wildfire

Index of Workpapers

Excel versions of Workpapers are available online

1. Go to www.sce.com/applications
2. Select SCE 2018 RAMP
3. In the new window, select Zipped document

Chapter:	Wildfire
Workpaper:	Baseline Risk Modeling Inputs

Legend			
Distribution	Input 1	Input 2	Input 3
Poisson	Mean		
Exponential	Mean		
Lognormal	Mean	StdDev	
Normal	Mean	StdDev	
Triangular	Min	Mode	Max
Uniform	Min	Max	

	ID	Name	2018	2019	2020	2021	2022	2023	Source / Justification
Driver Frequency	D1	Contact From Object	23.0	23.0	23.0	23.0	23.0	23.0	Driver frequencies are based on the annual average CPUC Reportable incidents from 2015-2017, per D.14-02-015 which defines reportable incidents as including fires that travel greater than one linear meter from the ignition point. The 2015-2017 data was filtered to those incidents identified as starting in SCE's HFRA, and associated with SCE's distribution infrastructure. For purposes of this analysis, HFRA includes the most recent CPUC High Fire Threat District maps with Tier 2 and Tier 3 designations, plus areas previously identified by SCE as high fire risk areas prior to the release of the most recent CPUC maps.
	D2	Equipment/ Facility Failure	14.0	14.0	14.0	14.0	14.0	14.0	
	D3	Other (Wire-to-Wire Contact/ Contamination	2.0	2.0	2.0	2.0	2.0	2.0	
	D4	Unknown/ Unspecified	5.0	5.0	5.0	5.0	5.0	5.0	

	ID	Name	2018	2019	2020	2021	2022	2023	Source/Justification
Triggering Event Frequency	TEF	Ignition associated with SCE in HFRA	44.0	44.0	44.0	44.0	44.0	44.0	The TEF is the sum of the annual driver frequencies

	ID	Name	Probability	# of Events (2018)	Source / Justification
Outcomes	O1	Wildfire Red Flag Warning In Effect; Fire Greater Than 5,000	0.8%	0.4	The following data sources were used: SCE overlaid Red Flag Day data on CPUC reportable incidents for distribution infrastructure across SCE's service territory from 2015-2017.
	O2	Wildfire Red Flag Warning In Effect; Fire Less Than 5,000	31.0%	13.6	
	O3	Wildfire Red Flag Warning Not In Effect; Fire Greater Than	0.2%	0.1	
	O4	Wildfire Red Flag Warning Not In Effect; Fire Less Than 5,000	68.1%	30.0	

	ID	Name	Distribution (see	Input 1	Input 2	Input 3	Source / Justification
Consequences	O1	Serious Injuries	Exponential	22.161	N/A	N/A	Serious injury data related to wildfires was not readily available among data reviewed, therefore a
		Fatalities	Exponential	2.670	N/A	N/A	SCE reviewed fatalities associated with CalFire data for fires statewide >300 acres from 2007-
		Reliability	Exponential	1,138,799	N/A	N/A	
		Financial	Exponential	$530,464,210	N/A	N/A	Financial consequence was estimated based on several factors:
	O2	Serious Injuries	Exponential	0.007	N/A	N/A	Based on CalFire 2010-2017 dataset, received through data request to CalFire. Filtered on < 5,000
		Fatalities	Exponential	0.001	N/A	N/A	Imputed from the Mean of Serious Injuries using the 8.3 ratio
		Reliability	Exponential	125,506	N/A	N/A	
		Financial	Exponential	$50,630	N/A	N/A	Based on CalFire 2010-2017 dataset, received through data request to CalFire. Filtered on < 5,000
	O3	Serious Injuries	Exponential	8.300	N/A	N/A	Serious injury data related to wildfires was not readily available among data reviewed, therefore a
		Fatalities	Exponential	1.000	N/A	N/A	Please see O1 - Fatalities.
		Reliability	Exponential	1,138,799	N/A	N/A	Same distribution as O1
		Financial	Exponential	$477,798,167	N/A	N/A	Please see O1 - Financial.
	O4	Serious Injuries	Exponential	0.007	N/A	N/A	Same as O2
		Fatalities	Exponential	0.001	N/A	N/A	Same as O2
		Reliability	Exponential	125,506	N/A	N/A	Same as O2
		Financial	Exponential	$50,630.00	N/A	N/A	Same as O2

Chapter:	Wildfire
Workpaper:	Baseline Risk Modeling Inputs - O1 O3 - Fatalities

Legend			
Distribution	Input 1	Input 2	Input 3
Poisson	Mean		
Exponential	Mean		
Lognormal	Median	StdDev	
Normal	Mean	StdDev	
Triangular	Min	Mode	Max
Uniform	Min	Max	

	Fatalities	Exponential	2.670	N/A	N/A	SCE reviewed fatalities associated with CalFire data for fires statewide >300 acres from 2007-2016, inclusive of several data modifications: SCE also included several 2017 wildfires that were described within CalFire press releases as caused by "Power Lines". SCE removed the 2015 Valley Fire, which was reported by CalFire with a cause listed as "Electrical Power". CalFire investigation reports indicated that the fire was caused by faulty residential wiring, therefore this fire was removed from analysis. SCE added the 2007 Witch Fire, which was classified in CalFire RedBooks as "Equipment Cause". SCE included this fire to be consistent with Cal Fire investigations, which indicated "Electric Power" cause. http://www.fire.ca.gov/fire_protection/fire_protection_fire_info_redbooks http://calfire.ca.gov/communications/communications_newsreleases SCE overlaid Red Flag Day data on CalFire incidents described above. The Red Flag data provided was from the Iowa State University Mesonet GIS Page. https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml
	Fatalities	Exponential	1.000	N/A	N/A	Please see O1 - Fatalities.

O1 - Wildfire (Red Flag Days) >5,000 Acres 2007-2016, Power Lines

year	Fire Name	Acres Total	Fatality
2007	Witch Fire	197990	2
2017	Norrbom, Ado	56556	3
2017	Atlas	51624	6
2017	Redwood	36523	9
2017	Pocket	17357	0
2013	DEER	11429	0
2017	Cherokee	8417	0
2017	La Porte Fire	8417	0

Distribution Detail

- Fitted historical fatality (by event) using @RISK
- Exponential Distribution with mean of 2.67

O3 - Wildfire (Not Red Flag Days) >5,000 Acres, Power Lines

year	Fire Name	Acres Total	Fatality
2015	BUTTE	70868	2
2013	MOUNTAIN	27531	0

Distribution Detail

- 2 data points not enough to fit a distribution
- Assumed same distribution as O1 (i.e. Exponential) and the mean would be the average, in this case 1.

Chapter:	Wildfire
Workpaper:	Baseline Risk Modeling Inputs - O2 O4 Serious Injury

Legend			
Distribution	Input 1	Input 2	Input 3
Poisson	Mean		
Exponential	Mean		
Lognormal	Median	StdDev	
Normal	Mean	StdDev	
Triangular	Min	Mode	Max
Uniform	Min	Max	

	ID	Name	Distribution (see legend)	Input 1	Input 2	Input 3	Source / Justification
Consequences	O2	Serious Injuries	Exponential	0.007	N/A	N/A	Based on Calfire 2010-2017 dataset, received through data request to CalFire. Filtered on < 5,000 acres, electrical cause, codes 141,142,143. Attempted to match with Red Flag day data, however Calfire dataset does not have the incidents by county. Performed a match on date (best information available).
	O4	Serious Injuries	Exponential	0.007	N/A	N/A	Same as O2

O2 - Wildfire (Red Flag Days) < 5,000 Acres
Distribution Detail:
•1,377 rows of data
•Total of 9 injuries (assumed Serious)
•Distribution Fitting using @RISK
•Exponential , mean = 0.006531
Note: Since County Information was not available within the CalFire data set, approximated Red Flag designation by searching the date of the fire and if it matched any date from the

O4 - Wildfire (Not Red Flag Days) < 5,000 Acres

Across 190 rows of assumed non-red flag day fires, zero injuries were recorded. A zero value seemed unlikely given a large number of fires, and based on the injury rate listed above Spot checks of larger fires (>5,000 acres) could not match data against CalFIre redbook data. Data integrity concerns were noted.

Chapter:	Wildfire
Workpaper:	Baseline Risk Modeling Inputs - O1 O3 Financial

Legend			
Distribution	Input 1	Input 2	Input 3
Poisson	Mean		
Exponential	Mean		
Lognormal	Median	StdDev	
Normal	Mean	StdDev	
Triangular	Min	Mode	Max
Uniform	Min	Max	

	ID	Name	Distribution (see legend)	Input 1	Input 2	Input 3	Source / Justification
Consequences	O1	Financial	Exponential	$530,464,210	N/A	N/A	Financial consequence was estimated based on several factors: Damage Claims: SCE used CalFire's destroyed structure counts from reported Power Line fire incidents statewide >300 acres from 2007-2016, and partial year 2017. SCE applied a cost per structure of $819,472 based on insurance industry property claims data for fires in California, in constant 2017 dollars. https://www.iii.org/fact-statistic/facts-statistics-wildfires Suppression Costs: SCE used acreage count from CalFire reported Power Line fire incidents statewide >300 acres from 2007-2016, and partial year 2017. A unit cost of $248.39 was applied per acre suppression based on nationally reporet suppression costs, in constant 2017 dollars. https://www.nifc.gov/fireInfo/fireInfo_documents/SuppCosts.pdf Land Restoration Costs: SCE used acreage count from CalFire reported Power Line fire incidents statewide >300 acres from 2007-2016, and partial year 2017. A unit cost of $1,227 was applied per acre restoration based on public agency research papers. https://www.blm.gov/or/districts/roseburg/plans/collab_forestry/files/TrueCostOfWilfire.pdf Data modifications to CalFire data were consistent with the methodology described in O1 - Fatalities description above. http://www.fire.ca.gov/fire_protection/fire_protection_fire_info_redbooks http://calfire.ca.gov/communications/communications_newsreleases
	)3	Financial	Exponential	$477,798,167	N/A	N/A	Please see O1 - Financial. Costs were calculated based on actual data described in O1 - Financial, for non Red Flag Days SCE Used Red Flag Data to identify incidents not occurring on Red Flag Days. The Red Flag data provided was from the Iowa State University Mesonet GIS Page. https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml

Property Claims Cost per structure in 2017 dollars	Per Acre Restoration cost in 2017 dollars	Per Acre Estimated Firefighting cost in 2017 dollars
$819,472	$1,227	$248.39

PROPERTY CLAIMS
https://www.iii.org/fact-statistic/facts-statistics-wildfires
California Fires only

Rank	Date	Name, Location	Dollars when occurred	In 2016 dollars (2)	2017 Inflation Multiplier	In 2017 Dollars (millions)	# Structures (Calfire Redbooks)	# Acres (Calfire Redbooks)	Property Claims Cost per structure in 2017 dollars
1	Oct. 20-21, 1991	Oakland Hills Fire, CA	1,700	2,746	1.02	$2,804	2,900	1,600	
2	Oct. 21-24, 2007	Witch Fire, CA	1,300	1,488	1.02	$1,520	1,650	197,990	
3	Oct. 25-Nov. 4, 2003	Cedar Fire, CA	1,060	1,362	1.02	$1,391	2,820	273,246	
4	Oct. 25-Nov. 3, 2003	Old Fire, CA	975	1,253	1.02	$1,280	1,003	91,281	
~~5~~	~~Nov. 28-30, 2016~~	~~Great Smoky Mountains Fire, TN~~							
6	Sep. 12-14, 2015	Valley Fire, CA	921	933	1.02	$953	1,955	76,067	
7	Nov. 2-3, 1993	Topanga Fire, CA	375	578	1.02	$590	323	18,000	
~~8~~	~~Sep. 4-9, 2011~~	~~Bastrop County Complex Fire, TX~~							
9	Oct. 27-28, 1993	Laguna Canyon Fire, CA	350	540	1.02	$552	441	14,437	
~~10~~	~~Jun. 21-28, 2012~~	~~Waldo Canyon Fire, CO~~							
						$9,090	**11,092**		**$819,472**

(1) Property coverage only for catastrophic fires. Effective January 1, 1997, ISO's Property Claim Services (PCS) unit defines catastrophes as events that cause more than $25 million in insured property damage and that affect a significant number of insureds and insurers. From 1982 to 1996, PCS used a $5 million threshold in defining catastrophes. Before 1982, PCS used a $1 million threshold. Does not include wildfires in 2017.

(2) Adjusted for inflation through 2016 by ISO using the GDP implicit price deflator.
Source: The Property Claim Services® (PCS®) unit of ISO®, a Verisk Analytics® company

Suppression Costs
https://www.nifc.gov/fireInfo/fireInfo_documents/SuppCosts.pdf
Federal Firefighting Costs (Suppression Only)

Year	Fires	Acres	Forest Service	DOI Agencies	Total	CPI Inflation Ins	2017 Dollar Total	$/acre in 2017 dollars
1985	82,591	2,896,147.00	$161,505,000	$78,438,000	$239,943,000	49.33	$546,774,665	188.7938235
1986	85,907	2,719,162.00	$111,625,000	$91,153,000	$202,778,000	50.27	$453,477,006	166.7708678
1987	71,300	2,447,296.00	$253,657,000	$81,452,000	$335,109,000	52.11	$722,919,942	295.3953843
1988	72,750	5,009,290.00	$429,609,000	$149,317,000	$578,926,000	54.23	$1,199,967,021	239.5483233
1989	48,949	1,827,310.00	$331,672,000	$168,115,000	$499,787,000	56.85	$988,230,018	540.8113663
1990	66,481	4,621,621.00	$253,700,000	$144,252,000	$397,952,000	59.92	$746,571,810	161.5389514
1991	75,754	2,953,578.00	$132,300,000	$73,820,000	$206,120,000	62.46	$370,977,533	125.6027547
1992	87,394	2,069,929.00	$290,300,000	$87,166,000	$377,466,000	64.35	$659,396,427	318.559925
1993	58,810	1,797,574.00	$184,000,000	$56,436,000	$240,436,000	66.25	$407,976,271	226.9593747
1994	79,107	4,073,579.00	$757,200,000	$161,135,000	$918,335,000	67.98	$1,518,649,975	372.8048419
1995	82,234	1,840,546.00	$367,000,000	$110,126,000	$477,126,000	69.88	$767,491,587	416.9912553
1996	96,363	6,065,998.00	$547,500,000	$153,683,000	$701,183,000	71.93	$1,095,783,773	180.6436094
1997	66,196	2,856,959.00	$179,100,000	$105,048,000	$284,148,000	73.61	$433,912,819	151.8792602
1998	81,043	1,329,704.00	$306,800,000	$109,904,000	$416,704,000	74.76	$626,607,909	471.2386431
1999	92,487	5,626,093.00	$361,100,000	$154,416,000	$515,516,000	76.39	$758,595,630	134.8352454
2000	92,250	7,383,493.00	$1,076,000,000	$334,802,000	$1,410,802,000	78.97	$2,008,218,341	271.987573
2001	84,079	3,570,911.00	$683,122,000	$269,574,000	$952,696,000	81.20	$1,318,850,414	369.3316393
2002	73,457	7,184,712.00	$1,279,000,000	$395,040,000	$1,674,040,000	82.49	$2,281,250,798	317.5145779
2003	63,629	3,960,842.00	$1,023,500,000	$303,638,000	$1,327,138,000	84.36	$1,768,376,065	446.4646822
2004	65,461	8,097,880.00	$726,000,000	$281,244,000	$1,007,244,000	86.62	$1,307,130,837	161.4164247
2005	66,753	8,689,389.00	$524,900,000	$294,054,000	$818,954,000	89.56	$1,027,906,959	118.2945037
2006	96,385	9,873,745.00	$1,280,419,000	$424,058,000	$1,704,477,000	92.45	$2,072,509,737	209.9010798
2007	85,705	9,328,045.00	$1,149,654,000	$470,491,000	$1,620,145,000	95.09	$1,915,330,562	205.3303304
2008	78,979	5,292,468.00	$1,193,073,000	$392,783,000	$1,585,856,000	98.74	$1,805,480,020	341.1414145
2009	78,792	5,921,786.00	$702,111,000	$218,418,000	$920,529,000	98.39	$1,051,751,842	177.6072019
2010	71,971	3,422,724.00	$578,285,000	$231,214,000	$809,499,000	100.00	$909,970,432	265.8614695
2011	74,126	8,711,367.00	$1,055,736,000	$318,789,000	$1,374,525,000	103.16	$1,497,840,506	171.9409257
2012	67,774	9,326,238.00	$1,436,614,000	$465,832,000	$1,902,446,000	105.29	$2,031,093,757	217.7827498
2013	47,579	4,319,546.00	$1,341,735,000	$399,199,000	$1,740,934,000	106.83	$1,831,826,749	424.0785373
2014	63,212	3,595,613.00	$1,195,955,000	$326,194,000	$1,522,149,000	108.57	$1,576,052,083	438.3263948
2015	68,151	10,125,149.00	$1,713,000,000	$417,543,000	$2,130,543,000	108.70	$2,203,377,025	217.6142816
2016	67,595	5,503,538.00	$1,603,806,000	$371,739,000	$1,975,545,000	110.07	$2,017,626,282	366.6053149
2017	71,499	10,026,286.00	$2,410,165,000	$508,000,000	$2,918,165,000	112.41	$2,918,165,000	291.0514422
2018								
		172,468,518.00					**$42,840,089,796**	**$ 248.39**

The Department of Interior agencies include: Bureau of Indian Affairs, Bureau of Land Management; National Park Service; and U.S. Fish and Wildlife Service. The U.S. Forest Service is an agency of the Department of Agriculture.
Annual fires and total acres include all private, state and federal lands in the United States.
Costs are not adjusted for inflation.

RESTORATION COSTS

https://www.blm.gov/or/districts/roseburg/plans/collab_forestry/files/TrueCostOfWilfire.pdf

Fire Name	Suppression Costs	Other Direct Costs	Rehabilitation Cost	Indirect Costs	Additional Costs	Total Costs	Total / Suppression	Suppression	Acres	Year	CPI Index	2017 CPI	2017 rehab	Cost per acres
Canyon Ferry Complex (MT 200	$9,544,627	$400,000	$8,075,921	$55,310	n/a	$18,075,858	1.9	53%	43,944	2000	78.97072	112.4116	$11,495,740	$262
Cerro Grande (NM 2000)	$33,500,000	$864,500,000	$72,388,944	n/a	n/a	$970,388,944	29	3%	42,873	2000	78.97072	112.4116	$103,042,670	$2,403
Hayman (CO 2002)	$42,279,000	$93,269,834	$39,930,000	$2,691,601	29529614	$207,700,049	4.9	20%	137,759	2002	82.49047	112.4116	$54,413,481	$395
Missionary Ridge(CO 2002)	$37,714,992	$52,561,331	$8,623,203	$50,499,849	3404410	$152,803,785	4.1	25%	70,000	2002	82.49047	112.4116	$11,751,027	$168
Rodeo-Chedeski (AZ 2002)	$46,500,000	$122,500,000	$139,000,000	$403,000	n/a	$308,403,000	6.6	15%	462,614	2002	82.49047	112.4116	$189,418,330	$409
Old, Grand Prix,Padua (CA 2003)	$61,335,684	n/a	$534,593,425	$681,004,114	n/a	$1,276,933,224	20.8	5%	125,000	2003	84.36308	112.4116	$712,331,511	$5,699
COST CATEGORY									**882,190**			**112.4116**	**$1,082,452,759**	**$1,227**

https://fred.stlouisfed.org/series/CPALTT01USA661S
FRED Graph Observations
Federal Reserve Economic Data
Link: https://fred.stlouisfed.org
Help: https://fred.stlouisfed.org/help-fa
Economic Research Division
Federal Reserve Bank of St. Louis

CPALTT01USA661S Consumer Price Index: Total All Items for the United States, Index 2010=100, Annual, Not Seasonally Adjust

Frequency: Annual

observation_date		CPALTT01USA661S
1960-01-01	1960	13.5630607803976
1961-01-01	1961	13.7082837473334
1962-01-01	1962	13.8726149993923
1963-01-01	1963	14.0445895655005
1964-01-01	1964	14.2242074456579
1965-01-01	1965	14.4496852101109
1966-01-01	1966	14.8853541109182
1967-01-01	1967	15.2980930695778
1968-01-01	1968	15.9515964207889
1969-01-01	1969	16.8229342224036
1970-01-01	1970	17.8051000777325
1971-01-01	1971	18.5694314826577
1972-01-01	1972	19.1770749495732
1973-01-01	1973	20.3617886272073
1974-01-01	1974	22.6127446147120
1975-01-01	1975	24.6802610650347
1976-01-01	1976	26.0980958211709
1977-01-01	1977	27.7949115401048
1978-01-01	1978	29.9159311887723
1979-01-01	1979	33.2828110274678
1980-01-01	1980	37.7923663165264
1981-01-01	1981	41.6980997956942
1982-01-01	1982	44.2547883451690
1983-01-01	1983	45.6764447583299
1984-01-01	1984	47.6407764689876
1985-01-01	1985	49.3299488738723
1986-01-01	1986	50.2662548449057
1987-01-01	1987	52.1082935307754
1988-01-01	1988	54.2331348364675
1989-01-01	1989	56.8509698983363
1990-01-01	1990	59.9197604891109
1991-01-01	1991	62.4573407534626
1992-01-01	1992	64.3490609806524
1993-01-01	1993	66.2484245218916
1994-01-01	1994	67.9758134970225
1995-01-01	1995	69.8828203523109
1996-01-01	1996	71.9312285175104
1997-01-01	1997	73.6127576083459
1998-01-01	1998	74.7554330587090
1999-01-01	1999	76.3911022652490
2000-01-01	2000	78.9707207568715
2001-01-01	2001	81.2025684592531
2002-01-01	2002	82.4904668765520
2003-01-01	2003	84.3630788186188
2004-01-01	2004	86.6216781201728
2005-01-01	2005	89.5605323721102
2006-01-01	2006	92.4497050827274
2007-01-01	2007	95.0869923788516
2008-01-01	2008	98.7374773853445
2009-01-01	2009	98.3864199710624
2010-01-01	2010	100.0000000000000
2011-01-01	2011	103.1568415686220
2012-01-01	2012	105.2915045328670
2013-01-01	2013	106.8338488748660
2014-01-01	2014	108.5669321189640
2015-01-01	2015	108.6957219606930
2016-01-01	2016	110.0670089342700
2017-01-01	2017	112.4115573023080

Legend			
Distribution	Input 1	Input 2	Input 3
Poisson	Mean		
Exponential	Mean		
Lognormal	Median	StdDev	
Normal	Mean	StdDev	
Triangular	Min	Mode	Max
Uniform	Min	Max	

Chapter:	Wildfire
Workpaper:	Baseline Risk Modeling Inputs - O2 O4 Financial

	ID	Name	Distribution (see legend)	Input 1	Input 2	Input 3	Source / Justification
Consequences		Financial	Exponential	$50,630	N/A	N/A	Based on Calfire 2010-2017 dataset, received through data request to CalFire. Filtered on < 5,000 acres, electrical cause, codes 141,142,143. Attempted to match with Red Flag day data, however Calfire dataset does not have the incidents by county. Performed a match on date (best information available). SCE applied the unit costs described in O1 for $/acres suppression and restoration, and $/structures destroyed to form a distribution of costs
		Financial	Exponential	$50,630.00	N/A	N/A	Same as O2

Property Claims Cost per structure in 2017 dollars	Per Acre Restoration cost in 2017 dollars	Per Acre Estimated Firefighting cost in 2017 dollars
$819,472	$1,227	$248.39

See Workpaper "Baseline Risk Modeling Inputs - O1 O3 Financial" for detail supporting these unit costs.

O2 - Wildfire (Red Flag Days) < 5,000 Acres

Distribution Detail:

- 1,377 rows of data
- Used Unit costs for Acre Suppression, Restoration Costs, and Structures destroyed
- Distribution fitting using @RISK
- Exponential, Mean = $49K

O4 - Wildfire (Not Red Flag Days) < 5,000 Acres

See Above