Southern California Edison

WSD-011 – Resolution implementing the requirements of Public Utilities Code Sections 8389(d)(1), (2) and (4) related to catastrophic wildfire caused by electrical corporations subject to the Commission's regulatory authority

DATA REQUEST SET W S D - S C E - 0 0 5

To: WSD
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Job Title: Manager
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Response Date: 3/19/2021

Question 002:
How did SCE calculate the risk reduction value for covered conductor installation, in terms of the percent effectiveness? Include all associated work papers and inputs into the final value.

Response to Question 002:
Please refer to SCE's response to Question 1 for details on the methodology for calculating the overall risk reduction value. Please note that the risk reduction value for covered conductor in the 2021 WMP Update combined the mitigation effectiveness of covered conductor and Fire Resistant (FR) poles.

To determine the percent effectiveness of covered conductor, SCE evaluated the ability for covered conductor to address each risk driver. Subject Matter Expert (SME) judgment was used to determine the mitigation effectiveness of covered conductor; this judgement was informed by benchmarking, analysis, and testing. This is expounded upon in detail in the attached deck entitled "Covered Conductor Compendium." Table 1 and Table 2, below, explain the reasoning behind the effectiveness values established for each driver. Table 1 includes only the covered conductor values and not the combined covered conductor and FR pole values used in the risk reduction calculation. Table 2 includes only the FR pole mitigation effectiveness values. Additionally, mitigation effectiveness values at 0% or that were not applicable were omitted from both tables.

The attached Excel file entitled "CC and FR Pole ME" details the combined mitigation effectiveness data.

Table 1: Covered Conductor Mitigation Effectiveness

Driver		Mitigation Effectiveness	Reasoning
D-CFO	Veg. contact- Distribution	60%	SCE conducted analysis that involved establishing four vegetation sub-drivers based on SCE's experience with vegetation contact. The four sub-drivers are: Heavy Contact (Tree), Heavy Contact (Limb), Light Contact (Frond/Branch), Light Contact (Grow In). SCE analyzed historical vegetation fault data from 2015-2018 and

			determined that percentage of occurrence between all four sub-drivers. • Heavy Contact (Tree): 30% • Heavy Contact (Limb): 22% • Light Contact (Frond/Branch): 43% • Light Contact (Grow In): 5% SCE testing supported that covered conductor will be 99% effective against both Light Contact drivers, which accounts for 1% of the line potentially being uninsulated at connection points or dead-ends. Additionally, SCE also determined that covered conductor will not be effective against Heavy Contact (Tree) due to being unable to mechanically support the weight of a tree. Covered conductor was determined to be 50% effective against limb contact, conservatively assuming that the limb will exceed the conductor's strength 50% of the time. The overall mitigation effectiveness value for vegetation is based on the weighted average of all four sub-driver and was calculated to be 60%.
D-CFO	Animal contact-Distribution	99%	Covered conductor is estimated to be 99% effective against contact with wildlife. This is supported by testing and accounts for approximately 1% of the line potentially being uninsulated at connection points or dead-ends.
D-CFO	Balloon contact-Distribution	99%	Covered conductor is estimated to be 99% effective against contact with metallic balloons. This is supported by testing and accounts for approximately 1% of the line potentially being uninsulated at connection points or dead-ends.
D-CFO	Vehicle contact-Distribution	50%	SCE analyzed the composition of historical wire downs from vehicle hit and found that nearly all ignitions from a vehicle hit are caused by conductor contact. SCE testing established the covered conductor is effective against conductor-to-conductor contact. However, there is uncertainty regarding the effectiveness of covered conductor during a wire down due to exposed conductor at the dead-end or break-point. To account for this uncertainty, a conservative mitigation effectiveness of 50% was assumed. Note: SCE believes this mitigation effectiveness percentage could be higher and will re-evaluate with more deployment of covered conductor.

D-CFO	Other contact from object - Distribution	77%	Analysis found that foreign material accounts for 77% of the "Unspecified" driver, while Ice/Snow accounts for the other 23%. While covered conductor is effective against foreign materials, it is not effective against Ice/Snow.
D-CFO	Connector damage or failure- Distribution	90%	Assumption that infrastructure replacement will lead to 90% mitigation effectiveness. Reconductoring with covered conductor will facilitate the replacement of aged hardware. Some hardware used in new installation will also be improved technology.
D-CFO	Unknown contact - Distribution	85%	Weighted average of vegetation contact, animal contact, balloon contact, vehicle contact, other contact, and wire to wire contact.
D-EFF	Splice damage or failure — Distribution	90%	Assumption that infrastructure replacement will lead to 90% mitigation effectiveness. Reconductoring with covered conductor will facilitate the replacement of aged hardware. Some hardware used in new installation will also be improved technology.
D-EFF	Crossarm damage or failure - Distribution	50%	Covered conductor is estimated to be 50% effective against crossarm failure. Reconductoring with covered conductor will facilitate the replacement of aged crossarms. Additionally, testing illustrated that covered conductor significantly reduced leakage current on the crossarm, reducing the occurrence of damage due to electrical tracking.
D-EFF	Insulator damage or failure- Distribution	90%	Assumption that infrastructure replacement will lead to 90% mitigation effectiveness. Reconductoring with covered conductor will facilitate the replacement of aged insulators.
D-EFF	Wire-to-wire contact / contamination- Distribution	99%	Covered conductor is estimated to be 99% effective against wire-to-wire contact. This is supported by testing and accounts for approximately 1% of the line potentially being uninsulated at connection points or dead ends.
D-EFF	Conductor damage or failure — Distribution	90%	Assumption that infrastructure replacement will lead to 90% mitigation effectiveness. Reconductoring with covered conductor will facilitate the replacement of aged conductor. Additionally, conductor failure due to faults will also be reduced because: (1) covered conductor will prevent contact-from-object faults from occurring and (2) the covered conductor will have a larger short circuit duty.

D-EFF	Insulator and brushing damage or failure - Distribution	90%	Assumption that infrastructure replacement will lead to 90% mitigation effectiveness. Reconductoring with covered conductor will facilitate the replacement of aged insulators.

Table 2: FR Pole Mitigation Effectiveness

Driver		Mitigation Effectiveness	Reasoning
D-EFF	Crossarm damage or failure - Distribution	50%	Replacing existing poles with FR poles with will facilitate the replacement of aged wood crossarms with composite crossarms. Additionally, FR composite poles significantly reduce leakage current on the crossarm, reducing the occurrence of damage due to electrical tracking. The improved crossarm design and reduction of leakage current accounts for the 50% effectiveness against crossarm damage or failure.
D-EFF	Capacitor bank damage or failure- Distribution	50%	Replacing poles with FR poles will facilitate the replacement of aged equipment.
D-EFF	Conductor damage or failure — Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment.
D-EFF	Fuse damage or failure - Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment. The new fuses used will be improved technology.
D-EFF	Switch damage or failure- Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment. The new switches may be improved technology.
D-EFF	Insulator and brushing damage or failure - Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment.
D-EFF	Voltage regulator / booster damage or failure - Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment.
D-EFF	Recloser damage or failure - Distribution	5%	Replacing poles with FR poles will facilitate the replacement of aged equipment.
D-EFF	Transformer damage or failure - Distribution	50%	Replacing poles with FR poles will facilitate the replacement of aged equipment.