

Southern California Edison
A.09-09-022 – Alberhill PTC & CPCN

DATA REQUEST SET ED - Alberhill - SCE - JWS - 2

To: CPUC
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Response Date: 4/5/2019

Question 01e: Provide additional analysis as required by Decision D. 18-08-026, Ordering Paragraph 4, items 4b, 4d, 4e, and 4h, replicated below:

e) An analysis of outages over the past 5 years by root cause for the Valley South systems in comparison to SCE system average and to other sub transmission radial systems

Response to Question 01e:

Table 1 and Table 2 provide the SAIDI¹ and total number of outages by root cause, respectively, for all outages in the Valley South subtransmission system. Also provided for comparison are SAIDI averages for all subtransmission systems,² including the split systems that are served from the 43 A-bank substations³ throughout SCE's service territory.

The data in Table 1 and Table 2 show that a large majority of outages and associated SAIDI contribution are caused by distribution system events. This is expected because reliability performance in a properly designed, operated and maintained system is largely driven by random, distribution level events that are associated with equipment failures or damage introduced by animal intrusion, weather, or third parties. Also driving the reliability performance is the response to one of these events by a utility, which can include the need to take larger portions of the system

¹ Per IEEE Standard 1366, "IEEE Guide for Electric Power Distribution Reliability Indices", SAIDI is defined as the total duration of interruption for the average customer during a predefined period of time (measured in minutes per customer).

² SCE serves a total of 56 distinct subtransmission systems from 43 A-bank substations. There are 31 A-bank substations that serve a single subtransmission system, 11 A-bank substations that serve two subtransmission systems, and one A-bank substations that serves three subtransmission systems. The A-bank substations that serve more than a single subtransmission system are called "split systems" Valley Substation is one of the 12 A-bank substations that are split and Valley South is an example of one of the subtransmission systems from these split systems. Of these 56 systems, 52 of them are radially connected, meaning that they are served by a single source of power. The four non-radial systems are included to provide a complete SCE subtransmission system average.

³ SCE defines its "A-bank" substations as load-serving transmission substations that transform voltage from the transmission level (220 kV or 500 kV) to the subtransmission level (115 kV or 66 kV) and then deliver power to multiple distribution substations.

out of service in order to troubleshoot and repair the affected equipment that directly caused the outage.

The root cause categories in Tables 1 and 2 include:

- 3rd Party –SCE vendor/contractor or other 3rd party
- Animal – Animal making contact
- Overhead – Failure of overhead equipment
- Operation – Action by operators to temporarily take an outage to avoid overloads, troubleshoot or test equipment, or make unplanned repairs.
- Source Loss – Loss of source power, typically due to the need to test or service a line.
- Transmission – Transmission substation or transmission line outage
- Underground – Failure of underground equipment
- Vegetation – Vegetation contact
- Weather – Weather caused
- Other – Includes failures which are not categorized by any other categories. Examples include failures of apparatus equipment, mylar balloon interference, or outages caused by power system conditions.

Among these categories, Source Loss and Transmission are the categories that are principally related to subtransmission system capacity and reliability. As shown in Tables 1 and 2, these categories contribute a very small fraction of the outages and associated SAIDI impact in the Valley South System.

While the data in Tables 1 and 2 have been provided in response to this specific request for an analysis of outages of the past 5 years by root cause, these historical data do not inform the need for a project at the subtransmission system level. This is because, although the Valley South System operates very close to its maximum operating limits, it has to date had adequate transformer capacity to meet peak demands. However, degradation in reliability performance is expected to occur once the substation transformer capacity margin has been eliminated, particularly because system tie-lines are not available to mitigate the shortage of transformer capacity.

As discussed throughout the Alberhill System Project (ASP) Certificate of Public Convenience and Necessity (CPCN) proceeding, the Valley South System now operates at or near its capacity. In the case of a major heat storm, SCE's ability to maintain service to its customers in the Valley South System is currently at risk. As electrical demands grow, these existing reliability risks will only increase. The peak demand served by the Valley South System is expected to exceed capacity by 2022 based on the SCE 2018-2027 load forecast, impacting SCE's ability to provide continuous safe and reliable electrical service to the approximately 500,000 people it serves in the Valley South System.

Table 1– System Level SAIDI Performance by Root Cause from 2014 - 2018

	3rd Party	Animal	Overhead	Operation	Source Loss	Transmission	Underground	Vegetation	Weather	Other	Total SAIDI Impact
Valley South 5 yr. Avg.	0.438	0.050	0.254	0.349	0.039	0.066	1.137	0.002	0.266	0.320	-
2014	0.309	0.151	0.558	0.309	0.007	0.328	1.347	0.006	0.729	0.277	4.021
2015	0.160	0.046	0.191	0.263	0.181	-	0.923	-	0.052	0.277	2.094
2016	0.975	0.011	0.213	0.513	0.000	-	1.219	-	0.019	0.182	3.132
2017	0.517	0.026	0.146	0.422	-	-	1.259	0.004	0.212	0.725	3.310
2018	0.229	0.015	0.161	0.236	0.006	-	0.936	0.001	0.318	0.138	2.040
(11 ²) Split System 5 Yr. Avg.	0.271	0.033	0.326	0.248	0.215	0.025	0.475	0.006	0.269	0.169	-
(55 ²) System 5 Yr. Avg.	0.285	0.056	0.355	0.258	0.137	0.037	0.536	0.007	0.353	0.189	-

Notes:

- SAIDI values provide in this table are measured in minutes per customer.
- SCE A-bank substations serve a total of 56 electrical systems, one of which serves the City of Riverside Public Utilities municipality. SAIDI data is not available for this system.

Table 2 – Total Outages by Root Cause from 2014 - 2018

	3rd Party	Animal	Overhead	Operation	Source Loss	Transmission	Underground	Vegetation	Weather	Other	Totals
Valley South 5 yr. Total	157	55	401	905	6	2	583	4	65	133	2,311
2014	24	11	52	152	1	2	85	1	22	31	381
2015	23	6	72	178	1	-	101	-	8	29	418
2016	38	13	87	260	1	-	111	-	10	26	546
2017	34	10	64	226	-	-	99	1	11	24	469
2018	38	15	126	89	3	-	187	2	14	23	497