Rulemaking No.:	12-03-014
Exhibit No.:	SCE-1
Witnesses:	Garry Chinn Colin Cushnie Mark Nelson Jonathan Rumble Carl Silsbee

SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL*® Company

(U 338-E)

TRACK 4 TESTIMONY OF SOUTHERN CALIFORNIA EDISON COMPANY

Before the
Public Utilities Commission of the State of California

Rosemead, California
August 26, 2013

sections and breakers) violates system performance requirements specified by the NERC Reliability Standards.[16]

The United States Congress created an electric reliability organization (ERO) through the Energy Policy Act of 2005. The Federal Energy Regulatory Commission (FERC) certified NERC as the ERO on July 20, 2006. NERC develops, implements, and enforces mandatory reliability standards for the bulk power system. NERC performs its duties in accordance with Section 215 of the Federal Power Act. The statute requires users, owners and operators of the bulk power system in the United States to be subject to FERC approved NERC Reliability Standards.

These standards require the simulation of a range of potential conditions from no contingencies (Category A) to extreme events (Category D). The two intermediate categories of contingencies, Category B, events resulting in the loss of a single element and Category C, event(s) resulting in the loss of two or more elements constitute the majority of contingencies examined in SCE's studies. An example of a Category B contingency is the fault and loss of one transformer bank. An example of a Category C contingency is the fault and simultaneous loss of two transmission lines that share a common tower.

Attachment 1 is Table 1 from NERC Reliability Standard TPL-001-3 which provides a complete description of Category A through D contingencies and the associated system performance requirements. Table 1 is common to transmission planning standards TPL-001-3, TPL-002-2b, TPL-003-2b, and TPL-004-2a. These NERC Transmission Planning (TPL) Reliability Standards require the system to be stable and both thermal and voltage limits to be within facility

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[16] NERC transmission planning Reliability Standards include TPL-001-3 (Category A), TPL-002-2b (Category B), TPL-003-2b (Category C), and TPL-004-2a (Category D).

ratings for Categories A through C. NERC TPL Reliability Standards generally do not permit loss of demand, such as load shedding, for Categories A and B. However, if planned and controlled, NERC TPL Reliability Standards permit loss of demand for Category C. Category D contingencies are extreme events with no specific performance requirements other than an evaluation for risks and consequences. SCE's power flow studies examined Category A through D conditions for facilities in SCE and SDGE's service areas.

b) SCE's Studies Look For Thermal Overloading and Voltage Violations During These Contingencies

SCE's studies identify both thermal overload and voltage violations for Category A through D conditions. The studies look for power flows in excess of normal (Category A) and emergency (Categories B through D) thermal ratings of transmission facilities. SCE establishes the thermal ratings of transmission facilities as the owner of these facilities to prevent damage to equipment and assure safe clearances are maintained in accordance with General Order No. 95. The studies also look for voltages at substations outside of specific bandwidths and percentage deviations in excess of thresholds established by the CAISO as provided in Table III-2 below[17]. Maintaining voltages at substations prevents voltage collapse events in which voltages in a portion of the electric system decrease catastrophically causing a blackout. The CAISO established these voltage limits via an open stakeholder process in 2011. Based on the identified thermal overloads and voltage violations, SCE develops mitigation options to improve system performance.

[17] "California ISO Planning Standards", June 23, 2011, Section II.3., page 4

Table III-2
CAISO VOLTAGE REQUIREMENTS

(Voltages are relative to the nominal voltage of the system studied)

Voltage level	Normal Conditions (TPL-001)		Contingency Conditions (TPL-002 & TPL-003)		Voltage Deviation	
	Vmin (pu)	Vmax (pu)	Vmin (pu)	Vmax (pu)	TPL-002	TPL-003
≤ 200 kV	0.95	1.05	0.90	1.1	≤5%	≤10%
≥ 200 kV	0.95	1.05	0.90	1.1	≤5%	≤10%
≥ 500 kV	1.0	1.05	0.90	1.1	≤5%	≤10%

c) <u>SCE Then Adds New Generation At Key Locations To Mitigate Violations</u>

SCE's studies first use generation as mitigation to establish a base line to address violations. SCE located the generation at several existing substations including: Alamitos, Huntington Beach, Johanna, Santiago, and San Onofre. SCE selected Alamitos, San Onofre, and Huntington Beach substations because they are existing OTC sites and are favorably located to relieve identified violations. Coastal southern California is both densely populated and well regulated. So, locating sufficient land for new generation development is challenging. Developing new generation at existing OTC sites may be possible. However, not all existing OTC sites were favorably located to relieve identified violations. Johanna and Santiago are not existing OTC sites, but proved beneficial locations to minimize the total generation needed to address violations in specific scenarios.

The generation modeled at these substations is a proxy for any generation in the vicinity that is electrically equivalent. SCE adds the minimum amount of generation required to mitigate all identified thermal and voltage violations. After establishing a minimum generation solution, SCE then tests transmission projects and Preferred Resources to determine the incremental reduction in the amount of generation required for each alternative.