

April 27, 2015

201403905

PUBLIC UTILITIES COMMISSION
STATE OF CALIFORNIA
ATTENTION: RICHARD KYO
320 WEST 4TH STREET SUITE 500
LOS ANGELES, CA 90013

Re: Date of Incident: May 15, 2014
Location of Incident: 6439 Danby Avenue, Whittier, California

Dear Mr. Kyo:

This letter is a supplemental response your information request relative to the above-captioned incident and received via e-mail on February 27, 2015. Southern California Edison Company (SCE) is required to cooperate with the Commission pursuant to General Order 95, Rule 19 and California Public Utilities Code Section 316, and SCE requests that the Commission hold this information confidential under Public Utilities Code Sections 583 and paragraph 2.1 of General Order 66-C. SCE contends that some or all of the following information is protected from further or public disclosure by the attorney-client privilege and/or attorney work product privilege. The provision of the information below at the Commission's direction is not a waiver by SCE of either the attorney-client privilege and/or attorney work product privilege. SCE is not withholding any information and/or documents on privilege grounds unless specifically noted in the response.

Furthermore, in our email communication of March 27, 2015, we indicated supplemental responses would be provided for Requests Nos. 11, 13 – 17. Please be advised the response to Request No. 13 was complete in our prior correspondence. As a result, we are providing supplemental responses to the following Requests.

Request No. 6: Were there any outages as a result of this incident? If so:
a. What was the duration of the outage?
b. How many customers were affected?
c. What was the date and time of restoration?

Response No. 6 In our response dated March 26, 2015, we reported that the service to 2,736 customers was interrupted on May 15, 2014 from 4:04 p.m. to 4:20 p.m. Upon review of our response a typographical error was noted. The 2,736 customers actually were without service from 4:04 a.m. to 4:20 a.m.

Request No. 11: SCE states in its letter to the CPUC dated June 10, 2014 that "the resulting fault current on the tap line caused the east phase, a #6 copper

conductor, between Pole No. 857337E and Pole No. 857336E to separate and fall..." Please describe in detail how the fault current caused the conductor to separate and fall.

Response No. 11: Please note the sentence from the June 10, 2014 correspondence was partially quoted as the entire sentence reads: "SCE believes the resulting fault current on the tap line caused the east phase, a #6 copper conductor, between Pole No. 857337E and Pole No. 857336E to separate and fall in the backyard of 6439 Danby Ave, Whittier."

To date, SCE has conducted no testing of the subject No. 6 copper conductor and thus, the exact mechanism causing its separation is unknown. Edison notes that the conductor separated at its interface with a connector, which was attached to the conductor on the line side of a rigid copper dead-end. However, the main reason for a conductor to part is high temperature. Electrical current flowing through a conductor can elevate the temperature of the conductor to a level above ambient temperature. All conductors have an annealing temperature and a melting temperature. Annealing temperature is that temperature which can cause the conductor to soften, and lose some of its tensile strength. Melting temperature is that temperature which can cause the conductor to lose all of its tensile strength and therefore separate. High conductor temperature can be attributed to a fault on the electrical system, which causes a very high magnitude of current to flow through the conductor. At times, the magnitude of the current causes the temperature of the conductor to exceed its annealing and/or melting temperature.

Request No. 14: Did the relay and circuit breaker operate correctly?

Response No. 14: The relay and circuit breaker at Westgate Substation operated correctly.

Request No. 15: For the relay on the Bronco 12 kV circuit, please provide the following:

- a. Installation date.*
- b. Model name and number*
- c. Testing records with results. Indicate if the device passed or failed the test.*
- d. Any other inspection/maintenance records, with results*

Response No. 15: For the relay on the Bronco 12kV circuit at Westgate Substation:
a. The installation date was December 3, 2009.
b. ABB DPU2000R.
c. The relay was last tested prior to the incident on September 26, 2006. The relay passed the test. The Relay Setting and Test Report

for the Bronco 12kV at Westgate Substation and the Pro Test Last Test Results for the Westgate and Narrows Substations are included on the enclosed CD titled "Whittier-5/15/14 Supplemental" under **Tab A**.

- d. No other records.

Request No. 16: For the circuit breaker on the Bronco 12 kV circuit, please provide the following:

- a. Installation date:*
- b. Model name and number*
- c. Testing records with results. Indicate if the device passed or failed the test.*
- d. Any other inspection/maintenance records, with results.*

Response No. 16: For the circuit breaker on the Bronco 12kV circuit at Westgate Substation:

- a. Installation date was September 4, 1959.
- b. Kelman, 14.4RA2TV-AG.
- c. A Circuit Breaker Analyzer (CBA) test was last performed prior to the incident on December 25, 2013. The Circuit Breaker passed the test. Copies of CBA records are included on the enclosed CD titled "Whittier-5/15/14 Supplemental" under **Tab B**.
- d. A photographic copy of the Power Circuit Breaker Maintenance History Card for the Bronco 12kV circuit breakers at Westgate Substation is included on the enclosed CD titled "Whittier-5/15/14 Supplemental" under **Tab C**.

Request No. 17: For each fault current, please provide the following:

- a. The time, in hour: minute: second format (down to a fraction of a second, if available) when the fault current began*
- b. The fault current magnitude (rms Amps)*
- c. The actual relay time delay*
- d. The expected relay time delay*
- e. The actual circuit breaker opening time*
- f. The total fault current clearing time. If this is not the sum of the "actual relay time delay" and the "actual circuit breaker opening time", please provide an explanation.*
- g. Whether the fault was phase to phase or phase to ground. Please identify the phase(s) involved (e.g. a, b, or c).*

Response No. 17: Relay and Circuit Breaker for the Bronco 12kv circuit at Westgate Substation:

For the relay event/capture times listed below, add approximately 4 hours and 51 minutes to the relay event/capture time to obtain clock time, i.e., the event record for May 14, 2014 at 21:57 corresponds to May 15 at

02:48. The offset time was determined approximately 10 months after the event, so the apparent discrepancy between the relay event and actual event can be accounted for in the clock drift in the relay (they are not satellite synchronized times).

- a. The first fault was recorded on May 14, 2014 at 21:57:38.14
- b. The fault current magnitudes were as follows: A-Phase 48 Amps; B-Phase 1613 Amps; C-Phase 1659 Amps and Ground 5 Amps.
- c. 0.129 seconds.
- d. 0.138 seconds
- e. 0.016 seconds.
- f. 0.145 seconds.
- g. The record is consistent with a B-C Phase fault.

Second Fault Event:

- a. The second fault was recorded on May 14, 2014 at 21:57:42.05.
- b. The fault current magnitudes were as follows: A-Phase 3240 Amps; B-Phase 3501 Amps; C-Phase 273 Amps and Ground 9 Amps.
- c. 0.091 seconds.
- d. 0.089 seconds.
- e. 0.054 seconds.
- f. 0.145 seconds.
- g. The record is consistent with an A-B Phase fault.

Relay and Circuit Breaker for the Bronco 12kv circuit at Narrows Substation:

For the relay event/capture times listed below, subtract approximately 24 minutes from the relay event/capture time to obtain clock time.

- a. The fault was recorded May 15, 2014 at 03:16:04.98.
- b. The single fault event was recorded in three (3) relay event captures. Each event capture prior to the circuit tripping recorded the following:
 1. 03:16:04.98- A-Phase 190 Amps, B-Phase 653 Amps, C-Phase 847 Amps and Ground 1 Amp.
 2. 03:16:07.41- A-Phase 902 Amps, B-Phase 1102 Amps, C-Phase 220 Amps and Ground 0Amps.
 3. 03:16:08.35- A-Phase 837 Amps, B-Phase 2043 Amps, C-Phase 217 Amps and Ground 1714 Amps.
- c. 3.38 seconds.

- d. 0.6 seconds if the current in the 51N (ground) relay was consistent at 1714 Amps. However, the current varied over the duration of the event.
- e. 0.09 seconds.
- f. 3.47 seconds.
- g. The initial event record (03:16:04.98) is consistent with a B-C Phase fault. The second event recorded (03:16:07.41) is consistent with an A-B Phase fault. The last event (03:16:08.35) is consistent with an A-B-Ground fault.

Sincerely,



Eric K. Coolidge

Enclosure: