INVESTIGATION REPORT
OF THE DECEMBER 5, 2017 WILDFIRE
IN SANTA CLARITA, CALIFORNIA
INVOLVING SOUTHERN CALIFORNIA EDISON FACILITIES
THAT CAME TO BE KNOWN AS THE RYE FIRE

SAFETY AND ENFORCEMENT DIVISION
ELECTRIC SAFETY AND RELIABILITY BRANCH
LOS ANGELES

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Definitions

Circuit breaker (CB) - An electrical component that incorporates automatic operation and protective features to monitor, control, and protect downstream circuits from excess current and other potentially damaging electrical transients. Electrical transients can include momentary bursts of energy induced upon power, data, or communication lines as well as other unexpected events that can occur on an electrical circuit.

Dead End - Assembly used to hold the end of a conductor or guy wire against tension. Common styles of dead end assemblies are compression type and automatic type. Automatic dead ends use a set of tapered jaws internal to the tapered funnel body of the dead end assembly to permanently grip a wire after the wire is guided through the assembly during installation. See illustration in Figure 1 below.

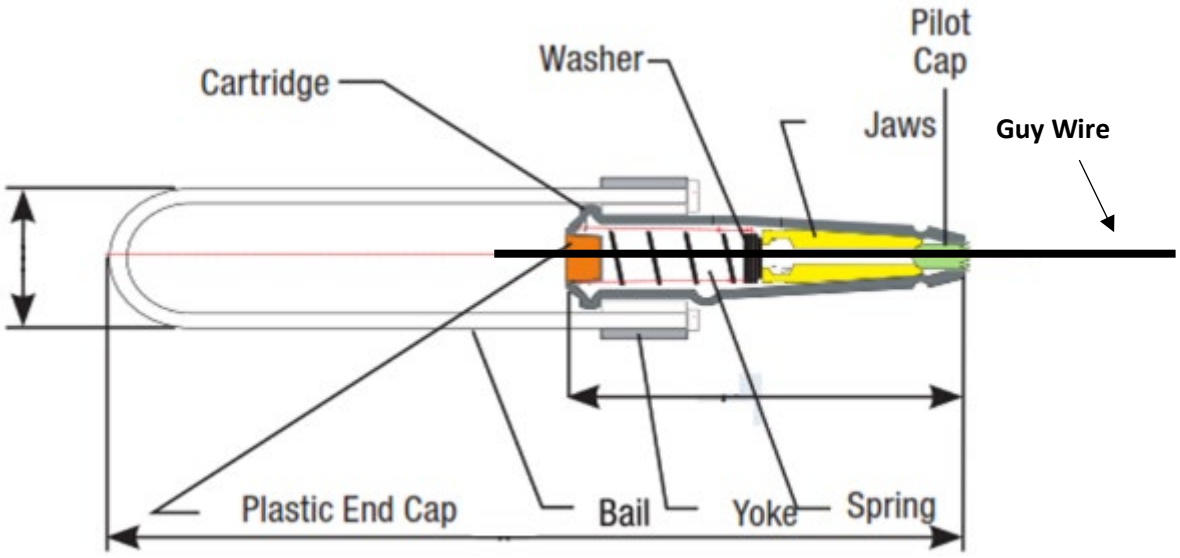

Figure 1: Automatic Dead End components

Electrical Arc - Electric current that flows through the air between two conductors.

Guy wire - A cable that is placed under tension and that is designed to add stability and support a free-standing structure. One common configuration of a guy wire is a down guy wire which is connected from a structure (such as a utility pole) to the ground with an anchor.

Jumper - A piece of wire connecting two conductors to form one continuous electrical path.

Lockout - When a circuit breaker relays to lockout, it opens and an additional protective lockout circuit is activated. The lockout circuit needs to be manually reset by an operator before the circuit breaker can be closed again. The purpose of the lockout circuit is to notify the operator that one of the protective sensing elements within the circuit breaker

control center (also called a Relay) has sensed a problem and that the circuit breaker, as well as the entire circuit to which it is connected, needs to be investigated.

Power restoration - A process to return from abnormal to normal electrical circuit conditions. Normal circuit conditions can be defined in terms of power sources, current paths, and power recipients.

Remote Automatic Reclosers (RAR) - RARs are small circuit breakers located at the top of distribution poles and are typically used on very long distribution feeders. Their function is to isolate a section of the feeder circuit in fault or overload condition and thereby minimize the number of customers without service. Since they act as small circuit breakers, they have the capability to restore power automatically in temporary fault situations, hence the name "recloser".

Remote Control Switch (RCS) - RCSs are devices installed on a circuit for the purpose of sectionalizing the circuit to facilitate selective energization and power restoration. They are not load-breaking switches and do not function as protective devices. RCSs can be operated after a circuit has already been de-energized for a set amount of time.

Red Flag Warning (RFW) - A warning issued by the National Weather Service to indicate that warm temperatures, very low humidity, and stronger winds are expected to combine to produce an increased risk of fire danger. Thresholds for Los Angeles county are 25 mile per hour winds or stronger and a relative humidity below 15%.

Relay (noun) - An electrically automated operated switch. It is a programmable microprocessor-based device that provides control, protection, automation, monitoring, and metering for circuit breakers and the electrical distribution circuits to which circuit breakers are electrically connected.

Relay (verb) - When a circuit breaker “relays”, it changes positions. It can change from the open position to the closed position or vice versa, based on the design of the control circuit for the circuit breaker. Distribution scale circuit breakers utilize relay circuits for the opening and closing functions of a circuit breaker.

Switch - A device for making and breaking a connection in an electrical circuit.

System Operating Bulletin (SOB) - Southern California Edison (Edison) uses SOBs to define operating procedures, policies, and restrictions for both regular and conditional operations.

I. Summary of Incident:

On Tuesday, December 5, 2017 at 0930 hours, the Nighthawk 16 kV circuit breaker out of the Lockheed substation relayed and locked out. This caused an outage that impacted a total of 341 customers and resulted in approximately 99,490 customer minutes of interruption.[1] At 0932 hours, the Los Angeles County Fire Department (LACFD) received notice of a fire, now known as the Rye Fire, in the 25000 block of Rye Canyon Loop Road in Santa Clarita.[2]

Edison found the cause of the relay to be contact between a broken guy wire supported by pole number 4389254E and a jumper wire of Nighthawk 16 kV overhead circuit. Pole number 4389254E is located approximately 600 feet north of the Lockheed substation on Rye Canyon Loop Road. Pole number 4389254E supported the Saugus-Haskell-Lockheed 66 kV transmission circuit and two distribution circuits – the Nighthawk and Blackbird 16 kV circuits - and a communication cable. The anchor support for a guy wire supporting the 66 kV transmission circuit on pole number 4389254E broke, causing the guy wire to become slack and subsequently contact two jumper wires on the Nighthawk 16 kV distribution circuit. The guy wire then broke at a point of contact with the jumper wires, causing an approximately 20-foot portion of the guy wire to fall to the ground. An approximately 12-foot portion of the guy wire remained attached to pole 4389254E at the transmission level with its broken end resting near the jumper wires.

The Rye Fire burned approximately 6,049 acres and was 100% contained by Tuesday, December 12, 2017 at 1800 hours. The Rye Fire caused damage to three structures and destroyed six.[3] One firefighter sustained injuries and no fatalities were reported.[4]

The California Department of Forestry and Fire Protection (CAL FIRE), Los Angeles County Fire Department (LACFD), and Ventura County Fire Department (VCFD) all responded to the Rye Fire. LACFD is the lead agency investigating the incident. The Rye Fire origin area is located in Tier 3 (Elevated fire risk) area of the California Public Utility Commission's (CPUC) High Fire Threat District (HFTD) map.[5] The approximate burn area was also within Tier 3 of the HFTD.

[1] Bates SCE-SED00003150.

[2] LACFD Rye Fire Final Incident Update.

[3] https://www.fire.ca.gov/incidents/2017/12/5/rye-fire/

[4] LACFD Rye Fire Final Incident Update.

[5] https://ia.cpuc.ca.gov/firemap/

A. Violation(s):

SED reviewed and analyzed records, inspected and examined physical evidence, and interviewed witnesses related to this incident to determine compliance with Commission regulations. The SED investigation determined the following nine (8) violations:

(a) One (1) violation of General Order (GO) 95, Rule 48 Strength of Materials

(b) Two (2) violation of General Order (GO) 95, Rule 31.1 Design, Construction, and Maintenance

(c) One (1) violation of Public Utilities Code (PU Code) § 399.2

(d) One (1) violation of Rule 44.3 Installation

(e) One (1) violation of General Order (GO) 95, Rule 49.6 (C) Detailed Strength Requirements, Guy and Anchors, Strength

(f) One (1) violation of GO 95, Rule 19, Cooperation with Commission Staff

(g) One (1) violation of PU Code § 316 for

a. Failing to provide the list of evidence and records used for SCE's own investigation.

b. Failing to provide a list of witnesses to the incident.

c. Failing to provide all photographs, notes, reports, and text messages generated by first responders to the incident.

II. Background

A. Witnesses:

No.	Name	Title	Address
1	Koko Tomassian	SED Investigator	320 W. 4th St, Los Angeles, CA 90013
2	Joceline Pereira	SED Investigator	320 W. 4th St, Los Angeles, CA 90013
3	Bryan Pena	SED Investigator	320 W. 4th St, Los Angeles, CA 90013
4	Gregory Greene	Edison Claims Investigator	2244 Walnut Grove Ave, Rosemead, CA 91770
5	Scott Hayashi	Edison Claims Investigator	2244 Walnut Grove Ave, Rosemead, CA 91770
6	Mariano Castillejo	Edison Senior Patrolman	2244 Walnut Grove Ave, Rosemead, CA 91770

B. Evidence:

No.	Description
1	Email notification to USRB reporting address, Subject: Electric Safety Incident Reported- Southern California Edison Company Incident No: 171205-8645, dated Tuesday, December 05, 2017
2	SCE 315 Letter dated December 29, 2017 (Confidential)
3	SED Investigator Data Request (DR) SED-001 and responses
4	SED Investigator Data Request (DR) SED-001B and responses
5	SED Investigator Data Request (DR) SED-002 and responses
6	SED Investigator Data Request (DR) SED-003 and responses
7	SED Investigator Data Request (DR) SED-004 and responses
8	SED Investigator Data Request (DR) SED-005 and responses
9	SED Investigator Data Request (DR) SED-006 and responses
10	SED Investigator Data Request (DR) SED-007 and responses
11	SED Investigator Data Request (DR) SED-008 and responses
12	SED Investigator Data Request (DR) SED-009 and responses
13	SED Investigator Data Request (DR) SED-0010 and responses

14	Examination Under Oath_ EUO_MARIANO CASTILLEJO; LAWRENCE BOSCHEE_101618
15	Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718
16	Examination Under Oath_EUO_ALVARO PINEYURA;DEVON ASHE_101618
17	Saugus-Colossus-Lockheed-Pitchgen 66kV Transmission Inspection Notes dated August 28, 2017

C. Description of Edison Facilities

The Nighthawk 16 kV circuit incorporates one primary protective device, the Nighthawk 16 kV CB. The CB provides power sensing and protection for the circuit and is located at the Lockheed substation.

Device Type	Model Number	Settings
Nighthawk 16 kV CB	ABB 17R417-12A (CB) ABB-DPU 2000R (Relay)	<u>Phase</u> 51P = 720 A Curve = Very Inverse Time Dial = 3.2
		<u>Neutral</u> 51N = 180 A Curve = Very Inverse Time Dial = 3.6

Figure 2: Nighthawk 16 kV CB settings.[6]

The Nighthawk 16 kV circuit protection scheme consisted of an ABB 17R417-12A CB and an ABB DPU2000R protection relay located at the Lockheed substation.[7] The protection relay of the Nighthawk 16 kV circuit breaker is configured to monitor the circuit and send signals to interrupt and de-energize the circuit after detecting overcurrent or fault conditions. The protection relay is normally configured to wait for a set amount of time and then send another signal to re-energize the circuit by reestablishing the circuit continuity. If the fault condition is still present, the protection relay will again sense the fault condition and interrupt and de-energize the circuit again. However, if the fault condition is cleared (i.e., no longer present), the circuit will remain energized.

During RFWs, Edison implements SOB 322 which restricts automatic relay and reclose operations in fire hazard areas.[8] In these instances, circuit breakers and remote automatic reclosers in areas affected by SOB 322 are made non-automatic and will lock out following the first relay operation. After a lock out, an employee must patrol the circuit to determine whether it is safe to reenergize the circuit.[9] SED confirmed that Edison issued SOB 322 at 2159 hours on December 3, 2017 on the Nighthawk 16 kV circuit and it was in effect during the fault condition occurring on December 5, 2017.[10,11]

[6] Bates SCE-SED00003444.

[7] Bates SCE-SED00003442.

[8] Bates SCE-SED00003591.

[9] Bates SCE-SED00003591.

[10] Bates SCE-SED00014019.

[11] Bates SCE-SED00011738.

The section of the Nighthawk 16 kV circuit involved in the Rye Fire incident included pole 4389254E, a steel pole supporting three circuits and one communication line. Pole number 4389254E was a 75-foot steel pole with eleven (11) guy wires in total supporting the distribution and transmission level circuits as seen in Figure 3.[12]

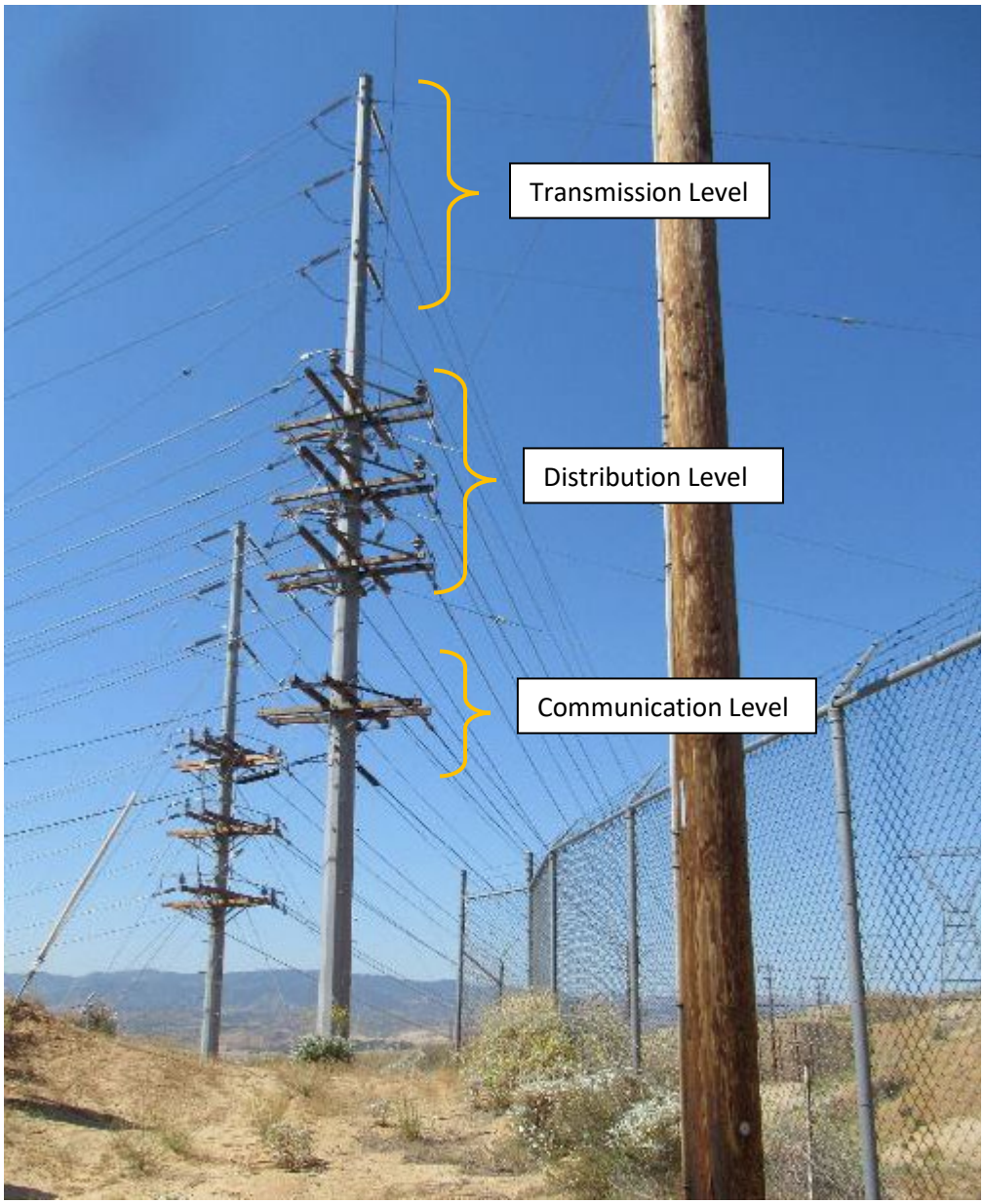

Figure 3: Pole 4389254E

[12] Bates SCE-SED00010128.

Pole 4389254E, the failed guy wire automatic dead end assembly, and the associated guy wire were all installed in 1999.[13] The automatic dead end assembly consists of an anchor secured to the ground, a tapered cartridge, and a bar and yoke system that connects the automatic dead end tapered cartridge to the anchor. Figure 4 shows the new automatic dead end assembly which is the same make and model as the previous automatic dead end assembly.

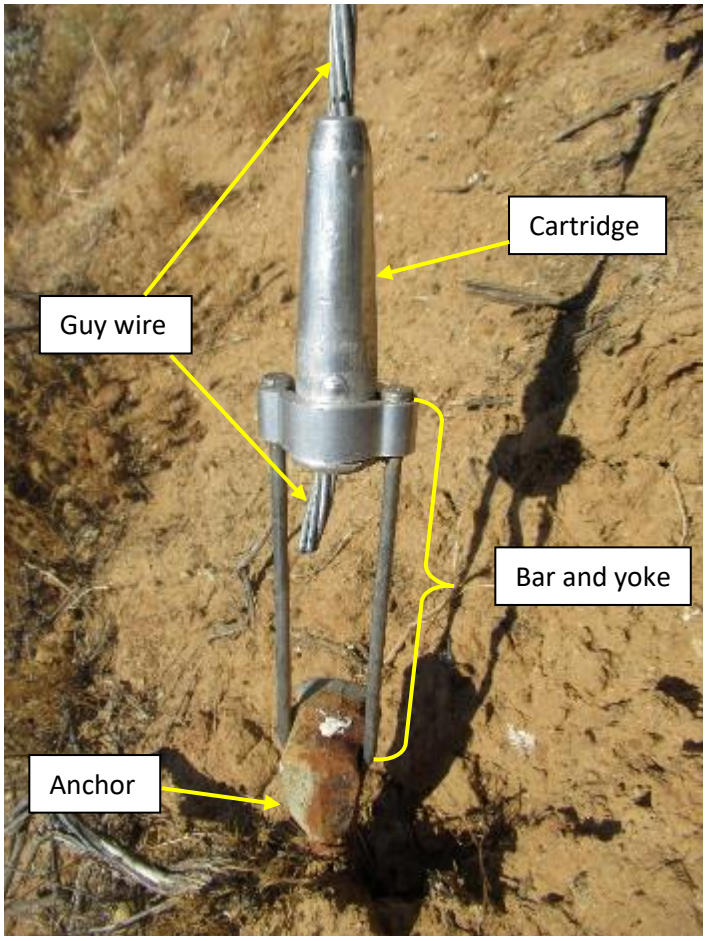

Figure 4: Like-for-like replacement of failed automatic dead end assembly at pole 4389254E.

[13] Bates SCE-SED00011487.

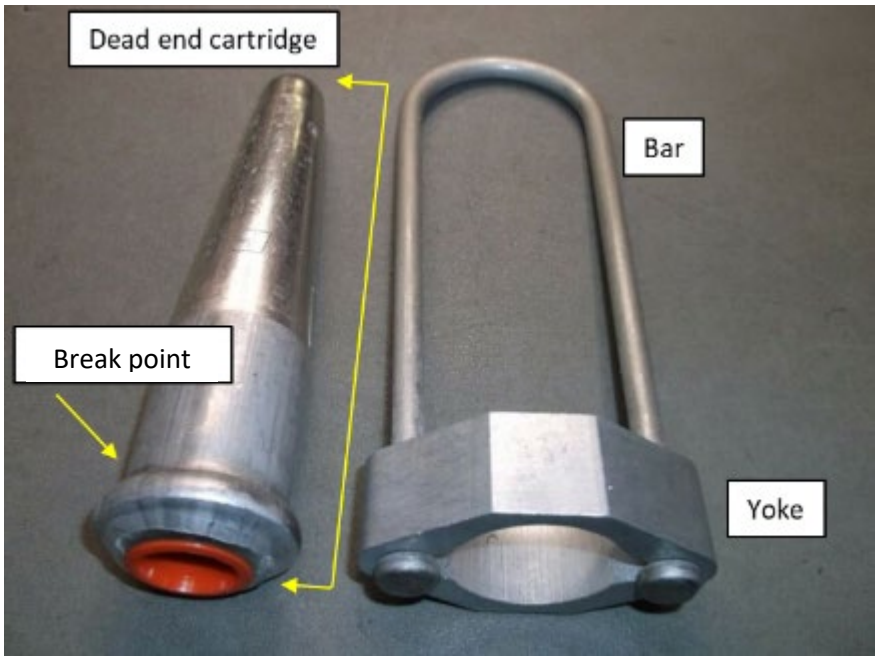

Figure 5: Automatic dead end showing point of failure, not an exact replica of the Edison automatic dead end

SED examined the failed automatic dead end assembly and found that the ring-end section of the tapered cartridge had broken off. This section is normally held in tension against the yoke. The automatic dead end assembly was manufactured by Reliable Power Products.[14,15] The automatic dead-end assembly was rated to support a maximum tensile force of 10,350 pounds.[16] The guy wire associated with the failed dead end was a 3/8 inch stranded zinc-coated steel wire and was rated to support a maximum tensile force of 15,400 pounds.[17,18] Edison installed the guy wire to support 6,839 pounds of tension on pole 4389254E.[19] LACFD collected the guy wire as evidence. Edison stated that it was unable to provide the manufacturer of the stranded guy wire because it had not examined the guy wire.[20]

[14] Bates SCE-SED00011487.

[15] Reliable Power Products was purchased by Maclean Power and no longer exists.

[16] Bates SCE-SED00016589.

[17] Bates SCE-SED00011706.

[18] Bates SCE-SED00011487.

[19] Bates SCE-SED00010128.

[20] LACFD is in possession of the broken guy wire and Edison does not keep an inventory for guy wires installed.

D. Description of Events

On December 5, 2017, an RFW and SOB 322 was in effect in Los Angeles County due to wind speeds above the 25 miles per hour (mph) threshold and relative humidity at or below 15%.[21] At approximately 0930 hours, Edison's Nighthawk 16 kV circuit of the Lockheed substation relayed and locked out.[22] An Edison senior patrolman responded to a report of a fire in Santa Clarita at approximately 0945 hours on December 5, 2015.[23] He arrived in the area of pole 4389254E shortly after in order to monitor the fire. Unidentified fire personnel were already in the area battling the fire when the senior patrolman arrived. He observed burn marks on pole 4389254E and a guy wire on the ground.[24]

At approximately 1500 hours on December 5, 2017, an Edison senior investigator arrived at pole 4389254E to investigate the relay that had occurred at 0930 hours.[25] By this time the fire was no longer burning in the Rye Canyon Loop area and the area had been evacuated.[26] The senior investigator observed burn marks on pole 4389254E.[27] He also observed a broken guy wire, detached from its anchor, and a broken portion of the automatic dead end were on the ground near the pole.[28, 29] Another portion of the guy wire was still attached to the pole at the transmission level. The senior investigator returned to the incident location on December 6, 2017 and collected the broken ring-end portion of the automatic dead end tapered cartridge that was on the ground near the broken guy wire.[30]

On December 8, 2017, SED met with Edison to examine the incident location. SED observed the failed guy support and the broken guy wire. Edison removed the portion of the guy wire that was still attached at the transmission level from pole 4389254E at the request of LACFD. Edison also removed a bar and yoke from the

[21] https://notify.lafd.org/redflag/index.cfm?fuseaction=main.faq&tab=tab6&fs=s&lang=en#tab6

[22] Bates SCE-SED00011738.

[23] Examination Under Oath_ EUO_MARIANO CASTILLEJO; LAWRENCE BOSCHEE_101618 page 39, lines 22-28; page 40, line 1.

[24] Examination Under Oath_ EUO_MARIANO CASTILLEJO; LAWRENCE BOSCHEE_101618 page 39, lines 11-16; page 48, lines 4-9.

[25] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 18, lines 6-14.

[26] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 22, lines 12-27.

[27] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 24, lines 4-17.

[28] SCE 315 Letter dated December 29, 2017.

[29] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 43, lines 23-28; page 44 lines 1-6.

[30] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 37, lines 16-23.

anchor to which the subject guy wire was attached.[31,32] LACFD kept the two portions of the broken guy wire and the tapered cartridge-end portion of the broken guy support. Edison kept the bar and yoke from the anchor and the ring-end portion of the broken guy support.

[31] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 37, lines 16-23.

[32] Examination Under Oath_ EUO_GREGORY GREENE_SCOTT HAYASHI_101718 page 50, lines 3-11.

III. SED's Investigation

A. Observations and Findings

SED investigated Edison's inspection programs, device logs, recent outages, maintenance history on the Nighthawk 16 kV circuit, as well as Edison's response to the incident.

During a site visit to Rye Canyon Loop on December 8, 2017, SED investigators observed that two jumper wires on the distribution level of pole 4389254E exhibited burn marks, as did a portion of the steel pole directly above the jumper cables. An approximately 12-foot portion of a guy wire was still attached to pole 4389254E at the transmission level and was hanging down to the distribution level and was resting on a crossarm. The broken end of the guy wire showed signs of burning. LACFD had already collected and removed the remaining approximately 20-foot portion of the guy wire that Edison initially found on the ground from the incident location. Edison collected the bar and yoke component of the anchor rod that supported the failed guy support. The preserved evidence in Edison's possession is being held in Edison's Rosemead office.[33]

[33] Bates SCE-SED00009815.

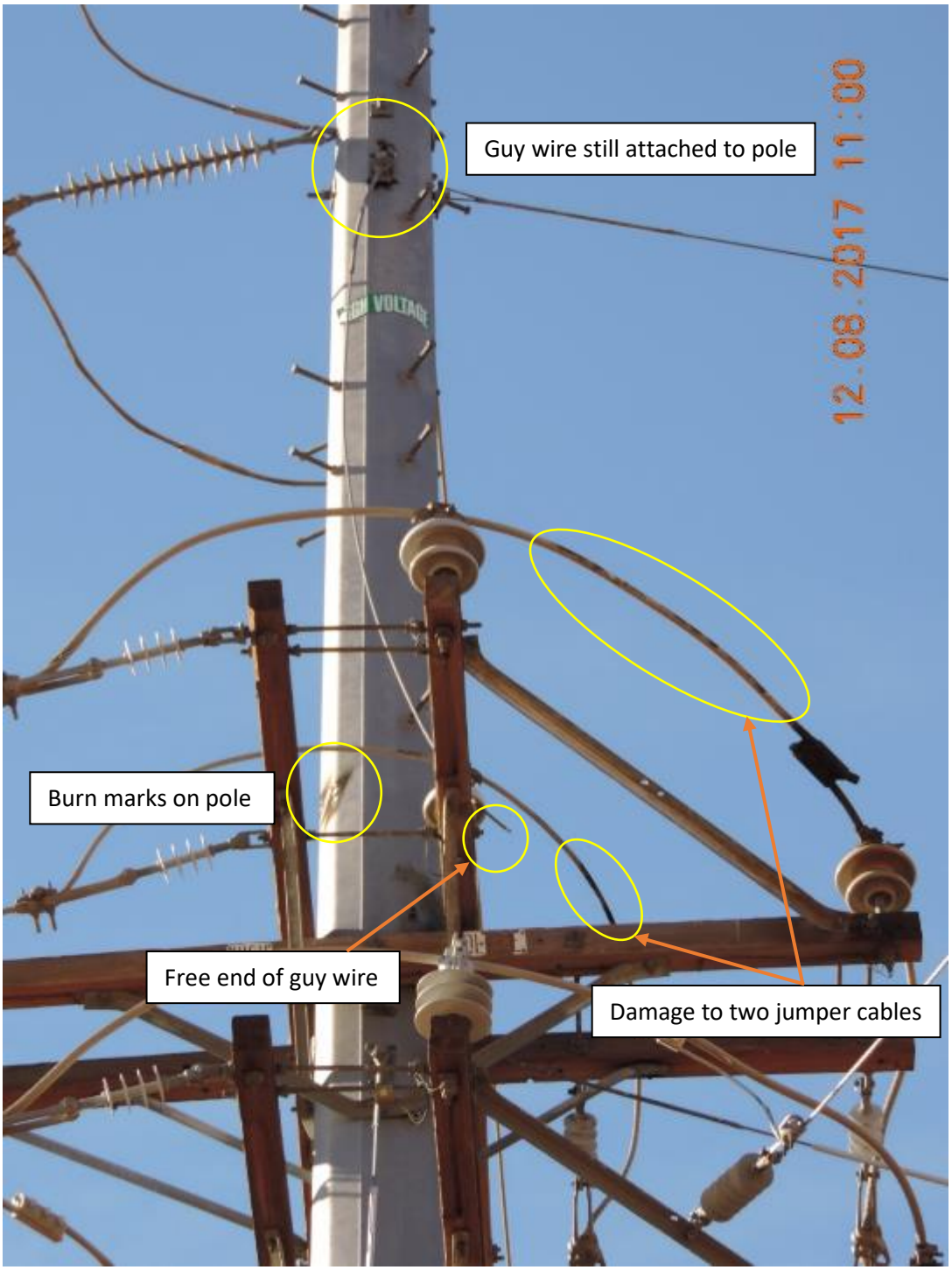

Figure 6: Pole 4389254E before evidence was removed.

Figure 7: Free end of guy wire resting on a distribution level crossarm before evidence was removed

SED investigators examined the guy wire sections collected by LACFD. The approximately 12-foot section of the guy wire exhibited multiple burn marks along the length of the wire. The free end of the guy wire that LACFD found resting on a distribution level crossarm is depicted above in Figure 7. The end of the guy wire exhibited burn marks and loss of material.

Figure 8: Loop on the approximately 12-foot section of guy wire found hanging from pole 4389254E

Figure 9: Damage along the approximately 12-foot section of guy wire.

Figure 10: Free end of the approximately 12-foot section of the guy wire found hanging from pole 4389254E

The two jumper lines that LACFD collected exhibited similar burn marks. These are depicted in Figure 11. Figure 12 depicts one example of the melting and loss of material observed on both wires, indicative of arcing due to contact.

Figure 11: Two jumper wires from pole 4389254E exhibit burns and loss of material.

Figure 12: Loss of material on a jumper wire from pole 4389254E.

SED investigators also examined the approximately 20-foot portion of the guy wire that Edison removed from the incident location on December 6, 2017. One side of the automatic dead-end tapered cartridge was fastened to one end of the guy wire with tape. The ring-end portion of the broken automatic dead-end tapered cartridge that Edison found next to the pole is shown positioned on the wire in Figure 13 as it was configured in service.

Figure 13: Both pieces of the broken dead end assembly

Figure 14: In-service configuration of the two pieces of the broken dead end support.

Figure 15: Broken end of 20-foot portion of guy wire

LACFD is in possession of both portions of the broken guy wire as well as the broken automatic dead-end tapered cartridge.[34] Edison is in possession of the broken ring-end portion of the automatic dead end tapered cartridge as well as the bar and yoke.[35]

The anchor to which the guy wire was attached remained intact and securely installed in the ground. At a follow up examination of the incident location on June 8, 2018, SED investigators observed that this anchor was still in service. During this site visit, SED confirmed that the new guy support installed was a like-for-like replacement of the guy wire support that failed on December 5, 2017.

The 0930 hours operation on the Nighthawk 16 kV circuit on December 5, 2017 was the result of a phase-to-phase-to-ground type fault involving A and B phases.[36] The trip settings on the Nighthawk 16 kV CB were 720 A and 180 A for phase and ground faults, respectively.[37] The fault resulting from this incident had a magnitude of 11,144

[34] Bates SCE-SED00009820.

[35] Bates SCE-SED00009815.

[36] Bates SCE-SED00016590.

[37] Bates SCE-SED00003444.

amps, exceeding the minimum trip settings on the CB, resulting in the opening of the CB and de-energization of the entire circuit from the source side at Lockheed substation.[38] At 0931 hours, one minute after the CB operation, RCS 0463 automatically opened downstream of the incident location in response to the loss of voltage.[39] This had no effect on the state of the circuit as it was already deenergized from its source at Lockheed substation to the end of the line.

Pole 4389254E supported both distribution and transmission circuits, and therefore, is subject to both distribution and transmission inspections.[40] Also, in addition to transmission and detailed distribution inspections, Edison performs annual grid patrols (AGP) on its distribution facilities. When inspecting a guy wire assembly during an AGP, Edison inspectors look for obvious failures in the guy wire such as broken strands, excessive slack, or an unsecured anchor that has pulled out of the ground.[41] Detailed and transmission inspectors more closely examine the general condition of the guy wire and the guy support, looking to ensure that the guy wire is not contacting other equipment, that each component of the guy assembly as a whole is intact, and that the points of attachment to the pole and to the anchor are secure.[42,43,44] Inspection of guy anchor assemblies in all three types of inspections (transmission, distribution, and AGP) is typically limited to whether a component is broken or otherwise no longer properly attached to the anchor.

Prior to the incident on December 5, 2017, Edison last performed a detailed inspection of pole 4389254E in May 2016 and an AGP in July 2017 through its Distribution Inspection and Maintenance Program (DIMP).[45,46] Edison did not record any findings for the AGP. The detailed inspection in May 2016 found one missing high voltage sign. No other findings were recorded as part of those inspections.[47] Edison last performed a transmission inspection on pole 4389254E in August 2017 through its

[38] Bates SCE-SED00016590.

[39] Bates SCE-SED00011738.

[40] GO 165 Sections III and IV; GO 95 Rule 31.2.

[41] Examination Under Oath_EUO_ALVARO PINEYURA;DEVON ASHE_101618 page 43, lines 23-28; page 44, lines 1-12.

[42] Examination Under Oath_EUO_ALVARO PINEYURA;DEVON ASHE_101618 page 32, lines 22-26, page 35, lines 1-6.

[43] Examination Under Oath_EUO_ALVARO PINEYURA;DEVON ASHE_101618 page 44, lines 18-28.

[44] Examination Under Oath_ EUO_MARIANO CASTILLEJO; LAWRENCE BOSCHEE_101618 page 23, lines 8-17.

[45] Bates SCE-SED00011942.

[46] Bates SCE-SED00011817.

[47] Bates SCE-SED00011942.

Transmission Operations and Maintenance (TOM) program.[48] Edison employees did not create any notifications to other utilities or internal findings for this inspection.[49,50]

To consider whether the cause of the broken guy assembly may have been weather or wind related, SED reviewed the historic weather patterns as recorded by the KCASANTA540 weather station located 0.67 miles east of the incident location. The data reviewed covered the period from September 2015 to December 2018, as earlier data from weather station KCASANTA540 was not available. The data indicated that the highest wind speed and wind gust recorded over that time period was 31.1 mph and 45.0 mph, respectively.[51] On December 5, 2017, KCASANTA540 recorded the daily high wind speed and daily high wind gust of 17.4 mph and 24.8 mph respectively.[52] A weather station located at Edison's Pardee Substation, located approximately 1.7 miles south of the incident location, recorded a wind speed of 19.48 mph at 1130 hours on December 5, 2017 and a daily high wind gust of 41.98 mph.[53] A comparison of the historic data to the data recorded on the day of the incident at this weather station does not indicate that the magnitude of wind speeds or wind gusts on the day of the incident were abnormal to the area.

SED also examined the pole loading calculation for pole 4389254E.[54] The calculation documents designate the guy wire assembly that failed as Guy #4. The calculation documents show that Edison assigned a maximum rated breaking strength of 15,400 pounds-force (lbf) for Guy #4. This is the strength capacity, also called rated load or rated strength, of the 3/8" Extra High Strength (EHS) stranded guy wire used in Guy #4.[55] However, SED found that the maximum rated breaking strength of the automatic dead end cartridge was only 10,350 lbf [56] much less than the guy wire itself. The automatic dead end cartridge is an interconnecting component installed between the guy wire and the ground anchor rod. When assessing the safety factor of Guy #4, Edison did not consider the weakest component installed along the guy wire assembly. The guy wire assembly includes all of the components between the pole and the ground that are used to securely attached the guy wire on both ends.

[48] Saugus-Colossus-Lockheed-Pitchgen 66kV Transmission Inspection Notes dated August 28, 2017.

[49] Saugus-Colossus-Lockheed-Pitchgen 66kV Transmission Inspection Notes dated August 28, 2017.

[50] Examination Under Oath_ EUO_MARIANO CASTILLEJO; LAWRENCE BOSCHEE_101618 page 71, lines 19-28; page 72, lines 1-3; page 74, lines 13-18.

[51] https://www.wunderground.com/dashboard/pws/KCASANTA540

[52] https://www.wunderground.com/dashboard/pws/KCASANTA540

[53] Bates SCE-SED00009824.

[54] Bates SCE-SED00010128.

[55] Bates SCE-SED00011706.

[56] Bates SCE-SED00016589.

B. Violations

SED reviewed and analyzed records, inspected and examined physical evidence, and interviewed witnesses related to this incident to determine compliance with Commission regulations. SED's investigation has discovered 13 violations:

General Order 95, Rule 48 - Strength of Materials*,* states in part:

> *Structural members and their connection shall be designed and constructed so that the structures and parts thereof will not fail or be seriously distorted at any load less than their maximum working loads (developed under the current construction arrangements with loadings as specified in Rule 43) multiplied by the safety factors in Rule 44. Values used for the strength of material shall comply with the safety factors specified in Rule 44.*

Rule 48 requires facilities to be designed and constructed in a way that they should not fail at any load less than the maximum working load. The maximum working load is determined using assumptions governed by GO 95, Rule 43, multiplied by the safety factor required by GO 95, Rule 44. GO 95, Rule 43 requires that utilities assume wind pressure of eight (8) pounds per square foot on conductors and other circular facilities when determining their maximum working load. A wind pressure of eight (8) pounds per square foot translates to a wind gust of 56 mph.[57,58] This implies that utilities must assume at least 56 mph of wind gust is imposed on their facilities when determining the maximum working load the facilities must be able to withstand. Rule 48 requires that facilities shall not fail at any load less than this calculated maximum working load multiplied by a required safety factor.

Violation 1.

SED's investigation found no indication or evidence to suggest that the working load imposed on the guy wire was unusual or abnormal. In addition, there is no evidence to indicate that the wind speed in this area at the time of the incident exceeded 56 mph in order to impose higher working load than the one required by Rule 48. Thus, the guy wire failed at a working load less than the maximum working load (produced by 56 mph) multiplied by the safety factor.

[57] Wind speed assessed using National Electrical Safety Code (NESC) Rule 250 C., General Loading Requirements and maps, Extreme Wind Loading.

[58] D.12-04-024 at 17 states in part, "SCE interprets GO 95 as requiring overhead power lines to withstand the wind loads specified in Rule 43. For facilities with a cylindrical surface in the Light-Loading District, Rule 43.2(A) sets a requirement of 8 psf, which equates to a wind speed of 56 mph. The purpose of the safety factor required by Rule 44 and Rule 48, according to SCE, is to ensure that facilities are built stronger than necessary for the design load of 56 mph established by Rule 43.

Publicly available data from weather stations local to the incident area establish the wind levels on the date of the incident as being at or near historic norms. Edison did not design or construct Guy wire #4 in a safe manner to prevent it from failing under known local wind conditions. A guy wire assembly that is designed (and subsequently maintained) properly should not fail during normal wind conditions, therefore Edison is in violation of GO 95, Rule 48.

General Order 95, Rule 31.1 - Design, Construction and Maintenance, states:

> *Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service.*
>
> *For all particulars not specified in these rules, design, construction, and maintenance should be done in accordance with accepted good practice for the given local conditions known at the time by those responsible for the design, construction, or maintenance of communication or supply lines and equipment.*
>
> *A supply or communications company is in compliance with this rule if it designs, constructs, and maintains a facility in accordance with the particulars specified in General Order 95, except that if an intended use or known local conditions require a higher standard than the particulars specified in General Order 95 to enable the furnishing of safe, proper, and adequate service, the company shall follow the higher standard.*
>
> *For all particulars not specified in General Order 95, a supply or communications company is in compliance with this rule if it designs, constructs and maintains a facility in accordance with accepted good practice for the intended use and known local conditions.*

GO 95, Rule 31 requires utilities to design, operate, and maintain their facilities for their intended purpose and in a safe manner consistent with industry standard practices and based on known local conditions.

Violation 2.

The failed guy wire assembly resulted in the down guy wire contacting an energized jumper and arcing, which created a dangerous condition that has the potential to cause property damage, fires, injuries, and fatalities. There are no documented conditions or evidence to suggest that a third party, or an external force caused the guy wire to fail. The guy wire failed by itself due to its inability to withstand the load/force imposed on it. Edison did not design and maintain the guy wire and its assembly to prevent them from failing under local known condition. When Edison designed and installed Guy wire #4 and its assembly, Edison considered the maximum breaking point of the guy wire in its calculation to determine the safety factor, instead of using the maximum breaking point

of the weakest element of the guy wire, such as the maximum breaking point of the cartridge that is part of the guy wire assembly, despite that the maximum breaking point of the cartridge was less than the maximum breaking point of the guy wire. When considering the strength of the components used, Edison didn't design it facilities based on the strength of the weakest element, and the load imposed on the weakest element. Edison relied on the strength of the strongest element of the guy instead, which is not according to accepted good practices.

The failure of the guy wire assembly created a condition wherein the guy wire assembly was no longer capable of adding stability and support to utility pole number 4389254E, which demonstrates that Edison did not design or maintain the guy wire and its assembly for their intended use; therefore, Edison is in violation of GO 95, Rule 31.1.

California Public Utilities (PU) Code – PU Code § 399.2, states in part:

> *(a)(1) It is the policy of this state, and the intent of the Legislature, to reaffirm that each electrical corporation shall continue to operate its electric distribution grid in its service territory and shall do so in a safe, reliable, efficient, and cost-effective manner.*

PU Code § 399.2 require utilities to operate their facilities in a safe manner.

Violation 3.

The failed guy wire assembly resulted in the down guy wire contacting an energized jumper and arcing, which created a condition that is not safe as it has the potential to cause property damage, fires, injuries, and fatalities. The failure of the guy wire assembly at utility pole number 4389254E and resulting dangerous conditions demonstrates that Edison did not operate its facilities in a safe manner; therefore, Edison is in violation of PU Code § 399.2.

General Order 95, Rule 44.3 – Replacement, states in part:

> *Lines or parts thereof shall be replaced or reinforced before safety factors have been reduced (due to factors such as deterioration and/or installation of additional facilities) in Grades "A" and "B" construction to less than two-thirds of the safety factors specified in Rule 44.1 and in Grade "C" construction to less than one-half of the safety factors specified in Rule 44.1. Poles in Grade "C" construction that only support communication lines shall also conform to the requirements of Rule 81.3–A.. In no case shall the application of this rule be held to permit the use of structures or any member of any structure with a safety factor less than one.*

GO 95, Rule 44.3 requires a guy wire to have a safety factor 2 at the time of design and construction and requires utilities to replace the guy wire before its safety factor is reduced to less than 1.33 (2/3 of 2).

Violation 4.

When Guy wire #4 broke and failed, its safety factor was reduced to less than 1, therefore, SCE was in violation of Rule 44.3 for not replacing the guy wire before its safety factor was reduced to less than 1.33. Although a safety factor of less than 1.33 does not automatically indicate that a guy wire will break, however, a guy wire would break if its safety factor falls below 1, which indicates that the guy wire or one of the interconnecting components of the guy wire was not capable of withstanding the load imposed on them.

General Order 95, Rule 31.1 - Design, Construction and Maintenance, (see above)

GO 95, Rule 31.1 requires utilities to design, operate, and maintain their facilities in a safe manner being cognizant of both industry standard practices and known local conditions for areas where the equipment operates. Any material strength requirement provided in other rules within GO 95 are part of safe facility design and are used to ensure that utility facilities can withstand outside forces imposed on them, such as the wind or snow, as they operate in open public spaces.

Violations 5.

SCE should have maintained Guy wire #4 and its assembly properly and safely in a way to prevent potential weakening of the Guy #4 or its assembly. Buy not maintaining Guy wire #4 in good acceptable condition, Edison allowed the guy wire and its assembly to fail due to their inability to withstand a local known conditions and load to the area. Therefore, Edison is in violation of GO 95, Rule 31.1.

General Order 95, Rule 49.6-C – Strength, states:

> *Where guys are used with poles or similar structures, capable of considerable deflection before failure, they shall be able to support the entire load, the pole below the point of guy attachments acting merely as a strut. Stranded wires shall be used when the ultimate strength of the guy exceeds 1,800 pounds. Anchor rods and their appurtenances shall meet the same strength requirements as the guy wire or strand (See Rule 44).*

GO 95, Rule 49.6-C requires that guy wires and all equipment held in tension along guy wires be able to support the load exerted on them.

Violation 6.

Guy wire #4 broke, indicating that the guy wire and/or the equipment held in tension along the guy wire was not able to support the load exerted on them. Therefore, Edison

is in violation of Rule 49.6-C, for failing to install and maintain Guy wire #4 in a way that would enable the guy wire and its assembly to support the entire load imposed on them.

General Order 95, Rule 19 - Cooperation with Commission Staff; Preservation of Evidence Related to Incidents Applicability of Rules, states:

> *Each utility shall provide full cooperation to Commission staff in an investigation into any major accident (as defined in Rule 17) or any reportable incident (as defined in CPUC Resolution E-4184), regardless of pending litigation or other investigations, including those which may be related to a Commission staff investigation. Once the scene of the incident has been made safe and service has been restored, each utility shall provide Commission staff upon request immediate access to:*
>
> - *Any factual or physical evidence under the utility or utility agent's physical control, custody, or possession related to the incident;*
> - *The name and contact information of any known percipient witness;*
> - *Any employee percipient witness under the utility's control;*
> - *The name and contact information of any person or entity that has taken possession of any physical evidence removed from the site of the incident;*
> - *Any and all documents under the utility's control that are related to the incident and are not subject to the attorney-client privilege or attorney work product doctrine.*
>
> *Any and all documents or evidence collected as part of the utility's own investigation related to the incident shall be preserved for at least five years. The Commission's statutory authorization under Cal. Pub. Util. Code §§ 313, 314, 314.5, 315, 581, 582, 584, 701, 702, 771, 1794, 1795, 8037 and 8056 to obtain information from utilities, which relate to the incidents described above, is delegated to Commission staff.*

California Public Utilities Code – PU Code § 316, states:

> *Each electrical corporation shall cooperate fully with the commission in an investigation into any major accident or any reportable incident, as these terms are defined by the commission, concerning overhead electric supply facilities, regardless of pending litigation or other investigations, including, but not limited to, those that may be related to a commission investigation.*
>
> *(a) After the scene of the incident has been made safe and service has been restored, each electrical corporation shall provide the*

commission, upon its request, immediate access to all of the following:

(1) Any factual or physical evidence under the electrical corporation's, or its agent's, physical control, custody, or possession related to the incident.

(2) The name and contact information of any known percipient witness.

(3) Any employee percipient witness under the electrical corporation's control.

(4) The name and contact information of any person or entity that has taken possession of any physical evidence removed from the site of the incident.

(5) Any and all documents under the electrical corporation's control that are related to the incident and are not subject to attorney-client privilege or attorney work product doctrine.

(b) Each electrical corporation shall preserve any and all documents or evidence it collects as part of its own investigation related to the incident for at least five years or a shorter period of time as authorized by the commission.

Any and all documents collected by an electrical corporation pursuant to this section shall be catalogued and preserved in an accessible manner for assessment by commission investigators as determined by the commission.

General Order 95, Rule 19 and PU Code § 316 require that utilities cooperate with Commission staff, including SED, for the purposes of investigating accidents.

Violations 7 and 8.

During its investigation of this incident, SED requested documents from Edison.[59] In one request, SED asked for a comprehensive list of all evidence and records that Edison would be using in its own investigation of the incident.[60] Edison objected to the request and did not comply, citing the attorney work product doctrine as the basis of its objection. In other incident investigations SED has discovered, through data request inquiries, that Edison creates maintenance, operation and/or repair records beyond the

[59] SED Investigator Data Request SED-001, SED-001B, SED-002, SED-003, SED-004, SED-005, SED-006, SED-007, SED-008, SED-009, SED-010.

[60] Bates SCE-SED00009814.

Commission's explicit General Order requirements. As is the case with all electric utilities, SED relies on Edison to maintain such internal records for its equipment and programs and provide such records to SED investigators when requested to do so. Under such circumstances, unless Edison had directly provided the records themselves or included such records in a comprehensive list, SED investigators would otherwise be unaware of their existence. By not providing a list of all evidence and records to SED, Edison impeded SED's ability to perform its own evidence review. Furthermore, Edison's actions prevented SED from reviewing all the records available for the subject equipment or programs involved in the incident that may have contributed to the cause or circumstances that led up to the incident, impending SED's ability to conduct a thorough investigation.

SED requested that Edison provide a list of all witnesses that Edison will be interviewing during the course of its investigation into the incident.[61] Edison objected to SED's request and did not comply, citing the attorney work product doctrine as the basis of its objection. Edison did identify one "non-retained, third party" witness but refused to identify Edison employees as well as "any witnesses that have been retained and/or interviewed as consultants."[62] As the owner and operator of the electric facilities in the area of the incident, Edison and its team of first responders would have firsthand knowledge of the incident as well as information about any potential witness who were present either during the initial moments of the fire or any other event that may have led to the fire. Because the knowledge of the existence of a witness or the factual information provided by a witness is not information that is gathered at the direction of Edison's counsel, it should therefore not be subject to attorney-client or work product privilege.

The employees and consultants that Edison refused to identify could have provided factual information to SED about the nature of the incident. However, by not providing a comprehensive list of all witnesses or potential witnesses to the incident involving Edison's own facilities, SED was unable to perform its own witness interviews and was deprived of information surrounding the cause of the incident. Edison therefore impeded SED's ability to perform its own thorough investigation since SED did not have full knowledge of the witnesses or access to their association with the incident.

In another data request, SED asked that Edison provide all photographs, notes, reports, and text messages generated by Edison's first responders, which captured their observations of the start of the incident.[63] Edison objected to this request and did not comply, citing the attorney work product doctrine as the basis for its objection. Instead, Edison provided Interruption Log Sheets, repair orders, and photographs which were a limited subset of first responder documents that SED requested.

[61] Bates SCE-SED00009812.

[62] Bates SCE-SED00009812.

[63] Bates SCE-SED00011709.

Because the destructive force of a wildfire can quickly alter a scene and destroy evidence, the earliest observations can be critical to understanding the events that occurred and determining the potential findings of an investigation. By not providing the comprehensive set of data and evidence that SED requested, Edison impeded and prolonged SED's investigation. Edison's actions prevented SED from reviewing all available information from the point at which the fire had least disturbed the electric facilities. This information was particularly vital for this incident investigation since Edison was unable to identify the primary first responder employee for this incident, thus preventing SED from interviewing this employee to obtain firsthand information about the incident. Furthermore, Edison provided an unintelligible timeline to explain how its first responders were under the direction of Edison counsel when they were taking their initial actions during this incident. The actions of Edison's first responders cannot preemptively be under the direction of Edison counsel. Any notes, reports, or text messages that SED requested would not be generated under the direction of Edison counsel and accordingly should not be subject to attorney-client or work product privilege.

For the reasons stated above, SED's investigation determined that Edison is in violation of PU Code § 316 and GO 95, Rule 19 for failing to provide: the list of evidence and records used for Edison's own investigation, a list of witnesses to the incident, as well as photographs, notes, reports, and text messages generated by first responders. In the spirit of full and transparent cooperation with the Commission and its staff, it is imperative that Edison respond to SED data requests with the most comprehensive information available. Without such comprehensive information, SED cannot conduct a thorough investigation, determine the root cause of the incident, expeditiously remedy any issues and prevent future similar incidents from occurring.

IV. Conclusion

SED's investigation has discovered eight (8) violations:

(a) One (1) violation of General Order (GO) 95, Rule 48 Strength of Materials

(b) Two (2) violation of General Order (GO) 95, Rule 31.1 Design, Construction, and Maintenance

(c) One (1) violation of Public Utilities Code (PU Code) § 399.2

Edison failed to maintain its facilities for their intended purpose as a guy wire assembly failed at utility pole number 4389254E, causing the guy wire to contact an energized distribution-level jumper cable.

(d) One (1) violation of Rule 44.3 Installation

Edison failed to replace the guy wire before its safety factor fell below 1.33. prior to failure.

(e) One (1) violation of General Order (GO) 95, Rule 49.6 (C) Detailed Strength Requirements, Guy and Anchors, Strength

Edison failed to ensure that the guy wire and its appurtenances were capable of withstanding the load imposed on them.

(f) One (1) violation of GO 95, Rule 19, Cooperation with Commission Staff

(g) One (1) violation of PU Code § 316

Failing to provide the list of evidence and records used for Edison's own investigation.

Failing to provide a list of witnesses to the incident.

Failing to provide all photographs, notes, reports, and text messages generated by first responders to the incident.

If SED becomes aware of additional information pertaining to this incident that could modify SED's findings in this Incident Investigation Report, SED may re-open the investigation and may modify this report or take further actions as appropriate.