

CALIFORNIA PUBLIC UTILITIES COMMISSION
Safety and Reliability Division
Electric Safety and Reliability Branch
Incident Investigation Report

Report Date: December 3, 2013

Investigator: Ivan Garcia

Incident Number: E20100925-02

Utility: Pacific Gas & Electric Company (PG&E)

Date and Time of Incident: September 25, 2010, Unknown (See Findings)

Location of Incident: 18401 Highway 1, Bodega Bay, Sonoma County

Summary of Incident:

On September 25, 2010, a Bodega volunteer firefighter, [REDACTED] made contact with a down 12 kV conductor. [REDACTED] was admitted into St. Francis Hospital's burn unit in the City of San Francisco where he was treated to 3rd degree burns.

Fatalities/Injuries: [REDACTED], Bodega Volunteer Firefighter

Property Damage: A small barn, one mobile home, two pick-up trucks and livestock fencing

Utility Facilities Involved: #6 copper 12 kV conductor on the Cotati 1105 circuit

Witnesses:

	Title	Phone
[REDACTED]	PG&E Electric Distribution Compliance	925-415-2571
[REDACTED]	PG&E Electric Distribution Compliance, Supervisor	925-415-6675
Kim Spire	CALFIRE Legal Analyst Public Records Act Requests	916-653-9656
Chuck Abshear	CALFIRE Fire Chief, Sonoma-Lake-Napa Unit	707-967-1402
Kathy Garner	CALOSHA Santa Rosa District Manager	707-576-2388
Kenneth How	CPUC Utilities Engineer	415-703-2875
Ben Nicholls	CALFIRE Battalion Chief	707-889-4229

Evidence:

Source	Description
PG&E	Initial Report
PG&E	Final Report
PG&E	Data Responses, DR101121, DR1012133, DR1101251, DR1102171, DR110401, DR1305161, DR1307161, DR1309301
PG&E	Vegetation Management Patrol Records for Cotati 1105 12 kV circuit
PG&E	Electric Notifications (EC) #104825626, #102097846, #103652349
PG&E	Overhead Patrols for Cotati 1105 12 kV circuit
PG&E	Overhead Inspection Records for Cotati 1105 12 kV circuit
PG&E	Time-Current Chart for a 15T (tardy) rated fuse
CALFIRE	Bodega Incident Fire Report by Fire Chief Ben Nicholls
CALFIRE	Serious Accident Review Team (SART) Report
CALOSHA	Bodega Incident Report #0950615

Observations and Findings:

This incident was originally assigned to Utilities Engineer, Kenneth How. The incident was reassigned to me on April 6, 2012, due to Kenneth How leaving the Commission.

On September 25, 2010 at 1232 hours PG&E received a telephone call regarding an outage on the Cotati 1105 circuit. At approximately the same time a passing by driver of the incident site reported a fire to the 911 dispatcher, Redwood Empire Dispatch Communication Authority (REDCOM). The Bodega Volunteer Fire Company responded to the fire, which became known as the Bodega Fire. While advancing a hose lay, a volunteer firefighter, [REDACTED] came in contact with a downed energized power line and sustained an electrical shock; resulting in him to being admitted into St. Francis Hospital's burn unit in the City of San Francisco where he was treated to 3rd degree burns.

In addition to the injury to the fire fighter, the fire caused property damage to a small barn, one mobile home, two pick-up trucks and livestock fencing located. The event caused an outage to 41 customers with all customers being restored by 0505 hours on September 26, 2010. PG&E completed repairs on September 27, 2010 which included replacing four spans of overhead, single-phase primary conductors and one transformer.

According to the Weather Underground website, www.wunderground.com the weather at the reported time of the fire at 1230 hours was at approximately 88°F with calm winds at 2.5 mph.

Reporting:

REDCOM notified PG&E of the electrical contact at 1326 hours. PG&E reported the incident to the Commission at 1841 hours. Commission Resolution E-4184 states in part:

Within 2 hours of a reportable incident during normal working hours or within 4 hours of a reportable incident outside of normal working hours, the utility shall provide notice to designated CPUC staff of the general nature of the incident, its cause and estimated damage. The notice shall identify the time and date of the incident, the time and date of notice to the Commission, the location of the incident, casualties that resulted from the incident, identification of casualties and property damage, and the name and telephone number of a utility contact person. ...

Additionally, Commission Resolution E-4184 states in part:

Reportable incidents are those which: (a) result in fatality or personal injury rising to the level of in-patient hospitalization and attributable or allegedly attributable to utility owned facilities; ...

September 25, 2010, was a Saturday and required that this incident be reported within 4 hours from when PG&E was notified of the incident. PG&E staff reported the incident after five hours.

Conductor Investigation:

The conductor that failed was the east conductor of the Cotati 1105 circuit. The conductor that failed was installed in 1976, the span length was at approximately 270 feet and the conductor was #6 copper.

PG&E staff stated in a data request response there were less than five splices in the subject conductor. PG&E staff stated that the conductor did not fail at the splices. Two of the splices were installed in January of 2009 and PG&E staff was unable to locate records indicating when the other splices were installed.

PG&E staff did not know the safety factor of the failed conductor at the time of failure. However, based upon PG&E's design criteria the safety factor of the conductor at the time of installation was greater than the value required by GO 95, Rule 44.1. GO 95, Rule 44.1 requires a minimum safety factor for conductors of Grade "A" Construction of 2.

According to PG&E's Overhead Construction Manual, PG&E document #059626, the breaking strength of a #6 copper tree wire is 1,046 pounds. The maximum stringing tension for #6 copper tree wire as shown in PG&E document #015221 is 385 pounds. Thus, if installed per PG&E standards the safety factor of the

conductor at the time of installation would be 2.71. This safety factor is greater than the required value of 2.0 at the time of construction.

Based upon the weather conditions at the time of the incident, the tension in the conductor would have been approximately, 206 pounds. The remaining strength of the broken conductor was not tested by CALFIRE or any other interested parties and thus the safety factor prior to failure cannot be determined.

Additionally, on February 28, 2011, Utilities Engineer, Kenneth How, visited Ben Nicholls, CALFIRE, Battalion Chief office and inspected the conductor involved in the incident. Mr. How verified a number of splices on the subject conductor. However, he was unable to discern anything about the cause of the conductor failure from a superficial observation.

Integrated Logging Information System (ILIS) Log

PG&E maintains an ILIS Log to document its circuit activity. The ILIS log showed that at 1413 hours a blown fuse was discovered on the Cotati 1105 circuit upstream (source side) of the incident site. However, the actual time of when the fuse blew is unknown.

Fuse Investigation

The Cotati 1105 circuit has three fuses upstream of the incident site (one for each phase). Only one fuse was found blown. The blown fuse #8723 was on the source side of the conductor break point. [REDACTED] also contacted the conductor on the source side of the break.

PG&E did not monitor the current at which the fuse blew or the time of when fuse blew. The fuse that blew was rated at 15T (tardy). According to the time-current characteristic chart of the fuse it will not blow at current below 3.5 amps no matter how long the current will flow. At 7 amps current the fuse will blow at 3 seconds and at 110 amps current the fuse will blow instantaneously.

My investigation leads me to believe that when the conductor fell down, it caused a sustained outage but did not blow the fuse as the fault current was still low. The fault current kept the conductor energized. When [REDACTED] touched the conductor it provided a path for current to flow which caused fuse to blow.

PG&E Notifications

Chuck Abshear from the Bodega Bay Fire Department indicated that they had previously responded to downed lines in the vicinity of the incident. According to PG&E records two other conductors failed in the vicinity. On August 12, 2006 PG&E made repairs to a similar downed conductor, and there was no apparent cause. On January 14, 2009 PG&E made repairs to a similar downed conductor, and the cause appears to have been a fallen tree branch.

PG&E Patrols and Inspections

PG&E staff furnished detailed and patrol inspection records required under GO 165. These records were completed prior to the incident date, and performed in the vicinity of the incident location.

The last two previous detailed inspections were completed on July 10, 2003 and August 6, 2008. The 2003 inspection created two EC notifications for the replacement of conductors near the incident site (EC notifications #100988473 and #100988475). Each notification was created to replace one span of tree wire with #4 Aluminum Conductor Steel Reinforced (ASCR) tree wire. The conductors replaced during these two notifications were not the same conductors that failed and caused the incident. The replaced conductors were #4 ASCR tree wire, however, the conductor that was replaced was #6 copper tree-wire.

The 2008 inspection created one EC Notification for the removal of brush on the base of a pole near the incident site address.

Overhead patrols for the Cotati 1105 12 kV circuit were also furnished by PG&E. Patrols were completed on June 27, 2006, August 6, 2008 and October 8, 2010. There were no abnormal conditions found on the patrols.

PG&E Vegetation Management Records

PG&E staff provided the two previous Vegetation Management Patrol Records for the Cotati 1105 circuit which were completed on January 19, 2009 and February 23, 2010. Upon reviewing the Vegetation Management records, I found five (5) trees that PG&E identified that were in the vicinity of the fallen conductor. I inquired with PG&E if any of those 5 trees were identified for trimming and were actually trimmed. In Data Response DR1309301, PG&E replied that during its inspection, the Vegetation Management inspector determined that it was not necessary to trim the trees as the trees had ample clearances from the conductors. I did not find any evidence suggesting that vegetation was the cause of the incident.

CALFIRE Report

CALFIRE has investigated the incident and prepared both an investigative report regarding the cause of the fire and an incident review report regarding the injury sustained by a firefighter. The author of the investigative report was CALFIRE employee, Fire Chief, Ben Nicholls. In his report, Chief Nicholls states that on September 25, 2010 at 1233 hours, a vegetation fire near the community of Bodega, California, near Highway 1 and Bodega Highway was reported to the REDCOM. The Bodega Volunteer Fire Company responded during the early stages of the Bodega fire. While advancing a hose lay, a volunteer firefighter came in

contact with a downed energized power line and sustained a significant electrical shock.

Chief Nicholls report does not state the cause of the conductor failure, however, it concludes that the fire was caused by the downed conductors based on his assessment that there was no evidence of an alternative cause and his determination that the conductor fell on the ground near the origin of the fire.

Discussion

My investigation did not find conclusive evidence that the failed PG&E conductor caused the Bodega Fire or PG&E has violated any of the Commission requirements.

The call to 911 regarding the fire and the call to PG&E about the outage were made at approximately the same time therefore it cannot be determined which event happened first.

Although CALFIRE's conclusion that the cause of the fire was a PG&E down conductor appears to be valid, no concrete evidence supporting the conclusion was provided in the CALFIRE report.

The investigation of the broken wire by CPUC staff did not find any evidence as to the cause of the conductor failure. PG&E's inspection records show they are complying with the Commission requirements. There is no clear evidence that PG&E knew of the impending failure of the conductor.

Preliminary Statement of Pertinent General Order and Public Utilities Code Requirements:

Public Utilities Code 451 states in part:

Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public.

General Order 95, Rule 44.1, Table 4 states in part:

Lines and elements of lines, upon installation or reconstruction, shall provide as a minimum safety factor of 2 for conductors, splices and conductor fastenings of Grade "A" Construction.

General Order 95, Rule 49.4, C-2, Strength in Light Loading Districts states in part:

Conductors in Grade 'A' construction in spans exceeding 150 feet and not exceeding 300 feet in length shall have a tensile strength not less than that of #6 AWG medium-hard-drawn copper.

Commission Resolution E-4184 states in part:

Within 2 hours of a reportable incident during normal working hours or within 4 hours of a reportable incident outside of normal working hours, the utility shall provide notice to designated CPUC staff of the general nature of the incident, its cause and estimated damage. The notice shall identify the time and date of the incident, the time and date of notice to the Commission, the location of the incident, casualties that resulted from the incident, identification of casualties and property damage, and the name and telephone number of a utility contact person.

...

Reportable incidents are those which: (a) result in fatality or personal injury rising to the level of in-patient hospitalization and attributable or allegedly attributable to utility owned facilities; ...

Preliminary Conclusion:

My investigation found that PG&E did not report the incident within the time intervals specified in Commission Resolution E-4184. Based upon the available data and the conductor not being tested, it cannot be determined if the conductor meet the applicable strength requirements.