Electric Safety and Reliability Branch
Safety and Enforcement Division, CPUC

Information Regarding Electric Transformer Incidents

● The following are summaries of the electric incidents reported to the CPUC since 2005 that involve an overhead or an underground transformer, with the date, location, and brief description of each incident, including the cause, if known.

Date of incident: 3/23/05
Location: Kettlemen City, Fresno County
Description: A 21/12kv step down transformer on the Tulare Lake 1108/2108 circuit failed.

Date of incident: 4/12/05
Location: San Francisco
Description: A fire broke out in manhole #252 at 0025 hours on 2/3/05. Due to the extensive damage to primary and secondary cables, PG&E was unable to determine the exact cause of the fire. A nearby transformer was changed out, but was later found to be in normal operating condition. No abnormal conditions or infrared findings were noted in any of the underground inspections or patrols.

Date of incident: 8/19/05
Location: Corner of Post and Kerney, San Francisco
Description: An electrical arcing fault developed in the High Voltage Chamber (32.5 kV) attached to a network transformer located in an underground vault. This event resulted in an explosion occurring within the vault. The force of the explosion was sufficient to lift the two (2) vault access covers on the sidewalk, to lift a manhole cover that was projected across Kearny Street (45 feet), and to expel flames and hot gases out of the manhole and openings that developed once the vault lids lifted.

Date of incident: 10/10/05
Location: Santa Clara St. and 19th, San Jose
Description: An underground transformer failed and caused an outage to 4152 customers. The failure resulted in a small fire which was extinguished by the San Jose Fire Department. No injuries or property damage was reported.

Date of incident: 5/3/2006
Location: Coffee Rd. and Highway 58, Bakersfield
Description: A transmission potential transformer (PT) was replaced after being damaged by lighting. The newly installed potential transformer failed during in-service testing. The failure resulted in an outage to a section of the 115 kV buss and related transmission circuits.

Date of incident: 7/11/06
Location: 423 6 ½ Avenue, Kingsburg
Description: A PG&E transformer failed and a house caught fire. According to the Kings County Fire Department, it appears that the fire was caused by the internal wiring of the home.
The fire and/or arcing may have caused the distribution transformer to fail.

Date of incident: 8/24/07
Location: Bakersfield, Kern County
Description: A 21 kV padmount transformer failed resulting in an outage to 1490 customers.

Date of incident: 8/1/07
Location: Fresno, Fresno County
Description: A single phase, 25 KVA, 21 KV subsurface transformer failed.

Date of incident: 7/17/07
Location: San Martin, Santa Clara
Description: PG&E reported that according to an eyewitness, a travel trailer parked near a PG&E pole caught on fire. The travel trailer fire then set the pole on fire. Due to the pole fire, a transformer on the pole failed and fell into a building which ignited a structure fire.

Date of incident: 6/13/07
Location: Fresno, Fresno County
Description: A 14-year old boy climbed a PG&E power pole and contacted the transformer bushing.

Date of incident: 6/12/07
Location: 2043 E Saginal Way, Fresno
Description: A pole-mounted 100 kVA distribution transformer located between two apartment complexes, failed catastrophically resulting in a fire at both apartments and an interruption to 21 customers.

Date of incident: 10/3/08
Location: San Pablo, Contra Costa County
Description: PG&E was contacted by the Pinole Fire Department to respond to arcing at an overhead transformer and wire down.

Date of incident: 7/10/08
Location: Fresno, Fresno County
Description: PG&E reported that a pad-mount transformer failed in downtown Fresno.

Date of incident: 6/28/09
Location: Milpitas, Santa Clara County
Description: A PG&E transformer failed at 190 N Milpitas Blvd in Milpitas, CA, causing an outage to 2643 customers including the Great Mall in Milpitas.

Date of incident: 7/1/09
Location: Milpitas, Santa Clara County
Description: A PG&E lineman was injured while he was working on a padmounted transformer. The lineman attempted to close a fuse switch, but the switch did not latch. This caused the electricity to arc and make contact with the lineman, resulting in the incident injury.

Date of incident: 7/6/09
Location: 799 Market St., San Francisco
Description: A PG&E underground network protector on a transformer failed catastrophically. The network protector failed either due to a short circuit in the wiring or a failed component in the relay and control system.

Date of incident: 3/22/10
Location: 6453 Auto Mall Pkwy, Fremont

Description: PG&E's Newark 115kV transmission Capacitor Bank breaker oil filled current transformer exploded, caught fire and relayed. This caused an outage to 40,899 customers.

Date of incident: 3/25/10
Location: San Francisco, San Francisco County
Description: An underground transformer and segment of underground cable failed in service, resulting in an outage to 1133 customers.

Date of incident: 12/24/10
Location: Mountain View, Santa Clara County
Description: A PG&E transformer failure occurred on PG&E's Mountain View 1106, 12 kV circuit resulting in an outage to 2,951 customers.

Date of incident: 12/6/10
Location: San Jose, Santa Clara County
Description: A PG&E transformer failed on PG&E's Edenvale 2106 21kV circuit resulting in an outage to 9,497 customers.

Date of incident: 4/30/11
Location: Oakland, Alameda County
Description: On April 30, 2011, an outage occurred on a 12kV circuit due to a failed underground transformer.

Date of incident: 11/3/11
Location: San Francisco, San Francisco County
Description: PG&E reported an underground transformer plug connector failure in San Francisco, CA. The failure resulted in an outage to 3,126 customers.

Date of incident: 10/25/11
Location: San Francisco, San Francisco County
Description: An overhead open delta transformer bank failed in the city of San Francisco resulting in an outage to 273 customers.

Date of incident: 5/17/11
Location: Oakland, Alameda County
Description: A Mylar balloon came in contact with PG&E’s 12 kV circuit in Oakland causing an outage to 3,034 customers.

Date of incident: 5/10/11
Location: San Francisco, San Francisco County
Description: An underground transformer failed in San Francisco, CA. The failure resulted in an outage to 2,921 customers.

Date of incident: 9/29/11
Location: Harriet St., San Francisco
Description: A PG&E switch failed on the San Francisco Substation A-1115 12kV circuit near Folsom and Harriet Streets in the city of San Francisco resulting in an outage to 1,168 customers. The failure caused a fire in a manhole and damaged three transformers.

Date of incident: 10/25/11
Location: 19th St., San Francisco
Description: An overhead open delta transformer bank failed on Station E-1105 12kV circuit at Yukon and Short Streets in the city of San Francisco resulting in an outage to 273 customers.

Date of incident: 11/9/12
Location: San Francisco, San Francisco County
Description: An outage occurred to 166 customers due to a lightning strike that damaged five PG&E transformers at different locations in the City of San Francisco.

Date of incident: 10/17/12
Location: Templeton, Monterey County
Description: A PG&E inspector received electrical burns while performing a routine inspection on a pad-mounted live-front transformer.

Date of incident: 10/18/12
Location: Lower Lake, Lake County
Description: A tree limb to fell and rested across the service drop pulling loose the service wire from the pole-mounted transformer and causing sparks which ignited a fire.

Date of incident: 7/27/12
Location: Livermore, Alameda County
Description: A third party contractor was injured when working at a pad-mounted transformer in the City of Livermore.

Date of incident: 3/15/12
Location: Danville, Contra Costa County
Description: An underground transformer failed and created an outage to 2,643 customers.

Date of incident: 3/14/12
Location: Oakhurst, Madera County
Description: A third party contacted a PG&E circuit inside a step-down padmounted transformer in the City of Oakhurst.

Date of incident: 1/16/12
Location: 3191 Pacific Ave., San Francisco
Description: an underground transformer failure, possibly due to overloading, and resulted in an outage to 332 customers

Date of incident: 2/22/2012
Location: Dubose Ave., San Francisco
Description: an overhead transformer failed after a possible overload from an alleged grow house. This incident resulted in an outage to over 2,000 customers and a fire at the pole.

Date of incident: 2/20/13
Location: Shasta, Shasta County
Description: A transformer failed due lightning in the Hat Creek area of Shasta County during a storm.

Date of incident: 12/19/13
Location: Vallejo, Solano County
Description: A PG&E transformer (T-1183) failed resulting in an outage to 6,127 customers on two PG&E circuits.

Date of incident: 7/22/13
Location: Fresno, Fresno County
Description: An outage to 22 customers occurred as a result of a secondary bus wire failure. After repairs were made by PG&E, and while in the process of re-energizing the line, a flashover occurred between the two bushings of a transformer causing an outage to an additional 3,064 customers.

Date of incident: 5/5/13
Location: San Francisco, San Francisco County
Description: An arc flash occurred while PG&E employees were in the process of removing installed grounds from an underground transformer enclosure in the City of San Francisco.

Date of incident: 1/14/13
Location: Larkspur, Marin County
Description: A 100 foot redwood tree uprooted and fell on the Greenbrae 1103 12 kV circuit near in Larkspur, Marin County. The tree damaged PG&E conductors, cross arms and transformer on the pole.

Date of incident: 6/10/13
Location: North side of King St., San Francisco
Description: An underground transformer T-3940 and elbow connector failed on the Z-1116 circuit. This incident caused an outage to 2,890 customers. The transformer damaged beyond recognition and scrapped by PG&E.

Date of incident: 6/20/13
Location: Vallejo, Solano County
Description: Transformer T-746 was damaged resulting in an outage to 783 customers.
A fault caused a fire to ignite within the underground transformer enclosure. The fire caused the wooden enclosure to collapse around the transformer. A squirrel carcass may have caused the fault that led to arcing at this transformer ultimately causing it to fail.

Date of incident: 12/8/13
Location: 164 Bocana St., San Francisco
Description: A fault caused an arc which resulted in a catastrophic failure of an underground transformer.

Date of incident: 8/19/14
Location: Millbrae, San Mateo County
Description: On August 19, 2014 at 0817 hours an outage affecting 375 customers on a 12kV circuit occurred due to an overhead transformer failure.

Date of incident: 7/11/14
Location: Gridley, Butte County
Description: A transformer was hit by lightning and a fire occurred at a residence causing damages.

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Date of incident: 4/10/15
Location: Stockton, San Joaquin County
Description: Two individuals opened/vandalized PG&E's pad-mount transformer T-15982 in an underground line section of the Weber 1105. This caused an arc. There was one reported fatality and one injury.

Date of incident: 5/6/15
Location: San Leandro, Alameda County
Description: On May 6, 2015 a Mylar balloon came into contact with a pole-mounted 12 kV transformer in San Leandro. The incident caused an outage to customers on the San Leandro 1107 12 kV circuit.

Date of incident: 5/14/15
Location: Granite Bay, Placer County
Description: Lightning struck a flag pole in the City of Granite Bay. The lightning arced from the flag pole to the customer's electric service drop. A voltage surge caused six transformers in the area to fail.

Date of incident: 5/28/15
Location: Cottonwood, Shasta County
Description: A lightning arrester mounted on a self-protected transformer broke from its mount and came in contact with the transformer casing. This resulted in power outages.

Date of incident: 7/30/15
Location: Dixon, Yolo County
Description: A house in Dixon caught fire. Preliminary reports indicate that the fire may have started at a failed PG&E transformer on the Dixon 1102 12 kV circuit near the house.

Date of incident: 9/24/15
Location: Oakland, Alameda County
Description: While removing/vandalizing the secondary copper (480 Volt) at a pad-mount transformer in Oakland, 3rd party made contact with energized parts resulting in a fatality.

Date of incident: 9/26/15
Location: San Francisco, San Francisco County
Description: An outage occurred on a 12kV circuit in San Francisco. During the restoration process, an underground PG&E subsurface transformer located in San Francisco catastrophically failed resulting in injury to two nearby individuals.

● Utilities must report any electric incident that meets specific criteria to the CPUC within two hours of its occurrence. The incident report is submitted to the Electric Safety and Reliability Branch (ESRB) in the CPUC's Safety and Enforcement Division (SED).

Please note that not all transformer failures meet the threshold criteria for being reported to ESRB. For example, a transformer failure that does not cause an outage or an injury or other damage is not required to be reported; accordingly, the above summary consists only of transformer failures that were reported to ESRB by utilities. There could be numerous additional transformers failure that fall below the reporting threshold.

The availability of more detailed information about specific incidents will vary, as each incident is unique. Some incidents may result in an investigation that relies upon information that is confidential under state law, release of which requires compliance with additional processes.

● When investigating a reported electric incident, ESRB will tailor its approach to the specific circumstances presented, as each electric incident is unique in nature.

In general a Utilities Engineer from ESRB is assigned to investigate an incident; the Engineer will typically first review the incident report and contact the utility to obtain more information, followed by a field visit to inspect the site of the incident and its surroundings.

At the scene of the incident, the assigned Engineer first identifies any unsafe locations/facilities and ensures that the incident scene is safe and under control before starting the investigation. After the field investigation, the assigned Engineer will review records and do any necessary follow up investigation, and proceed to analyze the evidence collected and will issue an investigation report.

● Because each incident is unique, the investigation length will vary, based on many factors, including the location and cause of the incident, availability of witnesses, the level of utility and witness cooperation, involvement of other government agencies, witnesses, and any tests that may need to be conducted, among other things. Nevertheless, ESRB generally classifies incidents based on four levels, each of which has an associated timeline, and the assigned Engineers aim to meet those timelines:

Level 4: These are incidents that resulted in a fatality and/or injury requiring hospitalization, and that were caused, at least in part, by the utility or its facilities. Level 4 incidents may take up to 180 days to close.

Level 3: These are incidents that involve damages that are related to the utility or its facilities. Level 3 incidents should be closed within 150 days.

Level 2: These are incidents that involve power interruptions that are not due solely to outside forces. Level 2 incidents should be closed within 120 days.

Level 1: These are all other incidents. Level 1 incidents should be closed within 60 days from the date the engineer is assigned the incident.

● CPUC General Orders (GOs) 95, 128, and 165, codify the CPUC's requirements for transformers design, installation, maintenance, and inspection. Each General Orders contains a list of the dates of changes to that General Order.

● Transformer failures can be caused by many factors such as insulation and windings failure; overheating; oil degradation; improper installation and/or maintenance; oil contamination; external fires; vandalism; moisture ingress; overloading; inrush current; failure of protective equipment; and lightning. ESRB has not performed a trend analysis of incidents involving PG&E transformers, but the broad range of causes of failure results in a general lack of predictability in the rate of transformer failure.

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