

Appendix A

PG&E's Proposed Redacted Version of the SED Fire Report



Report on October 2017 Fire Siege

October 2017 Wildfires
in Northern California

Safety and Enforcement Division
California Public Utilities Commission

June 13, 2019

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	Appendix A – SED’s Incident Investigation Reports	

I. Executive Summary

On October 7, 2017, the National Weather Service issued a Red Flag Warning¹ throughout much of Northern California because “Diablo Winds”² were expected, with gusts between 20 and 30 miles per hour.³

On the evening of October 8, 2017 into the morning of October 9, 2017, a series of wildfires started burning across northern California. The California Department of Forestry and Fire Protection (CAL FIRE) stated that the start of the “October Fire Siege” was on Sunday, October 8, 2017, and that it was responding to 250 wildfires. At the peak of the Fire Siege, there were 21 major wildfires that, in total, burned 245,000 acres, involved 11,000 firefighters and forced 100,000 Californians to evacuate. The fires destroyed an estimated 8,900 structures (as of October 30, 2017) and took the lives of 44 people: Atlas (Napa) – 6, Cascade (Yuba) – 4, Nuns⁴ (Napa/Sonoma) – 3, Redwood Valley (Mendocino) – 9, and Tubbs (Sonoma) – 22.

The Safety and Enforcement Division (SED) of the California Public Utilities Commission (CPUC or Commission) investigated 17 wildfires that involved the facilities of Pacific Gas and Electric Company (PG&E) during the October Fire Siege. This report covers SED’s investigations for the following fires: Adobe, Atlas, Cascade, Cherokee, LaPorte, Norrbom, Nuns, Oakmont/Pythian, Partrick, Pocket, Point, Potter/Redwood, Sulphur, Tubbs, and Youngs.⁵ Based on its investigations, SED found that PG&E violated several General Order (GO) rules and other CPUC requirements and also failed to follow industry best practices. SED’s investigations revealed deficiencies in PG&E’s Vegetation Management practices and procedures in relation to the identification and removal of hazardous vegetation. Additional deficiencies were found regarding equipment operations in severe conditions. A Summary of

¹ A Red Flag Warning issued by the National Weather Service means that there is a high fire danger with increased probability of a quickly spreading vegetation fire in the area. Wikipedia (https://en.wikipedia.org/wiki/Red_flag_warning)

² Diablo Wind is the name describing the hot, dry wind from the northeast that typically occurs in north-central California, in particular, the San Francisco Bay Area, during spring and fall. Weather Corner (<https://ggweather.com/archive/weacornoct26.htm>)

³ Wikipedia (https://en.wikipedia.org/wiki/October_2017_Northern_California_wildfires)

⁴ The Nuns Fire is comprised of several fires that combined into one. The Oakmont, Norrbom, Adobe, Pressley and Partrick fires combined together and were deemed the Nuns Fire by CAL FIRE. The Pressley Fire was a spot fire that ignited from an ember that originated from the Adobe Fire. SED investigated each of these incidents except the Pressley Fire.

⁵ SED’s investigation reports for the Lobo Fire and the McCourtney Fire are not included in this Report. Information concerning these two fires remains confidential. Therefore, SED’s investigation reports, which build on information provided by CAL FIRE cannot be released at this time. SED plans to issue a supplemental report once the information for the Lobo Fire and the McCourtney Fire is no longer confidential.

Findings is located in Section I.C. below, and Table 1 in Section IV presents a summary of the violations that SED found.

A. Safety and Enforcement Division's Investigation

SED's Electric Safety and Reliability Branch (ESRB) focuses on regulation and enforcement of applicable laws related to the safety of electric facilities and operations. ESRB routinely conducts facility inspections via audits and investigates electric safety incidents and complaints. In certain cases, ESRB staff investigations incorporate information from Subject Matter Experts (SME) who draw conclusions, e.g., the cause of fires and vegetation risks. In SED's investigations of the October 2017 wildfires in northern California, staff focused primarily on investigating PG&E's overhead electric facilities involved in the fires and governed by GO 95. GO 95 prescribes the minimum design, construction and maintenance requirements of overhead electric infrastructure in California. SED also reviewed PG&E's inspection records for compliance with the minimum patrol and detailed inspection intervals for electric facilities required by GO 165.

SED and the Department of Forestry and Fire Protection (CAL FIRE) conducted separate investigations into the causes of the fires, but provided technical support to each other as requested. In addition, SED issued numerous data requests to PG&E, interviewed PG&E personnel, performed site visits, and reviewed PG&E records, other documents, and physical evidence. The goal of SED's investigations is to identify whether there were violations of the Commission's General Orders and related requirements by investigating electric facilities linked to the fires, focusing mainly on PG&E's maintenance and operation of its facilities, including, but not limited to vegetation maintenance, appropriate clearances, etc.

B. Department of Forestry and Fire Protection's (CAL FIRE) Investigation

CAL FIRE is a state agency responsible for fire protection and stewardship of California's privately-owned wildlands. In addition to wildfire protection and response, CAL FIRE manages and protects California's natural resources. CAL FIRE investigators responded immediately to the October 2017 wildfires to protect life and property; CAL FIRE also investigated the fires to find the origin and cause of each fire and, where utility facilities were involved in fire ignition, to determine whether PG&E violated State law and regulations. CAL FIRE enforces the California Penal Code, Public Resources Code and Health and Safety Code.

C. Summary of Findings

SED's investigations conclude that each of the 15 wildfires covered in this report that involved PG&E facilities was caused by a combination of one or more of the following factors:

1. Severe weather and dry conditions led to rapid and dramatic increases in wildfires. The National Weather Service issued Red Flag Warnings for much of the Northern California area.

2. California experienced the longest duration of drought since 2000, from December 2011 to March 2019.⁶
3. PG&E used underqualified vegetation management contractors to inspect its electric facilities for hazardous vegetation.
4. PG&E's vegetation management employees or contractors used improper practices.
5. PG&E kept inadequate records of vegetation that had the potential to fall onto its facilities.
6. PG&E used protection devices inappropriately and failed to appropriately respond to alarms during high risk fire conditions.

SED's investigations found the following types of violations, for one or more of the wildfires:

1. GO 95, Rule 19, for disposing of evidence related to a reported incident and Commission investigation.
2. GO 95, Rule 31.1:
 - a. For failing to identify and abate dying, diseased or weakened trees and tree parts.
 - b. For improper performance of vegetation management activities, such as trimming, removal, etc.
 - c. For failing to perform a complete patrol of its system and according to best practices described in PG&E procedures.
 - d. For failing to retain documents related to vegetation inspections and a work order.
 - e. For late completion of work orders according to PG&E's own procedures, and for PG&E's records indicating that a work order had been completed when, in fact, the work had not been performed.
3. GO 95, Rule 35:
 - a. For allowing vegetation to contact energized, bare conductors operating at distribution voltages.
 - b. For improperly prioritizing and deferring abatement of vegetation straining and abrading a secondary/service voltage conductor.
4. GO 95, Rule 38, for allowing two energized conductors of the same circuit to make contact thus violating minimum clearance requirements.
5. Resolution E-4184, for not reporting an incident location where CAL FIRE collected electric facilities with the aid of PG&E employees.

⁶ Since 2000, the longest duration of drought in California lasted 376 weeks beginning on December 27, 2011 and ending on March 5th, 2019., <https://www.drought.gov/drought/states/california>

D. Other Issues Related to the October 2017 Wildfires

Section V of this report addresses issues of concern that came to light during SED's investigations and may warrant further investigation. These issues include vegetation management issues, the use of protection devices, and preemptive de-energization of power lines. SED also found violations regarding work orders completed late, a work order not completed although the record indicated completion, missing inspection records, conductor-to-conductor contact, and disposal of evidence. These issues raise concern that PG&E may not be maintaining and operating its electric facilities in a safe manner as required by Public Utilities Code §451.

II. Applicable Laws, Regulations, and Procedures

A. California Public Utilities Code

Several provisions of the California Public Utilities Code (PU Code) have relevance to this investigation. In particular, PU Code §315 empowers the Commission to “investigate the cause of all accidents occurring within”⁷ California “upon the property of any public utility or directly or indirectly arising from or connected with its maintenance or operation, resulting in loss of life or injury to person or property.”⁸

PU Code §316⁹ orders electrical corporations to “cooperate fully”¹⁰ with the Commission “in an investigation into any major accident or any reportable incident...concerning overhead electric supply facilities.”¹¹ Reportable incidents are defined in Resolution E-4184,¹² as incidents that “(a) result in fatality or personal injury rising to the level of in-patient hospitalization and attributable or allegedly attributable to utility owned facilities; (b) are the subject of significant public attention or media coverage and are attributable or allegedly attributable to utility facilities; or (c) involve damage to property of the utility or others estimated to exceed \$50,000.”¹³ Any evidence and any documents under the utility's control that are related to the incident, except for documents subject to attorney-client privilege or attorney work product doctrine, must be provided to Commission staff for review.¹⁴

⁷ Public Utilities Code, Division 1. Regulation of Public Utilities, Chapter 2. The Public Utilities Commission: Organization. Section 315.

⁸ Id.

⁹ Public Utilities Code, Division 1. Regulation of Public Utilities, Chapter 2. The Public Utilities Commission: Organization. Section 316.

¹⁰ Id.

¹¹ Id.

¹² Resolution E-4184. Adoption of Web-based Emergency Reporting System for Utilities and Generation Asset Owners. Appendix B.

¹³ Id.

¹⁴ Id.

PU Code §451,¹⁵ which has been in effect since 1909 when California began regulating utilities, requires every public utility to provide and maintain “adequate, efficient, just, and reasonable”¹⁶ service and facilities as are necessary for the “safety, health, comfort, and convenience”¹⁷ of its customers and the public. A violation of the Public Utilities Code, or a Commission decision or order, is subject to penalties of \$500 to \$100,000 for each violation for each ongoing day pursuant to PU Code §2107¹⁸ and §2108.¹⁹

B. General Order (GO) Requirements for Electric Distribution and Transmission Facilities and PG&E’s Overhead Facilities Inspection Program

GO 95, Rule 31.2 provides general inspection guidelines that all overhead lines, including distribution and transmission lines, are required to “be inspected frequently and thoroughly for the purpose of ensuring that they are in good condition so as to conform”²⁰ with GO 95. In addition, GO 95 references GO 165 regarding inspection requirements of electric supply lines.

GO 165²¹ defines a patrol inspection as a “simple visual inspection” meant to identify “obvious” problems and hazards; patrol inspections may be carried out in the course of other company business. A detailed inspection is a type of inspection where facilities are “carefully examined” to gather and record conditions of overhead facilities. The maximum allowable patrol and detailed inspection intervals for distribution facilities vary depending on the population density of the area inspected.

Regarding distribution facilities, PG&E inspectors must perform annual patrol inspections for urban areas and biennial patrol inspections for rural areas. In both rural and urban areas, PG&E must conduct detailed inspections at no more than five-year intervals as required by the GO. Urban areas are

¹⁵ Public Utilities Code, Division 1. Regulation of Public Utilities, Chapter 3. Rights and Obligations of Public Utilities. Section 451.

¹⁶ Id.

¹⁷ Id.

¹⁸ Public Utilities Code, Division 1. Regulation of Public Utilities, Chapter 11. Violations. Section 2107.

¹⁹ Public Utilities Code, Division 1. Regulation of Public Utilities, Chapter 11. Violations. Section 2108.

²⁰ General Order Number 95. Rules for Overhead Electric Line Construction. Prescribed by the Public Utilities Commission of the State of California.

²¹ General Order Number 165. Prescribed by the Public Utilities Commission of the State of California. Inspection Requirements for Electric Distribution and Transmission Facilities.

defined by GO 165 as “those areas with population of more than 1,000 person per square mile”²² and rural areas are defined as “those areas with a population of less than 1,000 persons per square mile.”²³

For transmission level facilities, GO 165 requires each utility to prepare and follow procedures for conducting inspections and maintenance activities, and does not prescribe transmission inspection intervals. Prior to October 2017, PG&E procedure TD-1001M²⁴ required detailed inspections at 5-year intervals for steel structures carrying 60 to 230 kV circuits. For wood structures carrying the same voltage circuits, the procedure required detailed inspections every 2 years. Detailed inspections for transmission facilities are performed from the ground but may be substituted with aerial inspection, if approved by a PG&E transmission line superintendent.

For completeness, SED reviewed facilities inspections and resulting work orders even if the work was not directly related to the cause of the fire. SED also reviewed the documents to determine whether PG&E performed patrols and detailed inspections at a frequency required by GO 165 and PG&E’s internal procedures.

C. General Order 95 and PG&E’s Vegetation Management (VM) Program

The GO 95 rules applicable to Vegetation Management include:

1. Rule 31.1 – Design, Construction and Maintenance
2. Rule 35 – Vegetation Management
3. Rule 37 – Minimum Clearances of Wires above Railroads, Thoroughfares, Buildings, Etc., Table 1, Cases 13 and 14

In order to comply with the applicable GO 95 rules, PG&E’s Distribution Vegetation Management Standard²⁵ (DVMS) and Transmission Vegetation Management Standard²⁶ (TVMS) outline the general strategy used to identify:

1. Conductor radial clearance issues;
2. Trees that will encroach PG&E’s minimum distance requirements; and
3. Hazard trees that have the potential to contact or strike conductors.

²² Id.

²³ Id.

²⁴ PG&E Electric Transmission Preventive Maintenance Manual. Publication Date: 5/12/16. Rev: 03. Bates PGE-CAMP-CPUC-0000002535. Page 41.

²⁵ Bates PGE-CPUC_00005827_CONFIDENTIAL. Utility Standard TD-7102S. Publication Date: 9/4/15. Rev 1.

²⁶ Bates PGE-CPUC_00006008_CONFIDENTIAL. Utility Standard TD-7103S. Publication Date: 10/1/16. Rev 2.

In order to implement its VM strategy, PG&E's DVMS and TVMS prescribe annual vegetation patrols and completion of identified tree work for all overhead distribution and transmission facilities. The transmission program focuses on non-orchard transmission lines rated at 60kV and above.²⁷

PG&E's VM contractors, specifically Pre-Inspection personnel, work with VM Vegetation Program Managers (VPM) to create an annual plan for routine patrol inspections. These inspections then lead to actual vegetation work. Vegetation work prescribed by the Pre-Inspection personnel is completed by Tree Contractor personnel. PG&E also uses a combination of LIDAR²⁸ and spectral imagery to allow VM personnel to identify hazardous trees in high fire threat areas. Trees identified using these technologies are then inspected from the ground and addressed as necessary. In some cases, a primary contractor elects to subcontract vegetation work to other companies.

Vegetation patrol inspections, also referred to as Pre-Inspection, are performed by a Consulting Utility Forester (CUF), an individual vetted by PG&E, who inspects all vegetation that have the potential to grow into or fall into transmission or distribution primary conductors before the next inspection and identifies vegetation that is currently causing strain/abrasion on secondary voltage conductors.

PG&E's Pre-Inspection contract specification²⁹ requires a CUF to have at least two years' experience in line clearance tree pruning work, or equivalent experience as determined by PG&E. The Pre-Inspection contract specification also notes that PG&E desires that a CUF have an associate's degree in forestry, arboriculture or a related field; however, an associate's degree is not a requirement. The CUF should be "familiar with the Contractor's work practices, proper arboricultural techniques and practices, proper integrated pest management practices, PG&E's Tree Pruning Specification, PG&E's Pre-Inspection Specification and requirements, and all applicable legal and regulatory requirements."³⁰

In addition to routine vegetation management, PG&E's Second Patrol bulletin describes work requirements for contractors to conduct Second Patrols, often identified as Catastrophic Event Memorandum Account (CEMA) related inspections.³¹ The scope of a Second Patrol includes portions of circuits within State Response Areas (SRA), the Wildland Urban Interface (WUI) in Local Response Areas (LRA), and areas identified with "Very High" fire severity zones in the LRAs. Second Patrol is a term

²⁷An Orchard Program aims to remove incompatible trees in production orchards that exist under transmission lines. Id. Page 3.

²⁸LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances).
<https://oceanservice.noaa.gov/facts/lidar.html>.

²⁹ Bates PGE-CPUC_DR-071918_General_Q04. PG&E Pre-Inspection contract specification. Section 3.2.

³⁰ Id.

³¹ CEMA is an account used to recover the costs associated with the restoration of service and facilities affected by catastrophic events that have been declared disasters or states of emergency by federal or state authorities. The reasonable balance in the CEMA will be recovered in rates after the CPUC reviews and audits the recorded CEMA balance. Bates PGE-CPUC_00005452_CONFIDENTIAL.

described by PG&E as a project that addresses “only dead, dying, and declining trees, or dead portions of trees, including dead overhangs, that have the ability to contact PG&E facilities...”³² If a compliance issue is identified during a Second Patrol, the issue is reported to PG&E routine operations.³³

Beginning in May 2015, the Commission along with stakeholders, began developing the CPUC Fire Map as part of the CPUC Fire Safety Rulemaking. In August 2017, PG&E began conducting Tier 3 patrols, based on a draft version of the CPUC Fire Map and as part of CEMA inspections. Tier 3 areas identified on the CPUC Fire Map represent parts of the State with the highest wildfire risk. The Commission adopted the final version of the CPUC Fire Map in January 2018.³⁴

SED requested and reviewed PG&E’s VM documentation for the previous five years leading up to each incident. Documentation included operational procedures, VM inspections and associated vegetation work orders. SED reviewed VM inspection documentation in efforts to determine whether PG&E properly inspected for hazardous tree conditions and abated the issues via proper VM trim or removal. SED reviewed multiple VM work orders to try to identify the subject trees involved in ignition of the wildfires.

D. General Order Requirements and Protection Devices

Rule 31.1 and Rule 31.2 in GO 95 and the referenced inspection requirements in GO 165 are applicable to protection devices.

All utilities have protection devices such as fuses, line reclosers and circuit breakers, which are designed to open, close or switch a section of circuit in order to de-energize a circuit, or a section of a circuit, and to isolate the faulted parts from the rest of the circuit, thus keeping current from traveling on the affected/faulted circuit, or section of the circuit, without interrupting power to those customers that are not served by the section of the faulted circuit. For example, a tree may fall on a wire downstream of a device and cause a ground fault which is then recognized by upstream protection equipment due to the increase in current (fault current). Once the current reaches the limits set for the device, the fault causes the device to open, thus preventing current from traveling on the affected circuit, or section of a circuit (where the fault has occurred).

Line reclosers and circuit breakers have configurable settings that are selected based on numerous factors such as the ratings of the facilities they are designed to protect, local conditions, etc. Utilities have the option to set the devices to automatically reclose multiple times in attempts to clear the fault and improve reliability or to disable the automatic reclosing function to avoid multiple faults

³² Id. Page 1.

³³ Id. Page 1.

³⁴Tier 1 Advice Letter 5211-E / 3172-E. Joint Filing - Adoption of Final California Public Utilities Commission Fire-Threat Map, approved by SED on January 19, 2018.

<https://www.pge.com/tariffs/advice-filing-index.page?xmldoc=sites-data/tariffs/data/advice-letters/2018/electric.xml>

and possible sparks. Other protection equipment, such as fuses, have fixed characteristics and must be replaced after operating or opening once.

SED reviewed maintenance and test records of PG&E's protection devices and PG&E's responses to outage events related to each fire in order to establish whether PG&E acted safely in providing power to its customers as required by GO 95 and GO 165.

III. 2017 Wildfire Incident Summaries

For full details of SED's investigations of the 15 individual 2017 wildfire incidents in northern California covered in this Report, refer to Appendix A.

Adobe Fire

On October 8, 2017, the "Adobe Fire" ignited near Sonoma Highway in the city of Kenwood in Sonoma County. The Adobe Fire subsequently combined with other fires (Nuns, Norrbom, Pressley, Partrick and Oakmont/Pythian). These combined fires were called the "Nuns Fire." The Nuns Fire burned 56,556 acres, destroyed 1355 structures and damaged 172 structures. The Nuns Fire resulted in three fatalities with one occurring within the Adobe Fire perimeter.

SED's investigation found that a Eucalyptus tree failed, fell onto and severed PG&E 12 kV overhead conductors which fell to the ground and ignited the fire.

Atlas Fire

On October 8, 2017, the "Atlas Fire" ignited near 3683 Atlas Peak Road in the city of Napa in Napa County. The fire burned 51,624 acres, damaged 783 structures, and destroyed 120 structures. Six fatalities resulted from the fire.

The Atlas Fire resulted from two ignition points. SED's investigation found that at the first location, "Atlas 1," a Black Oak tree fell onto a PG&E 12 kV overhead conductor which caused the conductor to fall to the ground and ignite a fire. The second location, "Atlas 2," ignited when a branch from a Valley Oak tree failed and contacted a PG&E 12 kV overhead conductor which dropped sparks and molten metal to the ground. The fires eventually combined together.

Cascade Fire

On October 8, 2017, the "Cascade Fire" ignited near 13916 Cascade Way in the city of Browns Valley in Yuba County. The Cascade fire burned to 9,989 acres destroying 264 structures, damaging 10 other structures and resulted in four fatalities. The Cascade fire eventually combined with the La Porte fire to form the "Wind Fire."

SED's investigation found that two overhead conductors of PG&E's 12 kV circuit slapped together and dropped sparks or molten metal on the ground that ignited the fire.

Cherokee Fire

On October 8, 2017, the "Cherokee Fire" ignited near 3401 Cherokee Road in the city of Oroville in Butte County. The fire burned 8,417 acres and destroyed six structures.

SED's investigation found that multiple failed branches from a Valley Oak tree contacted a PG&E 12 kV overhead conductor, causing it to fall to the ground and ignite a fire.

La Porte Fire

On October 8, 2017, the “La Porte Fire” ignited at 167 Darby Road in the city of Bangor in Butte County. The La Porte Fire burned 6,151 acres, destroyed 74 structures, and damaged two structures. The La Porte fire eventually combined with the Cascade Fire and was named the “Wind Fire.”

SED’s investigation determined that a Valley Oak tree branch failed and fell onto PG&E 12kV overhead conductors, which fell to the ground and ignited the fire.

Norrbom Fire

On October 8, 2017, the “Norrbom Fire” ignited at 16200 Norrbom Road in the City of Sonoma, Sonoma County. The Norrbom Fire subsequently combined with other fires (Nuns, Adobe, Pressley, Partrick and Oakmont/Pythian) and was named the “Nuns Fire.” The Nuns Fire burned 56,556 acres, destroyed 1355 structures, damaged 172 structures, and resulted in three fatalities.

SED’s investigation found that a Black Oak failed and fell onto PG&E 12 kV overhead conductors which in turned failed and started the fire.

Nuns Fire

On October 8, 2017, the “Nuns Fire” ignited near 1210 Nuns Canyon Road in the city of Glen Ellen in Napa County. Once the Nuns Fire combined with the Norrbom, Adobe, Partrick, Pressley and Oakmont/Pythian fires, the fire burned 56,556 acres, damaged and/or destroyed 1,527 structures. The combined Nuns Fire resulted in three fatalities.

SED’s investigation found that an Alder tree stem fell on open wire secondary overhead conductors which in turned failed and ignited the fire.

Oakmont/Pythian Fire

On October 13, 2017, the “Oakmont/Pythian Fire” ignited near 8050 Pythian Road in the city of Santa Rosa in Sonoma County. The Oakmont/Pythian fire subsequently combined with other fires (Nuns, Adobe, Norrbom, Pressley, and Partrick fires) and was called the “Nuns Fire.” The Nuns Fire burned 56,556 acres, destroyed 1,355 structures, damaged 172 structures, and resulted in three fatalities.

SED’s investigation found that a Douglas Fir tree uprooted and fell onto PG&E 12 kV overhead conductors, which failed and fell to the ground igniting the fire.

Partrick Fire

On October 8, 2017 the “Partrick Fire” ignited at 1721 Partrick Road in the City of Napa, Napa County. The Partrick Fire subsequently combined with other fires (Nuns, Norrbom, Pressley, Adobe and Oakmont/Pythian) and was named the “Nuns Fire.” The Nuns Fire burned 56,556 acres, destroyed 1,355 structures, damaged 172 structures, and resulted in three fatalities.

SED’s investigation found that a Coast Live Oak tree failed and fell onto PG&E 12 kV overhead conductors, which in turned failed and started the fire.

Pocket Fire

On October 8, 2017 the “Pocket Fire” ignited near the intersection of Ridge Ranch Road and Ridge Oaks Road in the City of Geyserville, Sonoma County. The Pocket Fire burned approximately 17,357 acres and destroyed six structures and damaged two structures.

SED’s investigation found that a portion of a Valley Oak tree failed and fell onto PG&E 12 kV overhead conductors which in turn failed and started the fire.

Point Fire

On October 9, 2017, the “Point Fire” ignited near 22894 State Highway 26 in the city of West Point in Calaveras County. The fire burned 130 acres, destroyed 19 structures and damaged three structures.

SED’s investigation found that a limb from a Valley Oak tree failed onto a PG&E 12 kV overhead conductor resulting in both falling to the ground and igniting the fire.

Potter/Redwood Fire

On October 8, 2017, the “Potter Fire” ignited at 13801 N. Busch Road and 9100 Main St. in the city of Potter Valley in Mendocino County. The “Potter Fire” subsequently combined with a spot fire found in Redwood Valley. The combined fires were called the “Redwood Incident.” The Redwood Incident burned 36,523 acres, destroyed 546 structures, damaged 44 structures and resulted in nine fatalities and 43 injuries.

SED’s investigation found the branch of a Valley Oak tree failed and fell onto a PG&E 60 kV overhead transmission conductor resulting in both falling to the ground and igniting the fire near North Busch Road. The fire near Main Street started when a Valley Oak tree branch fell and contacted a PG&E 12 kV conductor, bringing the conductor down and starting a fire.

Sulphur Fire

On October 8, 2017, the “Sulphur Fire” ignited near Sulphur Bank Drive and Pomo Road in the city of Clearlake Oaks in Lake County. The fire burned 2,207 acres and damaged or destroyed 162 structures.

SED’s investigation found that a PG&E wood pole carrying energized facilities failed and fell to the ground, thus igniting the fire.

Tubbs Fire

On October 8, 2017, the “Tubbs Fire” ignited near 1128 Bennett Lane in the city of Calistoga in Napa County. The Tubbs Fire burned approximately 36,807 acres, destroyed 11,272 structures and damaged 317 structures. The fire resulted in 22 fatalities.

CAL FIRE eliminated all causes for the Tubbs Fire, except for an electrical caused fire originating from an unknown event that affected privately owned facilities.

Youngs Fire

On October 8, 2017, the “Youngs Fire” ignited near 995 Maacama Lane in the city of Healdsburg located in Sonoma County. The Youngs Fire burned 89 acres, and damaged three structures and multiple vehicles.

SED’s investigation determined that a Valley Oak tree failed and fell onto PG&E 12kV overhead conductors, which ignited the fire.

37 Fire

On October 9, 2017, the “37 Fire” ignited in the area of State Highway 37 and Lakeville Highway in the city of Sonoma in Sonoma County. The 37 Fire burned approximately 1,660 acres but did not damage structures or public infrastructure.

SED determined that this incident was not reportable to the CPUC. CAL FIRE investigators eliminated all causes for the fire except for an unknown event that may have occurred with the transmission lines above the burned area. SED did not identify any violations during its field review of the incident area and did not prepare an incident investigation report for the 37 Fire.

A. Summary of Violations

The following table summarizes the violations that SED found for 15 of the 17 the wildfires it investigated.

Table 1. Summary of violations specific to each incident.

No.	Incident	Violations Found
1	Adobe	GO 95, Rule 31.1 – Hazardous tree not identified and abated
		GO 95, Rule 31.1 – Records of 2015 CEMA inspection not retained
		GO 95, Rule 31.1 – Work order completed late
2	Atlas	GO 95, Rule 31.1 – Failure to identify and abate hazardous Black Oak tree at Atlas 1 site
		GO 95, Rule 31.1 – Failure to identify and perform correctional prune of hazardous Valley Oak codominant branch at Atlas 2 site
		GO 95, Rule 35 – Vegetation clearance not maintained at Atlas 1 site
		GO 95, Rule 35 – Vegetation clearance not maintained at Atlas 2 site
		GO 95, Rule 31.1 – Work order completed late
3	Cascade	GO 95, Rule 38 – Conductor clearance not maintained
4	Cherokee	No violations identified
5	La Porte	No violations identified
6	Norbom	GO 95, Rule 31.1 – Hazardous tree not identified and abated
		GO 95, Rule 35 – Vegetation clearance not maintained
7	Nuns	GO 95, Rule 35 - Improper prioritization and delay in abating vegetation strain on secondary conductor
8	Oakmont/Pythian	GO 95, Rule 31.1 – Incomplete patrol prior to re-energizing circuit
		GO 95, Rule 31.1 – Failed to complete work order and reinforce a pole
		GO 95, Rule 31.1 – Completed a work order late
9	Partrick	GO 95, Rule 31.1 – Hazardous tree not identified and abated

No.	Incident	Violations Found
		GO 95, Rule 35 – Vegetation clearance not maintained
10	Pocket	GO 95, Rule 31.1 – Hazardous tree not identified and abated
		GO 95, Rule 35 – Vegetation clearance not maintained
11	Point	GO 95, Rule 19 – Evidence disposal
12	Potter/Redwood	Resolution E-4184 – Second fire located at 9100 Main St., Potter Valley not reported
		GO 95, Rule 31.1 – Repair records not maintained
		GO 95, Rule 31.1 – Records of 2016 CEMA inspection not maintained
13	Sulphur	GO 95, Rule 19 – Evidence disposal
		GO 95, Rule 31.1 – Records of 2016 CEMA inspection not maintained
14	Tubbs	No violations identified
15	Youngs	GO 95, Rule 31.1 – Hazardous tree not identified and abated
		GO 95, Rule 35 – Vegetation clearance not maintained
16	37	N/A, not a reportable incident

IV. Systemic Concerns Identified During Incident Investigations

A. Vegetation Management

On January 17, 2014, Governor Edmund G. Brown Jr., proclaimed a State of Emergency and directed state officials to take actions to mitigate conditions that could result from the drought and cause a fire. On February 18, 2014, in response to the proclamation, SED issued a letter to PG&E directing PG&E to take all practicable measures to reduce the likelihood of fires caused by utility facilities, including, increasing inspections, taking corrective actions and modifying protective schemes. On June 12, 2014, the Commission issued Resolution ESRB-4 directing all Investor Owned Electric Utilities (IOU) to take remedial measures to reduce the likelihood of fires started by or threatening utility facilities. On October 30, 2015, Governor Edmund G. Brown Jr. declared a Tree Mortality State of Emergency due to tree mortality caused by the state’s prolonged drought and bark beetle infestations.

Due to California’s extended drought, there is a significant quantity of dead and dying trees and dry brush. Therefore, it is imperative that utilities use proper vegetation management practices to identify and abate hazardous trees that have the potential to contact and damage power lines. Based on SED’s investigations into the 2017 northern California fires caused by utility facilities, SED has

determined that PG&E has systemic issues with regards to its VM practices. As described below, SED concluded that:

1. PG&E VM inspectors failed to identify instances of internal decay and/or cavities in trees with the potential to impact electrical conductors.
2. Many of PG&E's VM inspectors did not possess the necessary training and certification to properly identify decay through visual inspection.
3. PG&E VM contractors may not have the proper training to properly remove or trim trees.

1. Identification of Internal Decay and Other Defects

SED investigated 17 incidents due to wildfires involving PG&E facilities. Of the 15 incidents covered in this Report, all but one were related to vegetation, in particular, a variety of trees including species of Oak (Coast Live Oak, Valley Oak and Black Oak), Douglas Fir, Eucalyptus and Alder trees. In six of the tree-related incidents covered in this Report, PG&E employees or contractors did not properly identify hazardous tree conditions that could have been reasonably identified by an arborist or forester.³⁵

SED found that failure to properly identify internal decay and/or cavities in trees near electrical conductors was a major contributing factor to several of the fire ignitions. While PG&E has claimed in the past that it could not have identified internal decay and/or cavities with a routine visual inspection, a study³⁶ published in the Journal of Arboriculture found that visual inspections could accurately determine the actual amount of decay and/or area of cavities and the remaining tree strength. The study used predictions from arborists, tree surgeons, and foresters to determine if visual inspection of ten hazardous Laurel Oak trees could provide accurate results. Values that resulted from the study were as follows:

- "The mean deviations of predicted area of decay and predicted loss in strength from actual values were 0.4% and 2%, respectively."³⁷
- "The interquartile range for predicted decay area was +12 to -15%; for strength loss it was +8 to -8%."³⁸

The ranges above represent a relatively low margin of error for predicting strength loss in the Laurel Oak trees studied.

³⁵ There are certain instances where internal decay and/or cavities show no obvious external indicators and cannot be identified with a routine visual inspection (e.g., the La Porte Fire).

³⁶ Kennard, Deborah K., et al. "THE PREDICTABILITY OF TREE DECAY BASED ON VISUAL ASSESSMENTS." Journal of Arboriculture, vol. 22, no. 6, Nov. 1996, pp. 249.

³⁷ Id.

³⁸ Id.

In addition to decay identification, defects such as codominant stems with weak connection points should have been identified for proper treatment. A codominant stem is “a forked branch nearly the same size and diameter, arising from the common junction and lacking a normal branch union.”³⁹ Codominant stems can be treated by bracing or by structural pruning to limit the wildfire risk of this type of defect.

2. Improper Removal/Trimming Practices

A related issue is the improper removal or trim of vegetation. For example, codominant stems are a tree defect that requires specific prescription when deciding which stem to remove or other steps to take such as bracing, in order to offer better structural integrity and lessen the risk of tree failure. SED found that PG&E failed to identify and perform a correctional prune for a hazardous Valley Oak codominant branch that contributed to one of the two ignition points of the Atlas Fire.

Another issue that SED found related to improper prioritization and delay in abating vegetation contact with a secondary service conductor (found while investigating the Nuns fire). Although this violation did not directly contribute to ignition of the Nuns fire, the violation identifies an unsafe practice by PG&E.

3. Vegetation Management Pre-Inspection Personnel (Inspector) Qualifications

A third issue pertains to the use of underqualified VM Pre-Inspection personnel, also simply known as VM inspectors, to identify potential risks for vegetation in proximity to electric overhead lines. The ability to identify internal decay and defects via visual inspection becomes a compounded issue when VM inspectors do not have formal training or certifications of a third-party agency. SED reviewed the qualifications⁴⁰ of PG&E pre-inspectors who inspected the incident areas prior to the fires and found some individuals without a degree in arboriculture or forestry or without certification from the International Society of Arboriculture (ISA); in some cases, inspectors did not have either a relevant degree or ISA certification. In addition, PG&E could not provide qualifications for some of its contracted inspectors who performed VM inspections of incident areas. On December 21, 2018, SED found that PG&E was still in the process of obtaining the qualifications for 43 of 104 inspectors listed.⁴¹

According to PG&E contract specification for VM Pre-Inspection personnel, PG&E does not require its VM inspectors⁴² to have a degree related to VM nor does it require VM inspectors to be ISA Certified Arborists. If an individual is hired as a VM inspector without either qualification, PG&E requires

³⁹ Evaluation of Oak Failure, Atlas Peak Rd. South of Lake Berryessa. Author: Mark Porter. Date: October 17, 2017.

⁴⁰ Bates PGE-CPUC_DR-10192018_Common_Q02.

⁴¹ Id.

⁴² Bates PGE-CPUC_DR-071918_General_Q04. PG&E Pre-Inspection contract specification. Section 3.2.

that the individual obtain an ISA certification but does not place a required timeframe to obtain the certification.⁴³ SED found that a lapse in formal training to competently inspect vegetation near electric conductors is a major contributing factor to fire ignitions especially in a time of severe drought.

B. Protection Devices in Severe Fire Risk Conditions

California's prolonged period of drought and decades of fire suppression, among other factors, have increased risk conditions that have led to a sharp increase in bark beetle infestations and weakened, dry vegetation. Drought conditions paired with severe weather events and possible sparks from electric infrastructure now create an expanded fire season beyond the traditional fire season that normally runs from June to October.

As described in Section II.D. above, utilities have protection devices such as line reclosers and circuit breakers that have reclosing capability to improve reliability of power service. Utility engineers must now consider the operations and settings of protection devices in proximity to dry vegetation during high fire risk conditions. When a line recloser opens due to a circuit fault caused by a tree, utilities have the option to set the line recloser to automatically reclose multiple times in attempts to clear the fault and improve reliability or, alternatively, to disable the automatic reclosing function to avoid multiple faults, each of which could cause sparks. Other common protection devices such as fuses may be additional risks to consider during severe fire conditions.

An example of the consequences of severe fire conditions are the wildfires that burned in October 2007 in Southern California. Prior to the 2007 fires, Southern California had experienced a record low rain season. In October 2007, strong Santa Ana winds caused dozens of wildfires, with several reportedly ignited by power lines, including the Rice, Witch, Guejito, Malibu Canyon, Sedgewick, and Grass Valley fires.⁴⁴ Since 2007, utilities have had an opportunity to use improved electric infrastructure technology, expanded fire maps and enhanced weather information to make better informed decisions when managing protection devices to reduce the risk of devastating wildfires.

At the time of the 2017 Fire Siege, PG&E had three reclosing (automatic and manual) policies in place that covered both operations and settings of automatic reclosing devices:

1. PG&E's TD-1464S⁴⁵ - Fire Danger Precautions in Hazardous Fire Areas. This standard established precautions for PG&E personnel working, traveling or operating in hazardous fire areas and State Responsibility Areas (SRA) during the Fire Season;
2. PG&E's TD-1464B-001⁴⁶ - Fire Index SCADA Scheme. This bulletin described changes to PG&E's Supervisory Control and Data Acquisition (SCADA) capabilities in an effort to efficiently enable or

⁴³ Bates PGE-CPUC_DR-10192018_Common_Q02.

⁴⁴ Decision 12-04-024, pp. 2-3.

⁴⁵ Bates PGE-CPUC_00022752. PG&E Utility Standard: TD-1464S. Published 5/15/17, Rev 2.

⁴⁶ Bates PGE-CPUC_00022773. PG&E Utility Bulletin: TD-1464B-001. Published 2/15/17, Rev 0.

disable automatic reclosing for groups of devices under certain circumstances. The purpose is to prevent automatic reclosing/testing during high fire risk conditions;

3. PG&E's reclosing settings policy (Electric Planning Manual, Chapter 8 – Protection Handbook⁴⁷) guides local area engineers to make individualized determinations as to the appropriate settings for each device.

During the 2017 Fire Siege, PG&E's Adjective Fire Index rating⁴⁸ indicated "Extreme" for October 8 and October 9.⁴⁹ In addition, the National Weather Service issued Red Flag Warnings across the affected counties.⁵⁰

1. PG&E's Reclosing Operations Policies

PG&E's Utility Bulletin, TD-1464B-001,⁵¹ Fire Index SCADA Scheme, describes opening and closing policies for reclosing relays for Electric Distribution System Operations and Control Personnel. The purpose of this bulletin "is to prevent automatic testing into the involved protected zone with a Very High or Extreme Fire Adjective Index rating." The bulletin further states that, "when a fault occurs beyond an LR [Line Recloser] or CB [Circuit Breaker] in the scheme, that device will open on one shot and be considered 'locked out'. DO NOT CLOSE the device until the line has been patrolled and all found trouble cleared."⁵²

PG&E's Utility Standard TD-1464S,⁵³ Fire Danger Precautions in Hazardous Fire Areas standard, describes procedures for operating in hazardous fire areas during the designated Fire Season in California. When the Fire Adjective rating is "Very High" or "Extreme," PG&E requires employees to follow the directives below, among others:

1. Fuses are not replaced until the line has been patrolled and all trouble cleared.
2. Do not reclose line reclosers, sectionalizers, or circuit breakers that have tested automatically to lockout or open position until the overhead line in the involved protected zone has been patrolled and all found trouble cleared.

⁴⁷ Bates PGE-CPUC_00022397. PG&E Distribution Protection Handbook.

⁴⁸ In the National Fire Danger Rating System, fire danger is expressed using these Adjective Class Levels: Low, Moderate, High, Very High, and Extreme. Source: https://en.wikipedia.org/wiki/National_Fire_Danger_Rating_System.

⁴⁹ PG&E's Response to Safety and Enforcement Division's 10/14/17 Questions. Date: 10/17/17. Page 3.

⁵⁰ PG&E's Response to Safety and Enforcement Division's 10/14/17 Questions. Date: 10/17/17. Page 3.

⁵¹ Bates PGE-CPUC_00022773.

⁵² Id. Page 3.

⁵³ Bates PGE-CPUC_00022752.

3. For lines with no automatic reclosing, (a) the line may be tested manually once if that test can be made within 5 minutes of initial relay or (b) the involved overhead line must be patrolled and all found trouble cleared before making a manual test.

In all cases where remote SCADA communication capabilities are available, a device can be operated remotely by the Distribution Operator at the Control Center. Based on the policies described above, PG&E Distribution Operators should not reclose certain devices until all affected lines have been inspected and any found trouble has been cleared by PG&E personnel.

2. PG&E's Reclosing Settings Manual

PG&E maintains an Electric Planning Manual⁵⁴ that includes Chapter 8 which is the Protection Handbook. "The current version of Chapter 8 has been in place since October 2002."⁵⁵ The purpose of Chapter 8 is to guide PG&E's local area engineers in selecting the device settings below:

1. Number of times the device should automatically reclose before locking open.
2. Amperage limits at which the device should open.
3. Length of time the device waits upon detection of a fault before opening.

According to Chapter 8, the general protection philosophy of distribution systems may be prioritized as follows:⁵⁶

1. Safety to personnel and the public
2. Equipment protection
3. Service reliability

SED found that PG&E performed an incomplete patrol of a downstream span prior to re-energizing a protection device, and that this violation may have contributed to ignition of the Oakmont/Pythian fire.

SED also found that the Protection Handbook recognizes public and personnel safety as a priority but does not specifically factor in fire risk mitigation. SED recommends that PG&E reconsider current circuit and equipment philosophies to design protection schemes specifically for fire risk mitigation in high fire risk situations and areas.

SED findings and recommendations also include:

1. PG&E did not require its engineers to account for wildfire mitigation during the design stage of circuit protection schemes.
2. PG&E did not consider very high to extreme wildfire risk areas when reviewing and revising procedures for outage investigation and response.

⁵⁴ Bates PGE-CPUC_00022397.

⁵⁵ Bates PGE-CPUC_DR-10192018_General_Q05. Page 2.

⁵⁶ Bates PGE-CPUC_00022397. Page 27.

3. PG&E should review the current protection devices in operation to verify appropriate devices and settings are used for the very high to extreme wildfire risk areas.
4. PG&E should require all protection devices in very high to extreme wildfire risk areas to be annually tested regardless of whether the device operated during the calendar year.

C. Other Violations

As detailed in individual incident investigation reports in Appendix A, SED found violations regarding work orders completed late (Adobe, Atlas, Oakmont/Pythian), a work order not completed although the record indicated completion (Oakmont/Pythian), missing inspection records (Adobe, Potter/Redwood, Sulphur), missing work order (Potter/Redwood), conductor-to-conductor contact (Cascade), and disposal of evidence (Point, Sulphur). While some of these violations are directly associated with ignition of a fire, other violations (such as missing inspection records) were not direct causes of fire ignition. Regardless, all of the violations may suggest broader systemic issues concerning whether PG&E is operating its electric facilities safely.

D. Proactive De-energization of Power Lines

The option to shut off power is an important tool to help mitigate the risk of wildfires caused by electric facilities. Such de-energizations can prevent wildfires, save lives, and protect property.

In response to a request by San Diego Gas & Electric Company (SDG&E), the Commission determined in 2012 in Decision (D.) 12-04-024 that SDG&E already had authority under PU Code §399.2(a) and §451 to shut off power in emergency situations, along with its obligation to provide safe and reliable power to customers.⁵⁷ D.12-04-024 required SDG&E to provide notice and mitigation to its customers whenever SDG&E shuts off power pursuant to its statutory authority and also described factors that the Commission may consider in determining whether a decision by SDG&E to shut off power was reasonable.

At the time of the 2017 Fire Siege, PG&E did not have procedures or policies to proactively de-energize power lines when weather conditions indicate a high fire risk. While de-energizing is only one option to pursue in an effort to circumvent catastrophic wildfires, it might have been effective if policies and procedures had been in place at PG&E so that it could make a reasonable determination to safely shut off power.

In July 2018, after the 2017 wildfires, the Commission issued Resolution ESRB-8⁵⁸ extending the requirements established in D.12-04-024 to all electric Investor Owned Utilities (IOU). The resolution also strengthened customer notification requirements before de-energization events and ordered

⁵⁷ Decision 12-04-024, Decision Granting Petition to Modify Decision 09-09-030 and Adopting Fire Safety Requirements for San Diego Gas & Electric Company, issued April 26, 2012.

⁵⁸ Resolution Extending De-energization Reasonableness, Notification, Mitigation and Reporting Requirements in Decision 12-04-024 to All Electric Investor Owned Utilities. Issued July 16, 2018.

utilities to engage local communities in developing de-energization programs to aid wildfire prevention efforts.

In October 2018, the Commission, CAL FIRE, and the California Governor's Office of Emergency Services (Cal OES) provided further clarification by sending a joint letter⁵⁹ regarding "Public Safety Power Shut-Offs" (PSPS) to executives at PG&E, SDG&E, and Southern California Edison Company. The letter details expectations that each utility will notify the California State Warning Center during different stages of its PSPS program from the initial decision to de-energize until the restoration of power. In addition to notifications, utilities must provide information, briefings and outage data to the state agencies.

The Commission is continuing to examine utilities' de-energization processes and practices, customer impacts, efforts to reduce the need for de-energization and to mitigate its impacts, and reporting requirements in Rulemaking 18-12-005.

Additionally, the Commission is reviewing electric utilities' Wildfire Mitigation Plans (WMP) in accordance with new provisions of PU Code §8386, enacted as part of Senate Bill 901.⁶⁰ WMPs include plans for PSPS, infrastructure hardening, and leading-edge fire prevention technology that help minimize the risk of deadly wildfires.

V. Conclusion

SED's investigations have identified numerous violations of Commission General Orders and regulations, as identified in Table 1. SED recommends that the Commission consider imposing fines for these violations. In addition, SED has found areas that raise issues regarding whether PG&E is operating its electric facilities in a safe manner. The Commission should therefore consider further investigating these issues to determine whether PG&E's operations and maintenance of its electric facilities violate any provisions of the Public Utilities Code, other state or federal statutes or state regulations.

⁵⁹ Joint Letter to Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company. Subject: Public Safety Power Shut-offs. Dated October 26, 2018.

⁶⁰ Senate Bill 901. An act to add Section 815.11 to the Civil Code, to add Section 65040.21 to the Government Code, to add Section 38535 to the Health and Safety Code, to amend Sections 4213.05, 4290, 4527, 4584, 4589, 4593.2, 4597, 4597.1, 4597.2, 4597.6, and 4799.05 of, to add Sections 4123.5, 4124.7, 4290.1, 4584.1, and 4584.2 to, to add Article 10 (commencing with Section 4205) to Chapter 1 of Part 2 of Division 4 of, to add and repeal Section 4556 of, and to repeal Section 4597.20 of, the Public Resources Code, and to amend Sections 399.20.3, 854, 959, 1731, 2107, 8386, and 8387 of, to add Sections 451.1, 451.2, 748.1, 764, 854.2, 8386.1, 8386.2, 8386.5, and 8388 to, to add Article 5.8 (commencing with Section 850) to Chapter 4 of Part 1 of Division 1 of, and to repeal and add Section 706 of, the Public Utilities Code, relating to wildfires. Published September 21, 2018.