Appendix D. Fire Prevention Plan

Fire Prevention Plan

September 30, 2017

D.1 Summary

Pacific Gas and Electric Company (PG&E) has had in place a number of separate operational plans and programs to prevent and mitigate the risk of fire ignitions associated with the operation of PG&E's electric facilities in areas having a "Extreme" and "Very High" fire rating, according to the USFS Wildland Fire Assessment System (WFAS). To complement and support the various operational measures PG&E has in place, PG&E monitors information made available from numerous entities and disseminates predicted weather and fire threat information to employees and contractors within its service territory to keep them informed of critical meteorological conditions. PG&E also has programs to reach out to its customers and first responders throughout its service territory to educate them on electric safety.

This plan collects in a single document the multiple fire prevention and mitigation plans and programs utilized in PG&E's entire service territory. It also includes in Attachment 1 the additional California Public Utilities Commission (CPUC) requirements for "Extreme" and "Very High" Fire Threat Zones in Southern California, which includes Santa Barbara County, and in Attachment 2, the identification of the CIP Tier 3 and Tier 4 fire threat areas to be used as the interim fire threat map, as ordered in Phase 2, D 12-01-032.

D.2 Policy Statement

It is the Pacific Gas and Electric Company's policy to:

- Plan for natural and man-made emergencies such as fires, floods, storms, earthquakes, cyber disruptions, and terrorist incidents;
- Respond rapidly and effectively, consistent with the National Incident Management System principles, including the use of the Incident Command System (ICS), to protect the public and to restore essential utility service following such emergencies;
- Help to alleviate emergency-related hardships;
- Assist communities to return to normal activity.

D.3 Plan Components

D.3.1 Fire Prevention Pre-Planning

Education

- Each year prior to May 1st, field personnel and their supervisors receive training on Utility Standard S1464 "Fire Danger Precautions in Hazardous Fire Areas." (This standard outlines operational requirements for working and operating in areas that are considered high fire risk during fire season.)
- PG&E conducts annual electric safety training for first responders; including law enforcement agencies, fire departments, public works and transportation agencies.

- PG&E participates in annual joint exercises that include external partners from the first responder community and emergency management community to enhance preparedness and prevention efforts.

Training First Responders

- PG&E meets annually with local, state and federal agencies and jurisdictions to share fire prevention plans, and strategize for the coming year.

Intelligence Gathering – Weather and Fire

- PG&E's meteorology department utilizes state-of-the-art weather forecast model data and information from the National Weather Service (NWS), The United States Forest Service (USFS) Wildland Fire Assessment System (WFAS), and other agencies to evaluate the short to medium term fire weather risks across its service territory.
- The PG&E meteorology department operates PG&E's Operational Mesoscale Modeling System (POMMS), a high-resolution weather forecasting model that forecasts important fire weather parameters including wind speed, temperature, relative humidity, and precipitation down to 3-km resolution. Outputs from the POMMS model then are used in the National Fire Danger Rating System (NFDRS) to derive key fire danger indicators such as the Energy Release Component, Ignition Component, Spread Component, Burning Index, and fuel moistures.
- Each day, fire danger output from the POMMS-NFDRS model as well as Red Flag Warnings or Fire Weather Watches from the NWS determine the "very high" and "extreme" fire danger ratings across the PG&E Service Territory. Operational decisions to reduce the fire ignition risk (see Section 2 – Operational Readiness during High Risk Conditions) go into effect each day "very high" or "extreme" fire danger ratings occur. Daily e-mails to electric operations with fire conditions are sent; fire conditions are also discussed is daily calls.
- Two to seven day forecasts are also provided each day that identifies upcoming periods of heightened fire weather risk. The updates provide information about offshore wind events, extreme hot and dry conditions, and dry lightning potential. This information, combined with weekly forecasts from National Interagency Fire Center (NIFC) - Predictive Services for Northern (ONCC) and Southern California (OSCC), give advanced warning about significant fire danger.

D.3.2 Established Fire Prevention Program

PG&E has in place programs that serve to mitigate the risk of an ignition associated with its electrical operations through its service territory. The various programs are:

Electric Operations – Asset Management

Non-Exempt Equipment Replacement

This program focuses on replacement of non-exempt equipment subject to firebreak maintenance under California Public Resource Code 4292. This work is identified and prioritized by a standardized risk assessment at each site. Prioritization starts with identification of equipment type and site specific fire risk assessment. If equipment is not eligible for replacement, fire risk continues to be mitigated by annual maintenance of firebreaks at the facility base.

CalFire has also granted an exemption for two lightning arresters since 2015. PG&E has developed a surge protection replacement initiative that will target replacement of non-exempt lightning arrestors with these new alternatives.

Infrared (IR) Program and Automatic Splice Inventory

This program is currently prioritized in PG&E designated wildland fire prevention areas with a multi-year strategy to IR and splice inventory the entire electric distribution system. This program utilizes forward looking infrared (FLIR) technology to identify thermal exceptions on all phases of line. Thermal exceptions are evaluated and repair/replacement are prioritized and completed.

Wires-Down Program

Our Distribution Planning department performs a site visit to most wire-down locations caused by either equipment failure or animal contact. The data obtained from these visits aids in our efforts to reduce future wires-down events. Some of the benefits include:

- Establishing failure rates for conductor types and size
- Obtaining splice data which is added to the MapGuide (GIS) system.
- Obtaining details on wire-down events where the conductor remained energized.
- Generating projects to replace deteriorated conductor

Wood Pole - Test and Treat Program

The Pole Test and Treat (PT&T) program performs intrusive testing on all wood distribution and transmission poles. While General Order (GO) 165 mandates this testing on 20-25 year increments depending on the time of installation, PG&E's program is based on a 10 year cycle. This PG&E program exceeds the inspection cycle requirements outlined in the GO and incorporates wood preservation practices beyond the regulatory requirement. These factors allow PG&E to identify and mitigate the decay of wood which reduces failures. The program also allows for proactive reinforcement or replacement of poles that do not meet strength requirements.

Wood Pole Bridging Program

Bridging crossarms prevents pole fires which can occur at the through-bolt location during light rain or mist. Because this area is dry and has a high resistance to insulator leakage currents flowing to ground, a hot spot exists on the pole. Shunting this high resistance area with a short length of bare wire usually abates the risk.

Electric Operations – Maintenance and Construction

Overhead Patrols and Inspections

PG&E inspects its electric facilities to identify conditions that may pose the risk of an ignition. The program is designed to:

- Perform annual patrols of distribution lines in urban areas, designated high fire threat zones, with biannual patrols of overhead distribution facilities in rural areas.
- Perform targeted patrols on transmission lines located within Tier 3 and Tier 4 designated high fire threat areas.
- Perform detailed inspections of overhead distribution facilities on a 5-year cycle.
- Perform detailed inspections of overhead transmission lines on a 3-year cycle for 500 kV, a 5-year cycle for 230 kV and lower having steel structures, and a 2-year cycle for wood pole structures.
- Document patrol and inspection activity and findings.

Operational Readiness During High Risk Conditions

PG&E Utility Standard S1464 “Fire Danger Precautions in Hazardous Fire Areas,” outlines operational requirements for working and operating in areas that are considered high fire risk during the designated fire season. When an area is rated “Extreme” or “Very High,” it is identified and colored coded on the map. (Refer to Attachment 3.) The following summarizes the plan:

- General readiness requirements for all employees are covered, including awareness of all laws, rules, and regulations of fire agencies having jurisdiction over areas in which they work or travel. Each crew must be equipped with well-maintained firefighting equipment.
- Fire Index ratings, as determined by the POMMS-driven National Fire Danger Rating System (NFDRS) and/or Red Flag Warnings and Fire Weather Watches issued by the National Weather Service, are in effect from 0800 hours to 2 hours after sunset.
- Field personnel traveling or working in an “Extreme” or “Very High” Fire Index area, are prohibited from any burning, welding, blasting, smoking, and driving off cleared roads.
- Electric Operations is restricted from testing any section of line that relays in a Fire Index area rated “Extreme” or “Very High”, until the line has been patrolled and all trouble cleared.

- Notification Process to Personnel of Daily Fire Threat Conditions
- Daily updates of a fire index website that contains an image showing active “Extreme” and “Very High” areas.
- Daily 6 a.m. fire index e-mail.
- Daily review of the fire index by Crew Supervisors and briefing of crews if they are heading into an area having fire indexes of “Extreme” and “Very High” zones.
- Daily dissemination of all Red Flag Warnings on Distribution System Operations (DSO) Storm Outage Prediction Project forecast for Extreme” and “Very High” areas and daily DSO status calls Mondays through Fridays, excluding holidays.
- Weekly fire danger forecast from meteorology team.
- Production of a daily image of the “Extreme” and “Very High” fire index areas, using internal Geographic Information Systems (GIS). This image is available on the PG&E intranet and can be viewed with intranet access.

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Vegetation Management

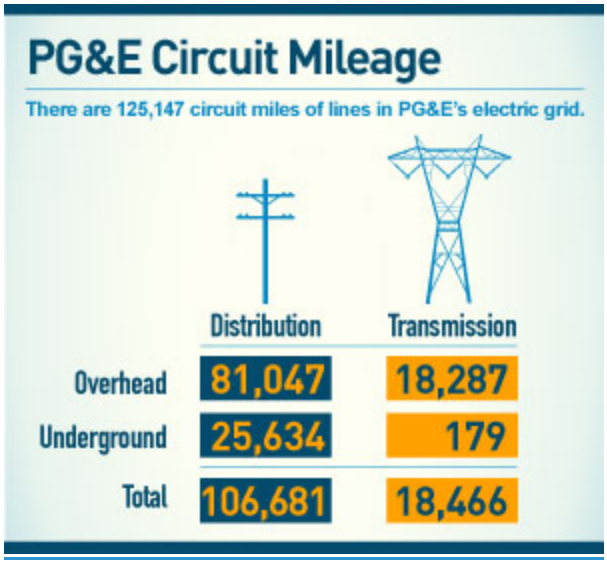
Regulatory

- PG&E manages the vegetation close to its overhead electric facilities, which reduces the risk of possible ignitions associated with vegetation contact. PG&E’s program is designed to:
- Comply with all existing State and Federal regulatory vegetation clearance requirements.

- Perform annual patrols to ensure required vegetation clearances are maintained and hazardous trees abated.
- Maintain tree-to-line clearances as well as radial clearances around its poles pursuant to Public Resources Code Section 4292 and 4293.
- Maintain auditable records of all work done in high fire risk areas.

PG&E's Routine Vegetation Management Inspections

In order to reduce the incidences of vegetation contacting energized conductors, PG&E employs over 400 utility arborists and contractors to conduct annual ground inspections of 100 percent of PG&E's 99,700 miles of overhead distribution and transmission power lines. Through the annual inspections, inspectors look for vegetation growing in the area around the power lines.



PG&E's line clearance qualified professional tree care workers then reduce the risks through pruning or removal of the trees, called "abatement" of the vegetation.

More than 400 utility arborists/foresters and 1,600 line clearance qualified tree care professionals perform routine annual activities on behalf of PG&E's Vegetation Management Department involving:

- 70,000 square mile service territory
- 81,000 miles of overhead distribution
- 18,300 miles of overhead transmission
- 5,000,000 trees with the potential to "grow into" power lines
- 147 million trees within tree-height of the facilities

Contract inspectors and tree workers annually:

- Prune or remove about 1,200,000 trees per year
- Prune or remove about 6,000 trees per day
- Interact with about 10,000 customers per day
- Inspect about 2,000,000 properties per year
- Maintain fire breaks on 120,000 power poles and towers

As a part of these activities, PG&E VM employees and contract work force is trained in fire prevention. Each year, arborists and tree workers learn about sources of ignition, ignition prevention, and fire suppression equipment and its use. Each worker is supplied with fire prevention and suppression tools to use in the field should a fire occur, including extinguishers, Mc Clouds (hoe-like firefighting tools), shovels, and back-pack sprayers.

PG&E's Public Safety and Reliability and Wildfire Risk Reduction Program

In addition to the routine inspection and abatement process, PG&E has also implemented a Public Safety and Reliability (PS&R) Program to further reduce vegetation related outages and ignitions. This program complements the routine inspection activities by providing additional data-driven vegetation management at high risk locations.

From years of performing targeted tree work, PG&E has collected an extensive database of information about tree failures causing outages and ignitions.

Analyzing that data, PG&E VM may predict how, generally when and where each species of tree is more likely to fail and cause an outage. The analyses indicate whether each type of tree species is more likely to shed limbs, break in the stem, or uproot and fall over, and the time of year and soil/climate conditions where each species is more susceptible to failure. PG&E's VM utilizes this experience and knowledge to prescribe tree abatement work along length of wire with a history of tree-caused outages. About 25,000 trees are abated each year with this program.

Utilization of Fire Modeling and Fire OIR Map 2 Products

In addition to PG&E's routine inspections and PS&R, PG&E determined that there was a need for more intensive tree inspections in the highest fire risk areas as determined by wildfire modeling and proposed CPUC Fire Map Tier 3. PG&E VM inspectors will conduct more intensive targeted tree inspections, and tree crews abate trees that meet certain thresholds.

Drought-Affected Vegetation Impacts – Special Redundant Abatement

The cumulative effect of the continued drought is beginning to manifest itself in widespread vegetation mortality—particularly in the low elevation conifer stands of the south and central Sierra.

The unprecedented level of mortality has left whole forested regions dead and has greatly increased the level of work necessary to abate risks associated with dead/dying trees and tree limbs failing.

PG&E's Vegetation Management Drought-Mitigation Initiatives In Addition to Its Annual Routine Work

Focusing on distribution assets, the initiatives to respond to the drought include:

- Redundant tree inspections abatement work where about 73,000 miles of power line are inspected and trees abated. About 155,000 trees will be abated in 2017 using 200 specialized tree inspectors and about 350 specialized tree crews. PG&E is also cleaning up tree debris (fuel) in drought affected counties; especially in High Hazard Zones (HHZ).

- Funding local community groups to conduct fuel reduction and safe ingress/egress work. About $11.6 million has been allocated to local groups since 2014.

D.3.3 In–Development, Pilot and Ad-Hoc Fire Prevention Activities

PG&E is dedicated to exploring the value of additional fire prevention programs associated with its varied operations. The following list of activities and mitigation have varied application within PG&E's service territory. All are being evaluated and incorporated into metrics as part of the company's strategy. These efforts are being evaluated for cost-benefit and fire prevention effectiveness on an on-going basis.

- Ignition reporting metrics and driver evaluations
- Voluntary firebreak maintenance for non-exempt equipment in PG&E designated areas
- PT&T prioritization of pole reinforcement and replacement in high fire threat areas
- Annealed copper replacement
- Targeted conductor replacement
- Annual detailed wildfire inspections in PG&E designated areas
- Increased SCADA and Fault Detection
- SCADA enabled Line Recloser auto-blocking in select high fire threat areas
- Equipment Testing and overhaul in high fire threat areas
- Sensitive ground fault tripping
- Increased Squirrel/Raptor Protection
- Protection-line down guy / insulator retrofits
- Targeted Pole Loading evaluations
- Insulator Washing
- Small Fire Suppression Training - Indian Backpacks/McCleod

- Exploration of emerging fire detection technologies and services

Detection Activities

PG&E's has implemented several fire detection efforts to aid early detection and facilitate rapid response to all fires.

- Contracted daily contacted, fixed wing aerial "smoke," patrols during fire season
- Daily "Service Line Agreement" for fire detection during daily Gas Operations flights
- Sponsoring remotely operated cameras to identify and call-in fires.
- Satellite fire detections

Fire detection from space has rapidly improved over the last decade. PG&E Meteorology is leveraging fire detection data from polar (MODIS) and geosynchronous satellites (GOES) at present. The next generation weather satellite (GOES R/16), once operational (~ November 2017), will scan the entire continental US every 5 minutes and will be able to detect fires as small as roughly 2/3s the size of a football field.

D.3.4 Pro-Active Responses to Fire Incidents

PG&E's fire prevention activities include firefighting and fire-recovery response. In the event a fire threatens public safety or PG&E facilities, PG&E will support firefighting efforts as appropriate, through the procurement and allocation of man power, particularly those from unaffected areas and outside sources and activation of PG&Es Incident Command System. PG&E has developed and has ready two 39', one 30' and four 24' Incident Command Centers that are self-contained, operationally ready, mobile coordination and communications centers, which can be deployed within hours.

With approval of the fire Incident Commander at the Incident Command Post, there are many cases where PG&E crews respond to the fire area and perform pole pre-treatment and fuel reduction activities ***ahead of the fire*** on and near the power line right-of–way.

- Pole pre-treatment is conducted with an approved wildland fire chemical applied to wooden power poles, thus helping to prevent ignition of the power pole from direct flame impingement or radiant heat.
- Vegetation clearing/fuel reduction – Vegetation Management crews may work ahead of the fire to reduce the fuel in and around the power poles and utility right-of-way using a variety of vegetation clearing/fuel reduction methods.
  - Limbs are removed to reduce ladder fuels, thus preventing a fire from getting into the tree crowns and reducing the volume of fuel/vegetation in the right-of-way.
  - Vegetation is treated with masticators to create defensible space around the power poles if the fire were to burn in the proximity, the right-of-way would act as a fuel break and bring the fire out of the crown and down to the ground , so that the fire suppression crews will have a better chance to control the spread of the fire.

- Field readiness – Field personnel may work directly with the fire suppression Incident Command to coordinate efforts to identify potential hazards and mitigations to provide a safe area for the public and the personnel working onsite. If the power lines need to be de-energized, the crews are onsite to perform the task for the fire control personnel. This will alleviate a hazard and the possibility of contact with a live/hot conductor should it come down from a burned power pole or be brought down by a hazardous tree or other conditions.
- Operational controls – Onsite personnel may coordinate with fire suppression Incident Command personnel should a change in tactics be necessary to protect critical generation, transmission and distribution system assets.

D.3.5 Post Incident Recovery

Critique Process

- PG&E normally conducts a thorough post-event critique within 21 days after a fire-related incident resulting in Operations Emergency Center (OEC) activation.
- PG&E also participates in joint public agency/PG&E debrief sessions following a fire event that required an escalated response, to gather information on response activities that went well, identify areas for improvement, and share best practices and lessons learned.
- Each department involved in an escalated-response event should review their emergency operations plans to determine whether modifications need to be made in light of the experience gained during the emergency.
- PG&E normally requests after action reports from responding agencies to review, and utilizes them in future improvement planning efforts.

Remediation Activities

- Abating fire affected trees that pose a threat to the utility lines is normally done after the fire has gone through the area.
- To control erosion, mastication is used with minimal soil disturbance and dense organic material left behind. In coordination with fire suppression agencies, PG&E may construct water bars in the power line right-of-way access roads for erosion reduction in the burned area. This is done after the restoration efforts are completed.
- In some cases conductors and insulators may need to be cleaned based on the possibility that fire retardant was dropped on the line and that the particulate matter from the smoke plume could have caused a buildup on the line due to incomplete combustion of the fire, particulate matter, and radiant heat.

Example of Masticated Area

D.3.6. Fire Prevention Plan Performance and Metrics

This Fire Prevention Plans performance is monitored and evaluated through annual program planning and schedule attainment monitoring. Annual CPUC reportable ignitions and a wildfire program dashboard are updated and distributed monthly.

Reportable Ignition Metric

Ignition reporting has been incorporated into PG&E operations since June, 2014. This data has been utilized in reporting to establish baselines to inform metrics that focus on continuous improvement. Ignition drivers are evaluated to identify and develop potential mitigations designed to reduce annual ignitions.

Wildfire Dashboard

Fire Prevention Plans performance is monitored monthly with a dashboard that highlights its programs and status relative to the annual schedules. Status is reported as Red, Amber or Green. Programs outside of “Green” status require corrective actions that identify operational challenges and actions required for schedule recovery.

D.4 Fire Prevention Plan References

1. CPUC General Order 166, Standard 1.E: *Fire Prevention Plan*.
2. CPUC Decision 09-08-029: *Decision in Phase 1—Measure to Reduce Fire Hazards in California Before the 2009 Fall Fire Season*, August 20, 2009. (Phase 1 of Rulemaking 08-11-005.)
3. CPUC Decision 12-01-032: *Decision Adopting Regulations to Reduce Fire Hazards Associated with Overhead Power lines and Communication Facilities*, January 12, 2012. (Phase 2 of Rulemaking 08-11-005.)
4. Electric Distribution and Transmission Utility Standard S-1464 "Fire Danger Precautions in Hazardous Fire Areas"
5. CPUC Decision 14-05-020: *Decision Granting In Part and Denying In Part The Petition to Modify Decision 12-01-032*, May 2014. (Refer to Attachment 4.)

D.5 Fire Prevention Plan Attachments

Attachment 1 – Special Fire Threat Zones: Santa Barbara County

Summary

The CPUC has directed utilities to take additional steps to mitigate fire risk in certain high fire threat areas in Southern California counties, including Santa Barbara County.[8]

As a result PG&E's plan includes the following additional fire prevention and mitigation measures for its facilities in the applicable areas of Santa Barbara County.[9]

Vegetation Management

For line sections in a State Responsibility Area (SRA) or line sections located in "Extreme" and "Very High" Fire Threat Zones in a Local Responsibility Area (LRA), the following vegetation clearance requirements apply.

Clearances to be maintained year-round:

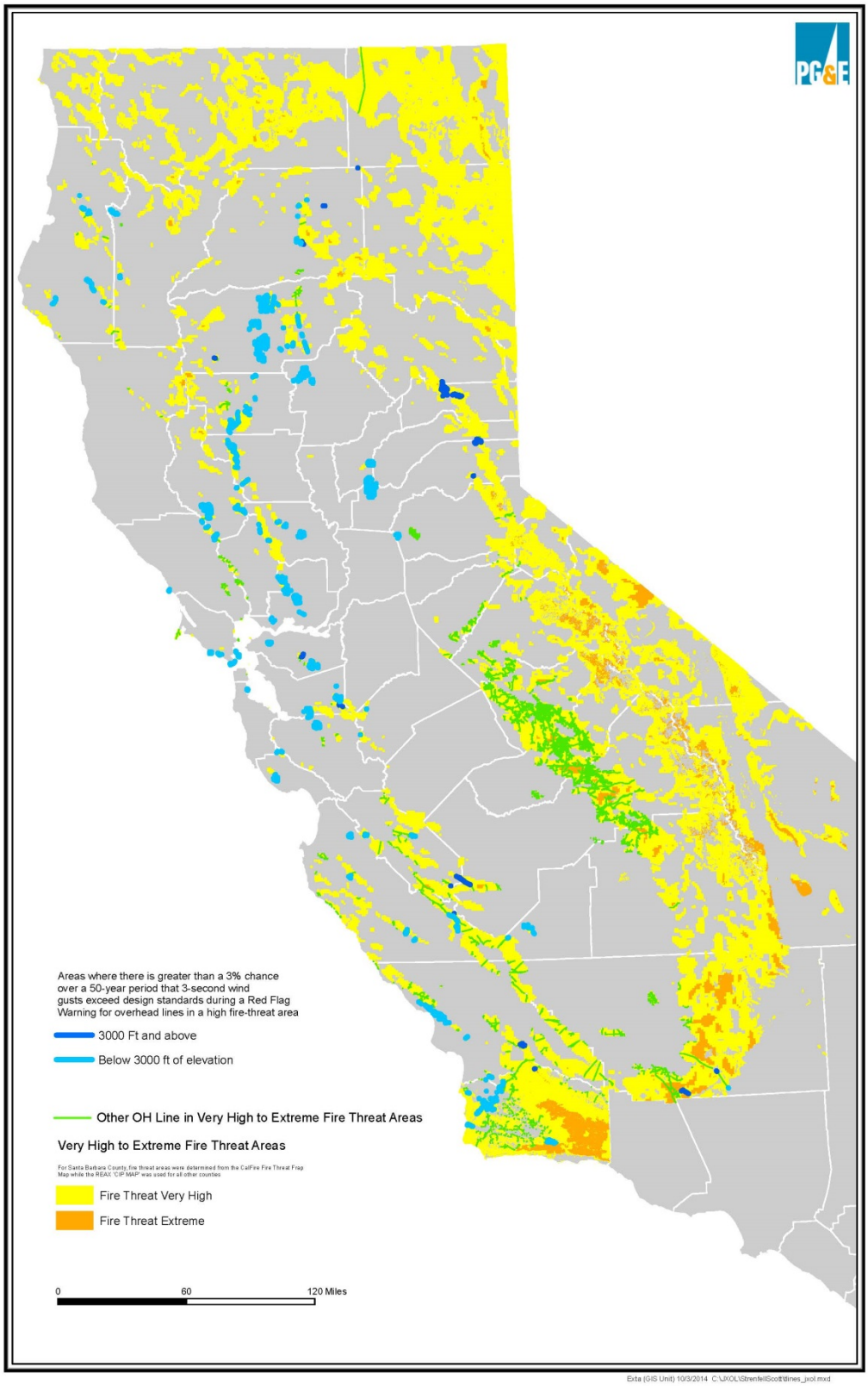
- 2.4 kV-72 kV = 6.5' at time of trimming, 4' at all times
- 72 kV-110 kV = 10' at time of trimming, 6' at all times
- 110kV-300 kV = 20' at time of trimming, 10' at all times
- Above 300 kV = 20' at time of trimming, 15' at all times

Overhead Patrols

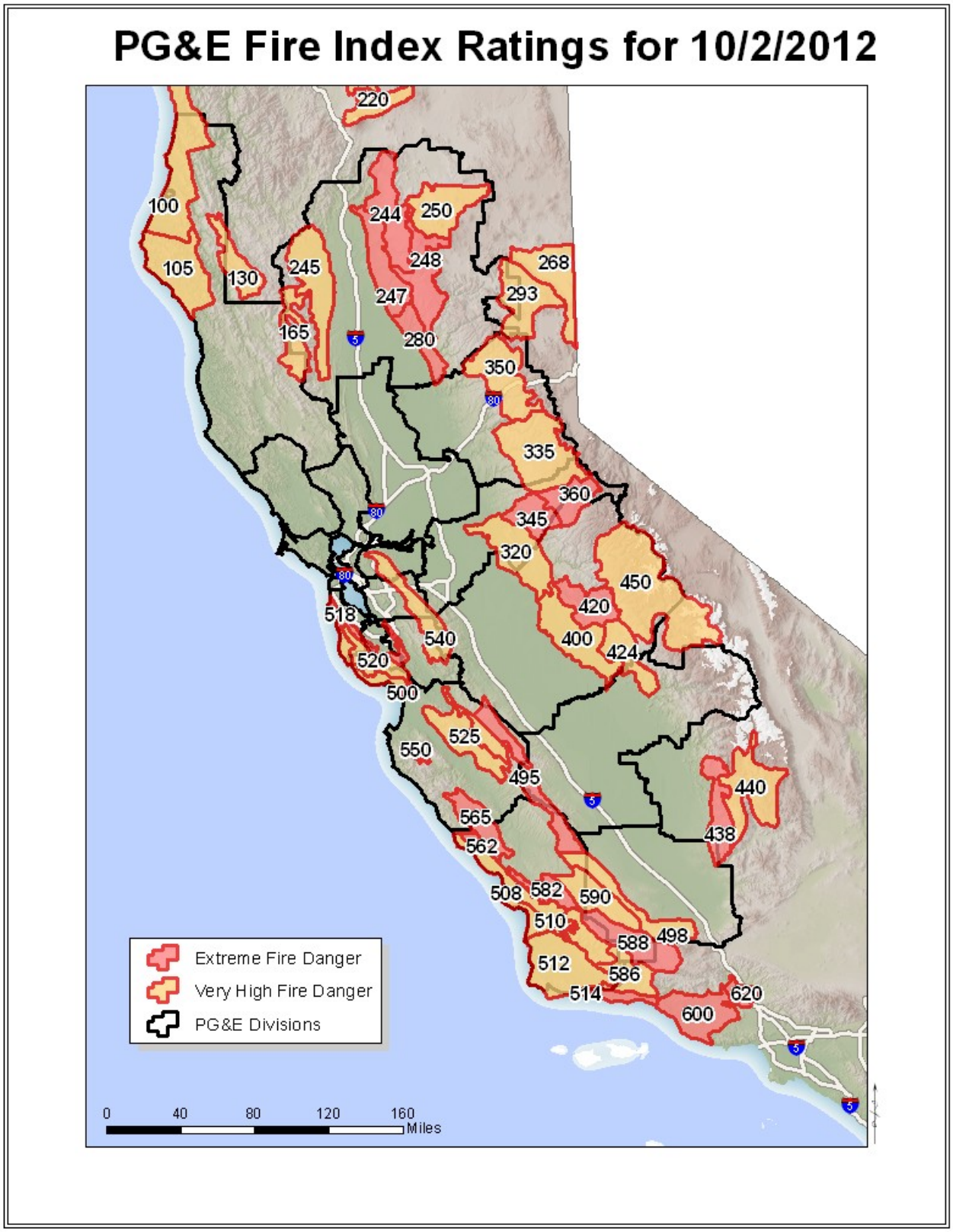
For overhead distribution facilities located in rural areas in the "Extreme" and "Very High" Fire Threat Zones of Santa Barbara County, patrols of applicable facilities should be conducted annually instead of every two years.

[8] See CPUC D.09-08-029 and D.12-01-032 and corresponding requirements in General Order (GO) 95 (including new Case 14 in Table 1 and Appendix E) and GO 165.
[9] The areas to receive special treatment by PG&E in Santa Barbara County are the "Extreme" and "Very High" Fire Threat Zones as designated on the Fire and Resource Assessment Program (FRAP) Map.

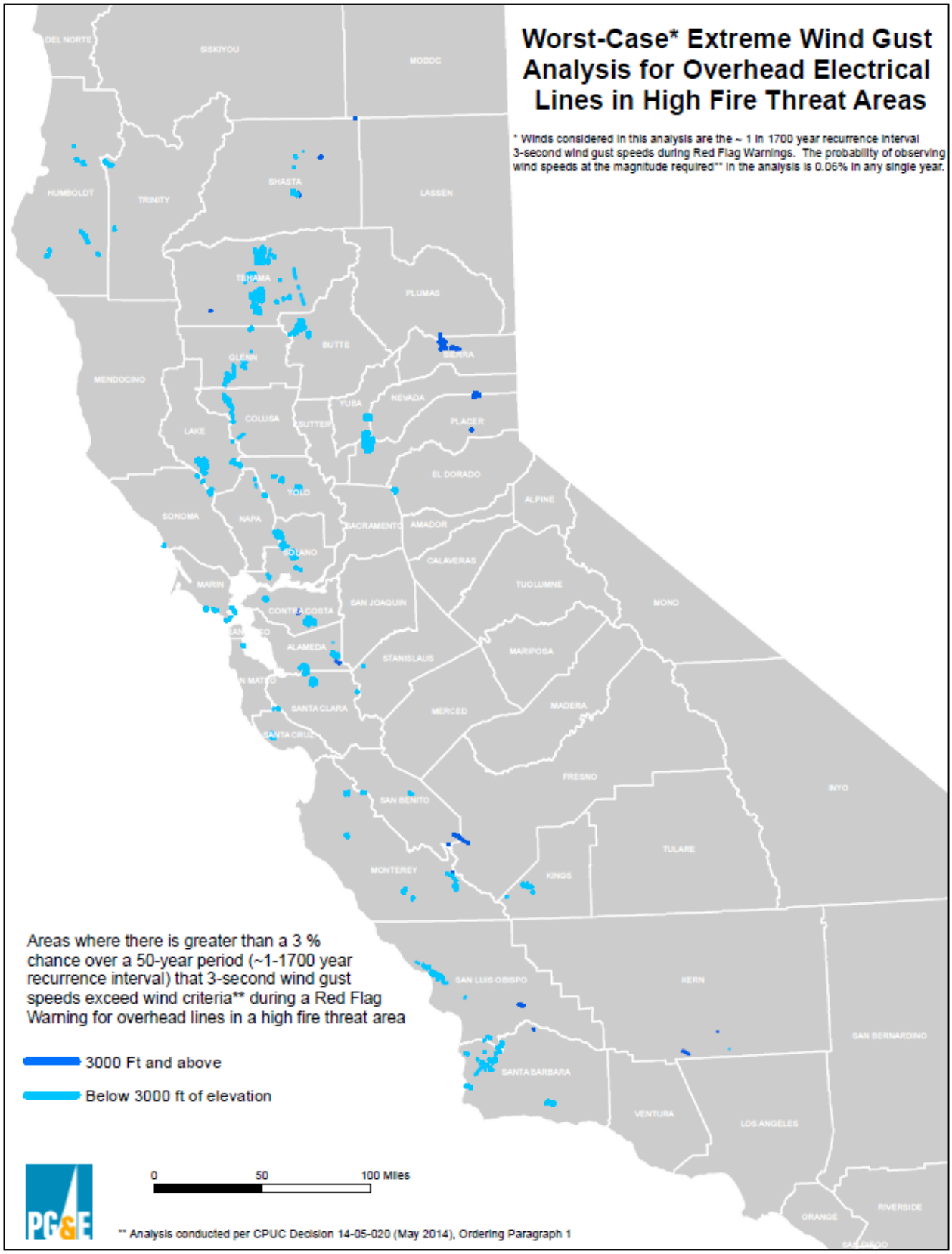
Attachment 2 – Interim Fire Threat Map



Attachment 3 - Fire Index Map of PG&E Territory



Attachment 4 – Worst Case Extreme Wind Gust Analysis



Appendix E. Electric Emergency Plan (EEP) For Capacity Emergencies

The California Independent System Operator (CAISO) operates the state's transmission grid. When it is determined that operating reserves are inadequate to meet the Western Electricity Coordinating Council (WECC) Standards, the CAISO initiates actions to address the imbalance between available system resources and system demand.

The Electric Emergency Plan (EEP) for Capacity Emergencies describes the actions PG&E will take upon receiving orders from the CAISO to address electric supply and/or capacity shortages. This plan is located at:

https://sps.utility.pge.com/sites/eep/SHARED%20DOCUMENTS/FORMS/ALLITEMS.ASPX