

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**



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Order Instituting Rulemaking to Implement  
Electric Utility Wildfire Mitigation Plans  
Pursuant to Senate Bill 901 (2018)

R.18-10-007  
(Issued October 25, 2018)

**SAN DIEGO GAS & ELECTRIC COMPANY (U 902-E)  
2019 WILDFIRE MITIGATION PLAN COMPLIANCE REPORT**

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April 8, 2020

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OF THE STATE OF CALIFORNIA**

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San Diego Gas & Electric Company (SDG&E) hereby submits its 2019 Wildfire Mitigation Plan Compliance Report (“Report”) submitted to Caroline Thomas Jacobs, Director of the Wildfire Safety Division, California Public Utilities Commission (“CPUC”) on April 1, 2020 and served on all parties to the service list R.18-10-007 (Attachment A). On April 8, 2020 Administrative Law Judge Sarah Thomas directed SDG&E to file its Report with the CPUC Docket Office (Attachment B).

Respectfully submitted,

By: /s/ Christopher M. Lyons  
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April 8, 2020

**Attachment A**

**SDG&E's 2019 Wildfire Mitigation Plan Compliance Report**



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April 1, 2020

**VIA EMAIL**

Ms. Caroline Thomas Jacobs  
Wildfire Safety Division  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, CA 94102

Re: 2019 SDG&E Wildfire Mitigation Plan Compliance Report

Dear Ms. Jacobs,

Pursuant to Section 8386.3(c)(1) of the Public Utilities Code, San Diego Gas & Electric Company submits this report addressing its compliance with its Wildfire Mitigation Plan during calendar year 2019.

Please contact me or Kirstie Raagas ([kraagas@semprautilities.com](mailto:kraagas@semprautilities.com)) if you have questions or concerns.

Respectfully submitted,

*/s/ Christopher M. Lyons*

*Attorney for  
San Diego Gas & Electric Company*

cc: R.18-10-007 Service List

# San Diego Gas & Electric Company 2019 Wildfire Mitigation Plan Compliance Report

April 1, 2020



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## I. Introduction

On February 6, 2019, in accordance with the January 17, 2019 Ruling of Administrative Law Judge Thomas<sup>1</sup> and California Senate Bill 901,<sup>2</sup> San Diego Gas & Electric Company (SDG&E) filed a Wildfire Mitigation Plan (WMP or Plan). Consistent with state law and objectives, SDG&E's WMP was founded upon the goal of minimizing the probability that the various components of SDG&E's electric system might become the original or contributing source of ignition for a wildfire. Wildfire safety, prevention, mitigation, and recovery are central priorities for SDG&E. The programs, initiatives, and plans described in the 2019 WMP highlight many of the efforts SDG&E has made and will continue to make to mitigate wildfire risk.

In 2019, SDG&E implemented and tracked the progress of the 54 different mitigations outlined in its 2019 WMP.<sup>3</sup> These mitigations involve a wide-array of topic areas such as: inspection and maintenance programs; infrastructure replacement programs; and vegetation management programs, which all mitigate the risk of ignitions due to a fault on the electric system. Additional topic areas include situational awareness, which informs SDG&E's risk models and helps prioritize infrastructure replacement, and strategies and tools for real time decision making during emergency response or Power Safety Power Shutoff (PSPS) events. SDG&E also has mitigations that reduce the impact of a wildfire once an ignition has occurred, including high definition cameras, ground and aerial fire suppression resources, and a fuels management program. In addition, SDG&E has implemented mitigations to the customer impacts associated with PSPS events including the installation of remote switches to limit the customer impact, the establishment of Community Resource Centers during PSPS events, and SDG&E's customer outreach programs.

Pursuant to Public Utilities Code Section 8386.3(c)(1), SDG&E submits this report addressing its compliance with its WMP in 2019. This report provides a detailed breakdown of each individual mitigation including the 2019 plan for the mitigation, the risk the activity mitigates, and the 2019 progress and results. The following are some activities that summarize this report. SDG&E has fire hardened 160 miles of its electric system and replaced over 3,600 structures within the high fire threat district from January 1, 2019 through December 31, 2019. The appropriate operational measures were taken for the Elevated, Extreme, and Red Flag Warning days. Annual routine and high fire threat district (HFTD) focused distribution, substation, and transmission inspections were completed including timely remediation per general order requirements. Vegetation management annual inspections and trimming were completed and also trimmed or removed over 8,000 targeted species trees in HFTD in accordance with the new 25-ft enhanced clearance program. Situational awareness capabilities were enhanced by adding 13 weather stations and gaining the ability for 30 second reads.

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<sup>1</sup> *ADMINISTRATIVE LAW JUDGE'S RULING ON WILDFIRE MITIGATION PLAN TEMPLATE, AND ADDING ADDITIONAL PARTIES AS RESPONDENTS*, dated January 17, 2019.

<sup>2</sup> California Senate Bill 901 (SB 901), enacted in 2018, adopted new provisions of Public Utilities Code Section 8386 requiring all California electric utilities to prepare, submit and implement annual wildfire mitigation plans that describe the utilities' plans to construct, operate and maintain their electrical lines and equipment in a manner that will help minimize the risk of catastrophic wildfires caused by those electrical lines and equipment

<sup>3</sup> SDG&E's 2019 Wildfire Mitigation Plan was approved in Commission Decision (D.)19-05-039.

## II. Operational Practices

### A. Operating Conditions (WMP Section 4.1.1)

**Description from 2019 WMP:** Using its situational awareness capabilities and a formalized escalation approach, SDG&E monitors the potential for wildfire throughout its service territory on a daily basis. As the conditions for wildfires increase, SDG&E can deploy additional layers of safeguards, or as a last resort, it might choose to shut-off power to certain areas of its service territory in the interest of public safety.

SDG&E uses a variety of situational awareness inputs to determine the appropriate operating environment given current and expected wildfire conditions. Among these inputs for situational awareness are the Fire Potential Index (FPI), Santa Ana Wildfire Threat Index (SAWTI), and field observations.

SDG&E established four Operating Conditions to monitor wildfire potential and among other thing, inform decisions regarding recloser settings, sensitive relay settings, testing procedures, and work restrictions. These Operating Conditions are: Normal Condition, Elevated Condition, Extreme Condition, and RFW Condition.

- **Normal Condition** is declared when it has been determined by SDG&E that the burn environment is not conducive for catastrophic wildfires within its service territory. The FPI forecast is in the range of 1 through 11.
- **Elevated Condition** is declared when SDG&E determines that the burn environment has become conducive to wildfires within its service territory. The FPI forecast is in the range of 12 to 14.
- **Extreme Condition** is declared when SDG&E determines that a combination of high winds, low relative humidity, and the burn environment will create critical wildfire weather conditions in its service territory. The FPI forecast is 15 or above, and specific areas of SDG&E's service territory have the potential for catastrophic wildfires.
- **RFW Condition** is declared by the National Weather Service when high winds and low relative humidity are forecasted to occur for an extended period. During these conditions, there is the potential for catastrophic wildfires. Depending on the weather zone impacted by the declared RFW and communicated by SDG&E's meteorological staff, various operational restrictions and procedures appropriate to each impacted operating district will be triggered and implemented.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by changing how SDG&E operates (i.e., enabling or disabling reclosing, enabling or disabling sensitive protection settings, limiting or not limiting certain construction activities) to reduce the risk of creating an ignition during periods of Elevated, Extreme, and RFW Conditions.

**2019 Progress and Results:** In 2019, SDG&E operated in Elevated Condition on 128 days, Extreme Conditions on 9 days (eight of which were declared a RFW by the National Weather Service) and Normal Condition on 228 days. Stated differently, SDG&E operated at an Elevated Condition or higher on 137/365 days or 37.5% of the time. During these Elevated and higher operating conditions, SDG&E took additional precautions as outlined in its 2019 WMP including disabling distribution reclosers within the

HFTD, enabling sensitive and fast fault settings, and limiting the areas and work that electric crews could perform to reduce risk.

## B. Recloser Protocols (WMP Section 4.1.2)

**Description from 2019 WMP:** SDG&E has deployed overhead distribution reclosers, with a particular focus in the HFTD. A recloser is a switching device that is designed to detect and interrupt momentary faults (i.e., a sudden undesirable significant increase in current from either external forces or equipment malfunction). The device has the ability to reclose automatically and open back up if a fault is still detected. The automated reclosing feature can be disabled, so if a device detects a fault it will trip open and remain open. These overhead distribution reclosers allow SDG&E to operate its system in a variety of configurations depending on input from its meteorologists, known localized conditions, and its declared Operating Condition. They also provide SDG&E the ability to sectionalize various elements of its distribution system to efficiently manage system operations and reliability, which results in quicker restoration times for customers. The overhead distribution reclosers and other Supervisory Control and Data Acquisition (SCADA)-controlled reclosers are managed remotely by SDG&E.

Under Normal Conditions, overhead distribution reclosers operate to clear faults by isolating the least amount of customers and reducing the overall exposure to the electric system. Under Elevated Conditions, SDG&E has seen a need to make overhead distribution reclosers operate faster and more sensitively in order to clear faults in a manner to reduce the energy of the fault as much as possible. By reducing the resultant energy of a fault, the probability of causing significant damage to the surrounding area is reduced. Because of this need, SDG&E has developed the ability to enable more sensitive relay settings on overhead distribution reclosers. These sensitive relay settings improve both the sensitivity of fault detection, and the speed at which faults are cleared. These sensitive settings can clear faults on distribution circuits up to a full second faster than normal settings, reducing fault energy up to 66%. These more sensitive settings are remotely enabled via SCADA, allowing for real-time adjustments triggered by adverse weather conditions.

Along with a wide deployment of distribution overhead reclosers with sensitive setting functionality, SDG&E has also installed a subset of pulse reclosers within the HFTD that have the added functionality of reducing fault energy during reclosing operations. Pulse reclosers can operate at significantly reduced energy flows during reclosing operations, which reduces the probability of a source ignition resulting in damage to facilities and the surrounding area.

In an Elevated Condition or higher, all distribution reclosing functions are disabled on circuits located within the HFTD but may include other circuits if the burn environment is conducive to large wildfires. If needed, SDG&E may enable the sensitive relay setting for overhead distribution reclosers in areas of most adverse wildfire weather conditions.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by disabling reclosing and enabling sensitive relay settings that can both more easily detect faults and trip faster when a fault is detected, limiting the fault energy. When enabled during high risk Operating Conditions, both features reduce the chance of ignitions.

**2019 Progress and Results:** SDG&E followed its recloser protocols as outlined above in SDG&E's 2019 WMP. On the 137 days that SDG&E operated at Elevated or higher in 2019, SDG&E disabled reclosing

and on the 9 days of Extreme Conditions, SDG&E enabled sensitive protections on its reclosers within the HFTD to mitigate the risk of wildfire.

### C. Other Special Work Procedures (WMP Section 4.1.3)

**Description from 2019 WMP:** SDG&E has designated the type of work activity that can be performed for each of the Operating Conditions. As conditions increase in severity, work activities may still be performed, but some might have additional mitigation requirements. In other situations, work activity might cease. The following summarizes the work activity guidelines for each Operating Condition.

- Normal Condition: Normal operating procedures are followed with baseline tools and equipment.
- Elevated Condition: Certain work activities may require additional mitigation measures in order to proceed with work. The additional mitigative measures will be documented.
- Extreme and RFW Conditions: Most overhead work activities will cease, except where not performing the work creates a greater risk than doing so. In those cases where work needs to be performed, an SDG&E fire coordinator is consulted, and any required additional mitigation steps are implemented. Status of the work, ceased or continued, will be documented.

These guidelines are generally sufficient for most routine types of activities performed in the wildland areas, which consist of undeveloped areas covered in native vegetation. For non-routine, or especially hazardous work, SDG&E's Fire Coordination group is consulted to determine if additional mitigation requirements are needed.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by restricting certain high-risk construction activities within the HFTD during Elevated or higher operating conditions.

**2019 Progress and Results:** In 2019, there were 128 days of Elevated Conditions. During these Elevated days, electric crews were accompanied by fire suppression crews to ensure safety while conducting high-risk work. On the 9 Extreme days, all non-emergency work stopped within the HFTD, and crews were utilized to perform pre-PSPS inspections, post-PSPS patrols, and to prepare for and execute emergency response.

### D. Wildfire Infrastructure Protection Teams (WMP Section 4.1.4.1)

**Description from 2019 WMP:** SDG&E contracts for wildfire prevention and ignition suppression services, Contract Fire Resources (CFRs), from mid-June through the end of November. SDG&E may extend CFR coverage into other months depending on Operating Conditions or when specific needs arise. These CFRs accompany SDG&E construction crews and other electric workers to provide site specific fire prevention and ignition mitigation during the work day. The CFRs also standby in case of crew member medical emergencies that may occur while work is being performed. During RFW events or when the FPI is "extreme," additional CFRs are deployed with electric troubleshooters in the field so that ignitions that may result from work performed by a troubleshooter can be suppressed quickly especially in high fire risk areas. A typical CFR strike team includes five engines (trucks) and a leader. The fire suppression engines that CFRs predominately use are ICS Type VI, which carries two qualified fire fighters, firefighting hose, valves, and approximately 300 gallons of water.

**Risk Mitigation:** This program mitigates the risk of wildfire by providing fire suppression capability proximate to SDG&E work or operational activities during extreme weather events.

**2019 Progress and Results:** In 2019, from June 1 to the end of November, and when conditions presented increased fire risk, Wildfire Infrastructure Protection teams (Contract Fire Resources) accompanied SDG&E personnel performing work activities that were located adjacent to wildland vegetation with an increased risk of ignition. These contract resources were also utilized to support the prevention of catastrophic fires throughout Red Flag Warning conditions and other extreme weather events of 2019. They perform their duties during pre-event inspections, responding with SDG&E crews to outages, and in during the re-energization process after an outage.

#### E. Aviation Firefighting Program (WMP Section 4.1.4.2)

**Description from 2019 WMP:** SDG&E has developed and implemented an effective, year-round aerial firefighting program to support the fire agencies in its service territory. SDG&E has an agreement with the County of San Diego, CalFire, and the Orange County Fire Authority for aerial firefighting. Dispatch of SDG&E's aviation firefighting assets is performed through CalFire.

As discussed in this Plan, the threat of wildfire risk throughout California and the region is ongoing and year-round. When wildfires occur north of SDG&E's service territory, there is the potential that CalFire may divert other aerial firefighting resources to emerging wildfires in other parts of the state. This can lead to reduced aerial firefighting capability in the San Diego region. Currently, SDG&E has a lease for year-round use of an Aircrane firefighting helitanker. To further mitigate the threat of a year-round wildfire risk, SDG&E plans to enter into a one-year lease for an additional firefighting helitanker, a Sikorsky S-60, which unlike the Aircrane, has night fly capability.

**Risk Mitigation:** This program mitigates the risk of wildfire by providing aerial firefighting capability throughout SDG&E's service territory and beyond.

**2019 Progress and Results:** SDG&E's aerial fire suppression resources were available year-round in 2019 to support vegetation fire suppression activities in the SDG&E service territory. In partnership with CalFire, these assets made a combined 279 drops, including 220,453 gallons of water. These statistics include drops on the Sawday and Miller Fires, both of which occurred within the HFTD, during Red Flag Warning conditions in 2019 that were conducive to rapid fire spread.

#### F. Industrial Fire Brigade (WMP Section 4.1.4.3)

**Description from 2019 WMP:** SDG&E has contracted a full-time Industrial Fire Brigade (IFB), which is available 24-hours a day, year-round. The IFB differs from the CFRs in that, the IFB is specially trained in fighting fires involving electrical equipment (in particular substations and large transformers) as well as flammable liquids. The IFB members are housed in facilities located near the geographical center of the SDG&E service territory and are fully equipped to handle utility-related fire emergencies.

The IFB incorporates a portable fire-suppression trailer equipped with 300 gallons of Class B alcohol resistant firefighting foam, 500 pounds of chemical extinguishing agent, a 500 gallon-per-minute monitor, and hoses designed to work with hydrants or other fire apparatus. SDG&E also provides three additional trailers to strategic fire agencies that are proximate to key SDG&E facilities.

The IFB is also responsible for the development of comprehensive pre-emergency response plans for each SDG&E facility. These plans are developed for SDG&E's high-value assets first, including SDG&E's power plants, peaker stations, and extra-high-voltage substations, and are designed to significantly improve emergency response at each of these facilities.

**Risk Mitigation:** This program mitigates the risk of wildfire by being available full-time to fight fires involving electrical equipment and flammable liquids.

**2019 Progress and Results:** The IFB resource was secured and available year-round in 2019. They respond to incidents within SDG&E substations and work with the fire agency having jurisdiction during the incident. They are equipped with a liquid foam truck which can extinguish oil fires caused by transformers. In 2019, SDG&E experienced one substation fire to which the IFB responded, while within the Incident Command Structure to safely mitigate the event. This group also completed 37 substation pre-fire pre-plans and was prepared to respond to any events.

#### G. Ignition Management Program (WMP Section 4.1.4.5)

**Description from 2019 WMP:** SDG&E has established an Ignition Management Program (IMP), which tracks ignitions and potential ignitions and perform root cause analysis on each ignition or potential ignition to detect patterns or correlations. Such ignition or potential ignition events will be assigned to a mitigation owner from the business unit most logically positioned to eliminate or reduce future events of a similar nature. To that end, SDG&E is considering employing a forensic fire coordinator to implement and manage this program.

**Risk Mitigation:** This program mitigates the harmful impacts of wildfires on both electric infrastructure and fire prone communities, regardless of the cause of the ignition of those fires.

**2019 Progress and Results:** SDG&E secured a resource for this role in June 2019 and the database has been developed. In 2019, the IMP began to collect data and perform root cause analysis on ignitions. Heat signatures were identified in 176 cases and investigated as part of this program from July through December of 2019. The data from this program is being integrated into best practice processes to reduce ignitions and minimize the consequences of an ignition should one occur.

#### H. Fuel Management (WMP Section 4.1.4.6)

**Description from 2019 WMP:** Protection of SDG&E's electric system from wildfires is critical to system reliability and first responder and public safety. Wildfires burning near electric facilities pose a threat to public and firefighter safety and can also affect reliability if circuits fault because of smoke columns. Fuel management projects can lower the risk of catastrophic wildfires by reducing and removing wildland fuel accumulations, such as live and dead vegetation. SDG&E, in partnership with fire departments, fire safe councils, and other stakeholders will seek to implement a comprehensive fuels management program to reduce wildfire fuel accumulations.

SDG&E has been involved with the following fuel management projects and initiatives:

- Member of the National Cohesive Wildland Fire Management Strategy – Western Regional Strategy Committee, which is a coalition of federal partners and other stakeholders committed to working together toward fire resilient landscapes, creation of fire adapted communities, and effective fire response through the treatment (reduction) of wildland fuels;

- Establishment of the Campo Indian Reservation fuel break, an approximately 50-acre fuel break adjacent to the international border and along the 500 kilovolt (kV) Southwest Powerlink;
- Funding of the Sunrise Powerlink Fire Mitigation Grant Program (CPUC mandated), which annually awards grants to eligible parcels to fund defensible space, structure hardening, and community fire protection projects;
- 4,000 acres of SDG&E lands currently receiving fuel treatment (by Realty Services) for the removal of wildland fuels;
- Various other projects/initiatives in the conception phase with Orange County Fire, CalFire, and Camp Pendleton Fire.

**Risk Mitigation:** This program will mitigate the harmful impacts of wildfires on both electric infrastructure and fire prone communities, regardless of the cause of the ignition of those fires.

**2019 Progress and Results:** SDG&E completed baseline surveys for 808 poles including Bureau of Land Management (BLM), Priority 13, Tier 3, and Cleveland National Forest (CNF) poles. Of the surveyed poles, SDG&E treated 511. The remaining poles either did not meet the habitat requirements for fuel work, or the landowner denied access.

SDG&E has completed fuels management on 100% of the poles surveyed that met the program criteria and were able to be accessed. In addition, the fuels management program achieved the following accomplishments in 2019:

- **Roadside Fire Prevention** – Conducted testing of a new fire prevention product developed by Stanford University by treating 3.5 miles of roadway and right-of-way (ROW) for the purpose of evaluating product effectiveness in reducing ignitions and facility protection.
- **Hazard Fuel Grants** – Awarded five grants to tribal and fire safe councils for the reduction of fuels treatment in the urban interface and adjacent to electric infrastructure.
- **Hazard Fuel Memorandum of Understanding** – Provided funding to the Viejas Reservation to increase defensible space on the reservation and around electric infrastructure.
- **Substation Hazard Assessment** – Prepared a substation hazard assessment report identifying substations that require additional fuels treatment and worker safety considerations relative to wildfire.

### III. Plans for Inspection

#### A. Distribution System Inspection (WMP Section 4.2.1)

**Description from 2019 WMP:**

*SDG&E Corrective Maintenance Program Inspections*

SDG&E is required to inspect its electric distribution system according to Commission GO 165. GO 165 establishes inspection cycles and record-keeping requirements for utility distribution equipment. In general, utilities must patrol their systems once a year in urban areas and HFTD Tier 2 and Tier 3. Patrols in rural areas outside of HFTD Tier 2 and Tier 3 are required to be performed once every two years. SDG&E, however, exceeds the basic requirements and performs patrols in all areas on an annual basis. In addition to the patrols, utilities must conduct detailed inspections at a minimum every 3-5

years, depending on the type of equipment. For detailed inspections, the utilities' records must specify the condition of inspected equipment, any problems found, and a scheduled date for corrective action. Utilities are required to perform intrusive inspections of distribution wood poles depending on the age and condition of the pole and prior inspection history.

SDG&E's Corrective Maintenance Program (CMP) is an inspection program, which consists of six different inspection categories with various, corresponding inspection cycle intervals per program.

#### *Quality Assurance/Quality Control Inspections in HFTD Tier 3*

SDG&E has implemented Quality Assurance/Quality Control (QA/QC) standards and programs throughout its service territory, with a special focus in the HFTD during fire season. These inspections exceed the requirements of GO 165. These proactive programs are designed to identify potential structural and mechanical problems before they fail. SDG&E has performed QC inspections of its overhead electric distribution poles in high risk fire areas with a focus on identifying items for which maintenance would improve fire safety and reliability, with a goal of mitigating the probability that SDG&E's overhead electric system, facilities, and equipment will provide the source of ignition for a fire. These QC inspections were conducted through 2016, after which, SDG&E decided to continue the QC inspections in the subsequent years. In 2018, when the CPUC adopted the statewide fire threat map, SDG&E began applying the QA/QC three-year cycle to the newly defined HFTD Tier 3.

In addition, SDG&E performs a system maintenance patrol (similar to those specified by GO 165) of the entire overhead electric system in the HFTD on an annual basis. Safety related non-conformances identified in those patrols are scheduled for follow up repair.

Over the years, SDG&E has enhanced its system-management programs. Inspection and repair of SDG&E's electric system have particularly intensified in the HFTD, with CPUC mandated annual patrols in the HFTD Tier 3.

During 2016 to 2018, SDG&E performed QA/QC inspections on an average of 15,000 poles annually (approximately one-third of the distribution poles) in its then-existing "extreme" and "very high" fire threat areas. SDG&E continues to conduct the QA/QC detailed inspections in the newly defined HFTD Tier 3. Annual adjustments to the HFTD map, if any, will be reflected in the scope of this QA/QC program.

**Risk Mitigation:** This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

**2019 Progress and Results:** In 2019, SDG&E performed QA/QC inspections of 10,000 poles, and detailed inspections of 47,813 poles. In compliance with applicable General Orders, SDG&E completed remediations within 6 months in Tier 3 of the HFTD and within 12 months in Tier 2 of the HFTD.

#### B. Substation System Inspection (WMP Section 4.2.2)

**Description from 2019 WMP:** Substation inspections are CPUC mandated and while they are conducted primarily for reliability, they have incidental wildfire mitigation benefits. The main goal of the Substation System Inspection and Maintenance Program is to promote safety for SDG&E personnel and contractors by providing a safe operating and construction environment. Additional goals include

meeting all of the requirements of GO 174, achieving a level of station availability satisfactory to SDG&E as well as assuring compliance with all sections of the California Independent System Operator (CAISO) Transmission Control Agreement (TCA). These are accomplished through inspection and managed maintenance of the electrical transmission and distribution substations.

**Risk Mitigation:** This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

**2019 Progress and Results:** In 2019, SDG&E completed 301 substation inspections and performed remediations identified during those inspections in accordance with GO 174.

#### C. Transmission System Inspection (WMP Section 4.2.3)

**Description from 2019 WMP:** All SDG&E transmission system facilities covered by the Transmission Inspection practice are routinely inspected using visual and infrared inspection techniques. Inspections are completed by both ground and air. Non-routine inspections are scheduled depending on operational need. Inspections/patrols of all structures, attachments, and conductor spans are performed to identify facilities and equipment that may not meet California Public Resources Code (PRC) §§ 4292 and 4293 or GO 95 and GO 128 rules. SDG&E annually evaluates its maintenance practice to ensure that inspection intervals meet or exceed regulatory requirements.

**Risk Mitigation:** This program mitigates the risk of wildfire by inspecting SDG&E facilities to identify nonconformances that could lead to equipment failures before they occur. Preventing equipment failure within the HFTD reduces the risk of ignitions caused by equipment failure.

**2019 Progress and Results:** In 2019, SDG&E completed 6,730 transmission inspections and performed remediations identified during those inspections in accordance with applicable General Orders and the filed maintenance plan with the California Independent System Operator (CAISO).

#### D. Geographic Information System Data (WMP Section 4.2.4)

**Description from 2019 WMP:** Geographic information system (GIS) data of electric infrastructure qualifies as critical energy infrastructure information under federal law and as such, should be not be disclosed to the public. SDG&E handles requests for GIS data of its electric infrastructure on a case-by-case basis and if disclosure is warranted, will provide the requested information confidentially. In response to the increasing desire to have the GIS data of electric facilities available to support statewide emergency preparedness, SDG&E is collaborating with agency stakeholders to find the best solution to provide the requested information in a timely manner. The initial step that SDG&E plans to take to support this effort is to develop an ESRI Cloud Managed Services infrastructure for the controlled sharing of the requested information.

**Risk Mitigation:** This program mitigates the risk of wildfire by sharing GIS information with other agencies and stakeholders to improve collaboration and overall emergency event response.

**2019 Progress and Results:** In 2019, SDG&E developed a semi-automated process to generate, update and share PSPS GIS data. A cloud-based GIS portal solution called ArcGIS Online was used to share GIS information with the California Office of Emergency Services (Cal OES), County of San Diego Office of

Emergency Services (County OES), and public safety partners during emergency and PSPS events. Utilizing ArcGIS Online allowed SDGE to quickly stand up data sharing, utilize an existing in-house platform and share data in a secure fashion. Potential, planned, and real-time de-energized PSPS outages were shared securely through a private group created on ArcGIS Online with Cal OES, County OES and public safety partners during each 2019 PSPS event.

## IV. System Hardening

### A. Design and Construction Standards (WMP Section 4.3.1)

**Description from 2019 WMP:** SDG&E has advocated for modernizing the rules and regulations governing the design and construction of overhead electric and communications facilities. To reflect the more stringent design and construction standards adopted by the Commission and to improve the performance of the SDG&E electric system in terms of meeting fire-prevention goals, the SDG&E Facilities Design Manual was modified to include an entirely new section aimed at providing guidance for hardening circuits against the risk of fire. These modifications include both proactive measures designed to reduce the incidence of ignitions and reactive measures by which SDG&E can respond to the threat of fires and mitigate the threat of fires.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by establishing design criteria that will withstand the extreme weather condition brought on by Santa Ana winds within the HFTD.

**2019 Progress and Results:** In 2019, SDG&E continued to design and construct its transmission and distribution systems in accordance with its standards.

### B. Testing and Deploying Emerging Technologies (WMP Section 4.3.2)

**Description from 2019 WMP:** SDG&E continues to evaluate and incorporate new technologies and equipment into its overhead electric system. SDG&E's Electric Distribution Engineering department is responsible for evaluating and creating new equipment and use standards for emerging and pre-commercial technologies. Using equipment failure data, the department makes recommendations regarding which technologies should be incorporated into the SDG&E system and which could be improved prior to application. This department evaluates new types of technologies which may improve electric reliability and public safety and gives special attention to technologies that may contribute to SDG&E's fire safety goals and objectives. As an example, SDG&E is beginning to apply and analyze more advanced fault-clearing equipment that contain algorithms to improve the ability of the system to clear "wire-down" faults more quickly, which will serve to reduce the potential such faults might provide an ignition source.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by looking for new technologies to deploy such as CalFire approved fuses (discussed in 2019 WMP Section 4.3.11), and the falling conductor protection technology (discussed in 2019 WMP Section 4.3.15) that reduce the risk of ignitions within the HFTD.

**2019 Progress and Results:** In 2019, SDG&E continued to evaluate and implement emerging technologies such as: the installation of falling conductor protection; the installation of CalFire approved fuses; and the completion of vendor selection and standards for covered conductor.

### C. Facility Analysis (WMP Section 4.3.3)

**Description from 2019 WMP:** In addition to adding, redesigning, and replacing facilities and elements as described above, SDG&E has implemented more stringent monitoring and inspection programs in the HFTD, which will intensify its efforts to identify facilities or elements that may need repair. As an example of these efforts, SDG&E is developing the use of pole-loading algorithms which more accurately calculate working loads and stresses. In addition, SDG&E coordinates these activities with communications infrastructure providers who jointly use SDG&E's poles and facilities.

SDG&E also maintains a comprehensive outage database, which is used for reliability measurement and reporting purposes. Correlations between outages and locations are analyzed to determine whether certain equipment is prone to outage or has the potential to be an ignition source. This analysis is then matched to weather and other environmental conditions. Where it is determined that certain types of hardware have higher incidents of failure and potentially a higher incidence rate for ignition, they are replaced or prioritized for replacement. Vegetation Management, which is discussed in Section 4.4 below, also maintains a comprehensive outage database. Outages related to trees and or vegetation are investigated, documented, and the results analyzed to determine if additional pruning or removal measures are warranted to prevent any reoccurrence.

SDG&E uses three-dimensional light detection and ranging (LiDAR) surveys throughout its service territory. The most prevalent use of LiDAR has been for engineering and design purposes on the electric transmission system, including areas in the HFTD. In particular, this technology is being used to perform aerial scans of the 69kV transmission system in the HFTD on a three-year cycle. These surveys provide detailed three-dimensional depictions of SDG&E facilities, terrain, vegetation, and other obstacles in the vicinity of SDG&E's facilities. Once the LiDAR and imagery data are processed, it can be ingested into Computer-Aided Design (CAD) tools such as Power Line System Computer-Aided Design and Drafting (PLS-CADD). PLS-CADD can then be used to determine wire tensions, sag and sway, and can be used to calculate the structure mechanical loading (i.e., pole loading).

It can also analyze the clearances to vegetation, ground or other wires to verify compliance with GO 95 or other relevant standards. If potential issues are discovered along the 69kV system in the HFTD, SDG&E will address them per GO 95 requirements and SDG&E standards. In 2013, SDG&E began applying this same technology extensively on the distribution system through the FiRM program (described in Section 4.3.9 below), which has fire hardened over 7,000 poles and 350 miles of conductor to date in the HFTD. New distribution programs such as PRiME (described in Section 4.3.10 below), will utilize this technology as well.

**Risk Mitigation:** This program mitigates the risk of wildfire by analyzing SDG&E facilities to identify facility locations that have a higher probability of failure based on engineering data and outage history. This information is used by capital programs, such as FiRM and PRiME, along with other tools to prioritize replacements.

**2019 Progress and Results:** In 2019, SDG&E completed the actions performed in the facilities analysis section of the 2019 WMP. This information helped to inform SDG&E's risk models and helped with the prioritization of wildfire mitigation activities.

#### D. Oversight of Activities in the Rural Areas (WMP Section 4.3.4)

**Description from 2019 WMP:** In 2016, SDG&E formed an Electric Risk Analysis (ERA) team to address safety and reliability risks for electric distribution infrastructure across the entire service territory with continued focus on reviewing equipment failures that cause wire down events. The ERA oversees the evaluation of equipment data to support the various fire-hardening activities using these principles:

- Inform and utilize risk-informed prioritizations to address risk-mitigation;
- Improve design specifications to reduce the potential for igniting fires;
- Consider and, to the extent prudent and cost-effective, employ technology-based solutions to reduce fire risks and improve overall system reliability and safety;
- Systematically consider and evaluate options such as:
  - Fire-hardening sections of feeder circuits or individual circuit branches;
  - Strategic undergrounding to reduce the exposure of ignition from overhead facilities;
  - Adjusting protective equipment by revising settings, balancing loads, adding reclosers, replacing expulsion fuses with CalFire approved fuses, replace/remove high risk assets, and/or reduce fuse size; and,
  - Employing new construction standards and/or technologies, such as insulated overhead conductors, wireless fault indicators, “off-grid” solutions, and advanced reclosers;
- Replace higher-risk equipment based upon statistical analytics.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by creating an oversight team that evaluates the impact of the proposed mitigations to ensure the most critical wildfire risks are addressed.

**2019 Progress and Results:** In 2019, the governance and strategy role evolved with the creation of the Wildfire Mitigation Department. This department is responsible for the filing of the Wildfire Mitigation Plans and updates, developing the overall wildfire mitigation strategy including the evaluation of new potential mitigations, and the tracking and reporting of mitigations filed in the plan to ensure compliance with the Wildfire Mitigation Plan.

#### E. Asset Management (WMP Section 4.3.5)

**Description from 2019 WMP:** SDG&E is in the process of developing and implementing an asset management program to align with its overall risk management objectives. The new asset management system conforms with ISO 55000, an international standard that specifies the requirements for the establishment, implementation, maintenance, and improvement of an asset management system. Benefits of such a system may include enhanced asset safety, improved performance, managed risk, demonstrated compliance, and improved efficiencies and effectiveness of assets and operations. Asset Management is a critical element of SDG&E’s focus on creating a sustainable and high-quality Safety Management System for electric operations.

SDG&E believes asset management will provide a means to optimize the Company’s risk, performance, and investments while meeting or exceeding safety and regulatory objectives. A comprehensive asset management system will provide the access to and integration of data throughout the asset life cycle to develop analysis and a health index for critical assets. Using a health index of its assets, SDG&E can identify which assets have a likelihood of failure and the respective consequence(s) of the failure(s). Based on this information, asset strategies would be evaluated and implemented to manage the asset in

a manner that aligns with SDG&E's overall risk management strategy. Asset management intersects with wildfire mitigation and prevention when failed assets located in the HFTD can potentially be the source of an ignition.

**Risk Mitigation:** This program mitigates the risk of wildfire by developing an asset health index for facilities located within the HFTD. Developing the asset health index will aid in prioritizing inspections, repairs, and replacements for at risk facilities.

**2019 Progress and Results:** In 2019, SDG&E's asset management group, the Asset Integrity Management (AIM) program team, was formed. The group commenced the process of publishing asset management plans and developing a system technology platform to integrate multiple-source data, to create asset health performance and risk modeling, and to calculate asset health and risk indices.

#### F. Overhead Transmission and Distribution Fire Hardening (WMP Section 4.3.6)

**Description from 2019 WMP:** SDG&E is committed to the fire hardening of its 69kV transmission and associated 12kV distribution system located in the HFTD. This hardening effort is a multi-faceted approach that starts with enhanced design criteria. Previous lines were constructed to withstand working loads under stress of 56 miles per hour (mph) wind speeds. The new electric lines are designed to withstand working loads under the stress of 85 mph wind speeds, and in some specific cases, up to 111 mph based on known local wind conditions. The new lines are being designed utilizing steel poles instead of wood. Steel poles are a more reliable construction material, giving more confidence in their designed strength and are more resilient should a fire occur leading to faster restoration times. These new steel pole facilities are being installed in conjunction with the application of higher strength conductors and increased spacing between lines beyond the requirements of GO 95, resulting in a decrease in the likelihood of energized lines coming into contact with one another or arcing after being struck by flying debris. In addition, SDG&E's current design standards now reflect the use of the enhanced design criteria, steel poles over wood poles, high strength conductor, and increased conductor spacing in the HFTD. To date, SDG&E has hardened 19% of the HFTD by installing over 15,000 new steel poles and plans on further investment to continue to these efforts.

**Risk Mitigation:** This program mitigates the risk of wildfire by fire hardening transmission and distribution lines within the HFTD.

**2019 Progress and Results:** In 2019, SDG&E hardened 10 miles of 69kV transmission and 83 miles of associated 12kV distribution within the HFTD. With progress made in 2019, SDG&E is on track to finish hardening all transmission circuits within the HFTD by 2025.

#### G. Underground Circuit Line Segments (WMP Section 4.3.7)

**Description from 2019 WMP:** The Commission approved a tariff rule change for SDG&E, which allows for conversion of existing primary voltage overhead facilities to underground facilities along public streets and roads, and on public lands and private property in more fire prone areas where undergrounding is the preferred method to reduce fire risk and enhance reliability. SDG&E formed a team with expertise in the undergrounding of distribution systems and facilities to evaluate the undergrounding of circuit segments located in the HFTD within primarily the County of San Diego jurisdiction. These experts provided the County of San Diego with an understanding of the potential for undergrounding portions of the overhead system to mitigate the risk of fire and the results are being

used on circuit analysis to propose underground portions where feasible. Conferences with County management and leadership are in progress to gain agreement on individual project prioritization. Design on these conversions are scheduled to begin in 2019 with anticipated construction in 2020.

In addition, SDG&E is evaluating undergrounding distribution lines in strategic areas, where a small amount of undergrounding would have a large impact by reducing a significant risk or limiting exposure to Public Safety Power Shutoffs for critical facilities and communities.

**Risk Mitigation:** This program mitigates the risk of wildfire and the use of PSPS by undergrounding overhead lines, reducing the risk of ignitions.

**2019 Progress and Results:** In 2019, SDG&E strategically undergrounded 2.6 miles.

#### H. Cleveland National Forest Fire Hardening (WMP Section 4.3.8)

**Description from 2019 WMP:** SDG&E currently operates and maintains a network of electric facilities located within the Cleveland National Forest (CNF). In 2016, SDG&E received a Master Special Use Permit (MSUP) to operate and maintain facilities within CNF. Specifically, the MSUP allows SDG&E to develop a series of projects and activities aimed at increasing the safety and reliability of existing electric facilities within and near the CNF. Final approval for these projects and associated permits have been received and work has been on-going since 2016.

These projects will increase safety and reliability of SDG&E's system by fire hardening existing electric infrastructure that currently serves the U.S. Forest Service, emergency service facilities (i.e., fire, communication, and other), campgrounds, homes, businesses, and other customers within the CNF and surrounding areas. The projects include the fire hardening of facilities and select undergrounding of several existing 12kV and 69kV electric facilities spread throughout an approximately 880 square mile area in the eastern portion of San Diego County. The existing electric lines located within CNF also extend outside of CNF boundaries. The overall project includes operational components complementing SDG&E's Community Fire Safety Program, which in turn includes community outreach, new fire prevention measures, and enhanced emergency response.

The project design was based on various recommendations addressing fire prevention and the U.S. Forest Service's environmental values and aesthetics. Using an analytical matrix reflecting elements of fire risks and environmental concerns, SDG&E and the U.S. Forest Service collaborated to determine which sections of the electric system should be upgraded. Each segment required a custom solution based on many factors, including the location of the customer being served by the distribution system, the topography of the land, and various biological, cultural, and environmental factors.

Construction commenced on the Cleveland National Forest project in late 2016 and is planned to continue through 2020. Through November 2018, there have been a total of 63 miles of electric transmission and distribution lines fire hardened. This includes 45 miles of 69kV transmission lines and 516 structures replaced with steel and 18 miles of 12kV distribution lines and 302 structures replaced with steel. For 2019, SDG&E plans to replace 28 miles of 69kV transmission lines and 243 structures as well as 22 miles of distribution lines and 308 structures. SDG&E plans to complete construction on fire hardening activities on this project in 2020.

**Risk Mitigation:** This program mitigates the risk of wildfire by fire hardening transmission and distribution lines within the HFTD.

**2019 Progress and Results:** In 2019, SDG&E fire hardened 61 miles of transmission and distribution lines within the CNF. The 61 miles of fire hardened lines consisted of approximately 25 miles of transmission and 25 miles of associated distribution underbuilt on the transmission system. Approximately 2 miles of distribution overhead and 8.7 miles of distribution trenching was completed. A total of 265 transmission poles and 113 distribution poles were fire hardened in 2019 in addition to the wire that was fire hardened. 95% of the construction packages were issued, and 90% of the environmental notice to proceeds were submitted and received by the CPUC.

#### I. Fire Risk Mitigation (WMP Section 4.3.9)

**Description from 2019 WMP:** In 2013, SDG&E established the FiRM program, an overhead distribution fire hardening re-building effort. The goal of the FiRM program is to address fire risk by hardening facilities in the HFTD by replacing aged line elements, utilizing advanced technology, and by safeguarding facilities by designing for known local weather conditions. FiRM is also tasked with developing a multi-year plan for the rebuilding of circuits of greatest fire-related risk. Prioritization and scoping of each FiRM project are driven largely by analysis using the WRRM and input from multiple stakeholders in the Company including operations and engineering.

Factors considered in the prioritization and scoping process include, but are not limited to, recent occurrences of a “wire-down,” wind and weather conditions, fire risks, outage history, conductor size and type, condition of equipment, environmental conditions, and resulting customer impacts. FiRM projects are scoped on a circuit-by-circuit basis by considering various risk factors. Risk mitigation methods include fire-hardening older conductor and poles, as well as other targeted fire risk mitigation methods of the circuit, including removal of equipment, long span elimination, and advanced technology implementation (namely, falling conductor protection and LiDAR survey data captured via Unmanned Aerial Vehicles (UAVs)).

To date, the FiRM program is currently 24% complete having replaced over 7,000 poles and 350 miles of wire. SDG&E plans to continue this effort for the foreseeable future as there are still 1,100 miles of aged high-risk conductor remaining within the HFTD in SDG&E’s service territory. At this current rate of reconductoring approximately 84 miles of high-risk conductor per year, it will take SDG&E approximately 13 years to complete this focused effort with the current resources and budget. However, given the California fires of 2017 and 2018 and the elevated risk climate change has brought to the state, SDG&E is planning to accelerate this effort to replace these older line elements by 2025 (years 2019-2025). The increased scope of work would begin engineering and design in 2019 and construction in 2020.

**Risk Mitigation:** This program mitigates the risk of wildfire by hardening the distribution system to known local wind conditions, reducing the risk of equipment failure in high wind. Additionally, the FiRM program installs high tensile strength conductors that are less likely to fail than the aged small wire that exists today.

**2019 Progress and Results:** In 2019, SDG&E’s FiRM program replaced 82 miles of small high-risk conductor with high tensile strength conductor.

## J. Pole Risk Mitigation and Engineering (WMP Section 4.3.10)

**Description from 2019 WMP:** The Pole Risk Mitigation and Engineering (PRiME) program was developed by SDG&E to assess pole strength and integrity considering loading conditions, third party attachments, localized weather conditions, and remaining pole strength throughout SDG&E's service territory. PRiME does not overlap with existing programs, such as FiRM or CNF. SDG&E's goal is to perform pole loading assessments on 170,000 wood distribution poles throughout its service territory. PRiME will focus its efforts in HFTD Tier 3 and Tier 2. Assessments on SDG&E's highest risk poles within Tier 3 and Tier 2 of the HFTD will be completed prior to poles located outside of the HFTD. Poles identified that require construction activities through assessment and follow-up analysis, will be remediated as they are identified. SDG&E anticipates performing approximately 700 pole remediations in 2019 and estimates approximately 1,700 pole remediations in 2020. At the current rate, it is anticipated that remediation activities will be completed in eleven years within the HFTD. However, SDG&E is planning to accelerate this effort to complete remediation activities by 2027 (years 2019-2027). The increased scope of work would begin engineering and design in 2019 and construction in 2020.

The tools and information have improved significantly over time, and the PRiME program leverages these improvements including LiDAR imaging of the structures and lines, PLS-CADD modeling software, weather, inspection, and third-party attachment data to take SDG&E well beyond the visual to a full engineering analysis of its overhead assets. This program allows SDG&E to mitigate asset integrity risks within the HFTD.

**Risk Mitigation:** This program mitigates the risk of wildfire by replacing at risk and aging distribution structures within the HFTD.

**2019 Progress and Results:** In 2019, SDG&E hardened 695 poles through its PRiME program.

## K. Expulsion Fuse Replacement (WMP Section 4.3.11)

**Description from 2019 WMP:** SDG&E continues to enhance its electric distribution system and reduce equipment with potential ignition sources. With the consistent analysis of data, new fire prevention methods and a continued effort by vendors to satisfy California's increasing fire threats, SDG&E is constantly rethinking and analyzing equipment. SDG&E's engagement with vendors to require equipment to be approved by CalFire as an exemption equipment has educated many vendors with the concerns and issues facing not just SDG&E, but all utilities in California. Vendors have understood this challenge and proposed several new products. The new program detailed below, highlights SDG&E's efforts and continuous strive to reduce ignition sources within the HFTD.

When the distribution system experiences a fault or overcurrent, there are fuses connected to the system to protect its integrity and isolate the fault. These expulsion fuses are designed to operate by creating a significant expulsion within the fuse, resulting in the fuse opening and isolating the fault, and in turn limiting further damage of other equipment. Because of this internal expulsion, the fuses are equipped with a venting system that sends a discharge of energy out of the fuse and into the atmosphere. This external discharge has the potential to ignite flammable vegetation.

To mitigate this potential, SDG&E has developed a three-year program to proactively replace existing expulsion fuses within the HFTD with CalFire approved power fuses. There are approximately 7,100 expulsion fuses in SDG&E's HFTD, and this new program is designed to lessen the chance for an ignition

source in the HFTD by reducing external discharges or venting required for the existing expulsion fuses and reducing the energy associated with the fuse operation. In 2019, this program will prioritize the replacement of the expulsion fuses to the CalFire approved power fuses by starting in the Tier 3 HFTD and then moving to Tier 2 HFTD. SDG&E anticipates completing this program by 2021.

**Risk Mitigation:** This program mitigates the risk of wildfire by replacing existing expulsion fuses with fuses that are CalFire approved as a mitigation to wildfire risk.

**2019 Progress and Results:** In 2019, SDG&E replaced 2,490 fuses with CalFire approved power fuses within the HFTD.

#### L. Hotline Clamps (WMP Section 4.3.12)

**Description from 2019 WMP:** Through equipment failure analysis related to wire down outages, SDG&E has identified high risk connectors known as “hotline clamps” that SDG&E intends to replace as part of the Hotline Clamp program. SDG&E has utilized the QA/QC inspections discussed in Section 4.2.1.2 above to identify over 6,000 structure locations with this type of connector within the HFTD. This maintenance program to replace these connectors is planned to begin in 2019 and will continue through 2025.

**Risk Mitigation:** This program mitigates the risk of wildfire by reducing a potential wire down that occurs when this particular clamp fails.

**2019 Progress and Results:** In 2019, SDG&E removed 660 hotline clamps within the HFTD.

#### M. Wire Safety Enhancement (WMP Section 4.3.13)

**Description from 2019 WMP:** The Wire Safety Enhancement (WiSE) program is designed to mitigate risk by hardening electric distribution overhead infrastructure and protection systems. WiSE addresses public safety risks in wildland urban interfaces where conductor or connection equipment failures may cause wildfires, and near dense urban populations (e.g., schools, public gatherings) where the likelihood of public contact may be increased.

Conductor equipment failure can pose serious risks to public and employee safety due to potential ignitions in fire vulnerable areas as well as causing serious injuries or fatalities due to touch or step potentials. Although WiSE was originally developed to harden the distribution system outside the Tier 3 and Tier 2 HFTD, recent events such as the California wildfires of 2017 and 2018 have provided evidence of the increasing risk to communities within the wildland urban interface. These factors, coupled with record wind speeds and dry vegetation measured in San Diego’s coastal canyons in recent months, have caused the need to refocus this program to mitigate potential ignitions within the wildland urban interface located outside the HFTD.

WiSE will apply new technologies to update equipment with hardened construction standards and materials. The resulting infrastructure enhancements may include wire upgrade, connector replacements, switch placements or replacements, long span removals, strategic undergrounding, and modifications to advanced protection systems. Design considerations will be driven by area-specific conditions that could include anti-corrosion materials for connectors or conductors, replacement of wood poles where fire hardening is beneficial, replacing bare wire with covered conductor to reduce

wire downs caused by foreign object contact (e.g., avian, vegetation, Mylar balloon, etc.), and strengthening conductors that are vulnerable to high wind storm events.

WiSE will focus on utilizing multi-attribute risk modeling to drive optimal risk reduction with considerations for factors including, but not limited to historic wire down events, projected wire down failures by asset type, proximity to vegetation, condition or age of assets, inspection records, susceptibility of corrosion, meteorology conditions, length of the conductor span, proximity to dense or sensitive public areas (e.g., schools, residences, parks, etc.), and conductors that cross major freeways or roadways. The risk model will be focused on these risk parameters within the wildland urban interface boundary first. In 2019 through 2020, WiSE will prioritize the highest risk circuit elements within the wildland urban interface and commence hardening efforts.

**Risk Mitigation:** This program mitigates the risk of wildfire by fire hardening distribution circuits in high fire risk areas outside the HFTD.

**2019 Progress and Results:** In 2019, SDG&E completed installation of 5.7 miles of infrastructure enhancements in the wildland urban interface in Rancho Santa Fe, and in the coastal canyons of La Jolla.

#### N. Covered Conductor (WMP Section 4.3.14)

**Description from 2019 WMP:** SDG&E's vegetation profiles in the HFTD and the wildland urban interface consist mostly of sparse trees and heavy brush. In general, the overhead electrical equipment in these areas are not in close proximity to dense vegetation. Given this specific vegetation profile, SDG&E has focused its hardening efforts on installing high tensile strength conductors to reduce the risk of downed wire; increasing phase spacing to reduce the risk of wire to wire contact; installing steel or composite structures sized to withstand high wind conditions; and deploying advanced protection systems designed to detect and isolate issues quickly and minimize the energy produced when faults occur. SDG&E believes this is a prudent approach for reducing the risk of wildfire to much of its system.

SDG&E also sees the benefits of a targeted approach to installing covered conductor in areas where electric infrastructure is near dense vegetation. However, there are factors that need to be considered when installing covered conductor. If a covered conductor fails and falls to the ground, it is possible that a high impedance fault would occur. High impedance faults, even with sensitive relay settings enabled can be very difficult to detect, leading to the potential for downed energized wires.

Today, SDG&E has over five miles of covered conductors installed where its overhead electrical equipment is in close proximity to dense vegetation and where outage history supports this type of installation. SDG&E believes the use of covered conductor in certain applications can be beneficial and will continue to utilize covered conductors in those applications.

**Risk Mitigation:** This program mitigates the risk of wildfire by installing conductor that will be resistant to phase to phase faults caused by third-party objects and vegetation.

**2019 Progress and Results:** In 2019, Distribution Standards selected covered conductor vendors, installed the conductor at a controlled test site, attached new hardware to SDG&E equipment, and planned to publish standards in the first quarter of 2020.

## O. Fire Threat Zone Advanced Protection (WMP Section 4.3.15)

**Description from 2019 WMP:** The Fire Threat Zone Advanced Protection (FTZAP) program<sup>4</sup> develops and implements advanced protection technologies within substations and on the electric distribution system to: reduce and/or mitigate the risks of utility caused fire incidents; create higher visibility and situational awareness in fire prone areas; and allow for the implementation of new relay standards with improved coordination in locations where it is difficult due to lower fault currents.

More advanced technologies such as microprocessor-based relays with phasor measurement (PMU) capabilities, automation controllers, sectionalizing capabilities, line monitors, direct fiber lines, and communication radios comprise a portfolio of devices being installed in substations and on distribution circuits to allow for a more comprehensive protection system along with greater situational awareness via SCADA in the fire prone areas of the HFTD. This portfolio of advanced technology allows SDG&E to implement new protection systems, such as:

- **Falling Conductor Protection** designed to trip distribution overhead circuits before broken conductors can reach the ground;
- **Sensitive Ground Fault** for detecting high impedance faults resulting from downed overhead conductors;
- **Sensitive Profile Relay Settings** enabled remotely on distribution equipment during red flag events to reduce fault energy and fire risk;
- **High Accuracy Fault Location** for improved response time to any incident on the system;
- **Event Reporting** for post analysis of system disturbances or outages;
- **SCADA Communication** to all field devices being installed for added situational awareness; and
- **Protection Integration with Private LTE** as a means of facilitating the communication infrastructure needs.

In 2019, FTZAP aims to replace aging infrastructure in substations such as obsolete 12kV substation circuit breakers, electro-mechanical relays, and Remote Terminal Units (RTUs) with new circuit breakers, microprocessor-based relays, and RTUs that facilitate the requirements of SDG&E's advanced protection systems. On the distribution circuits, FTZAP works with the FIRM program to strategically install and/or replace sectionalizing devices, line monitors, direct fiber lines, and communication radios to facilitate the requirements of SDG&E's advanced protection systems.

**Risk Mitigation:** This program mitigates the risk of wildfire by installing the sectionalizing devices, relays, and controls to enable advanced protection features, including sensitive profile settings, sensitive ground fault detection, down conductor detection, and falling conductor protection.

**2019 Progress and Results:** In 2019, SDG&E enabled 8 distribution circuits with advanced protection.

## P. LTE Communication Network (WMP Section 4.3.16)

**Description from 2019 WMP:** SDG&E plans to deploy long-term evolution (LTE) wireless network using a dedicated radio frequency (RF) spectrum. This will improve the overall reliability of SDG&E's

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<sup>4</sup> In SDG&E's 2020 Wildfire Mitigation Plan, this program has been renamed the "Advanced Protection program."

communication network, which is critical for fire prevention and public safety. This RF spectrum will be lower frequency with higher transmit power levels, which will allow the LTE network to operate over broader areas and in the presence of foliage. LTE is a globally recognized standard, with a very broad ecosystem made up of multiple vendors that provide equipment that is certified inter-operable. This effectively eliminates the risk of deploying equipment that could be stranded due to a vendor's support being eliminated. It also allows SDG&E to deploy equipment that best fits a particular purpose deployment, whereas proprietary systems generally have a limited number of configurations, there are myriad LTE configurations available to select from.

The LTE network significantly increases the reliability of remote communication, which is critical for the technology discussed in Section 4.3.15 (Advanced Protection) to function as intended. In addition, there are currently gaps in the wireless coverage of third-party communication providers primarily in the rural areas of east county San Diego that limit SDG&E's ability to communicate with field personnel during red flag crew deployments and Emergency Operations Center activations. The installation of LTE in Tier 3 and Tier 2 of the HFTD will reduce these gaps, allowing for more timely and reliable communication and information from SDG&E's field crews to emergency management leadership in these critical situations.

**Risk Mitigation:** This program mitigates the risk of wildfire by enabling more reliable communication for all the remote devices that depend on communication to function as intended. In addition, it provides another means of communication for crews during red flag deployments.

**2019 Progress and Results:** In 2019, SDG&E completed the construction of five LTE base stations in rural areas of east county San Diego. The base stations are currently under integration and testing and will be validated for operational use in early 2020. In addition, the LTE components in the data center, referred to as the LTE Core, were also deployed on a virtualized compute environment and have been confirmed as ready for operational network traffic. Furthermore, SDG&E validated end-to-end testing of the two primary use cases, Falling Conductor Protection (FCP) and Distribution SCADA, on a test LTE network in the SDGE Integration Test Facility (ITF) lab. Finally, in 2019, SDG&E completed preliminary LTE wireless coverage designs for one-half of the Tier 3 and 2 High Threat Fire District areas.

#### Q. Automated Reclosers (WMP Section 4.3.17)

**Description from 2019 WMP:** As part of its Community Fire Safety Program, and as discussed in Section 4.1.2 above, SDG&E has completed a large deployment of overhead distribution reclosers, focusing heavily on the HFTD. While recent Operating Conditions typically have not allowed for the enabling of automated reclosing, this equipment allows SDG&E to operate its system with significantly reduced energy flows during reclosing operations and provides the ability to sectionalize various elements of the distribution system to better manage system operations and reliability. Additionally, SDG&E has associated these remote SCADA controlled sectionalizing devices with specific wind anemometer locations, allowing for targeted applications of the Public Safety Power Shutoff to the areas that pose the most significant real time system condition risk of wildfire.

**Risk Mitigation:** This program mitigates the risk of wildfire through the pulse closing technology when reclosing is enabled. In addition, these devices help to minimize impacts to customers during PSPS events.

**2019 Progress and Results:** As stated in the 2019 WMP, this mitigation was more to inform the previous sectionalizing work performed by SDG&E since it began installing additional sectionalizing within the HFTD in 2008. By the end of 2019, SDG&E has over 240 remote sectionalizing devices that are associated with over 190 weather stations, which are critical to the way SDG&E manages its targeted approach to PSPS.

#### R. Public Safety Power Shutoff Engineering Enhancements (WMP Section 4.3.18)

**Description from 2019 WMP:** This program mitigates the impact to customers and communities involved in Public Safety Power Shutoff (PSPS) events by adding remote sectionalizing devices. Additional remote sectionalizing devices allow PSPS events to be more precise, which reduces the outage impact to customers. SDG&E is evaluating locations for these sectionalizing devices and based upon the results of the analysis, SDG&E plans to install additional units in 2019 and 2020.

**Risk Mitigation:** This program mitigates the exposure of customers to PSPS events by installing additional sectionalizing devices so that SDG&E is able to take a targeted approach during deenergized events, impacting only the necessary customers.

**2019 Progress and Results:** In 2019, SDG&E achieved its goal to expand switch installations within the HFTD by adding seven additional remote sectionalizing devices to mitigate the impacts of PSPS. These switches further sectionalize parts of circuits that may experience different levels of wind during Santa Ana wind conditions, potentially reducing PSPS impacts.

#### S. Pole Replacement and Reinforcement (WMP Section 4.3.19)

**Description from 2019 WMP:** The Pole Replacement and Reinforcement program replaces deteriorated wood poles identified through inspections. Wood pole damage is attributed to numerous factors including, but not limited to, the loss of original preservative treatment experienced with Penta-Cellon poles, the presence of fungi decay, and bird and/or termite damage. The Pole Replacement and Reinforcement program is designed to comply with GO 165.

In 2019, the wood pole intrusive inspections are cycling through structures located in the HFTD. Pole replacements associated with deteriorated structures found on these intrusive inspections reduce the risk of ignitions by preventing wood pole failures. In addition, poles replaced in these areas will be constructed to SDG&E's improved design criteria, meaning they will be replaced with a steel pole that will meet the known local wind conditions of the area. For poles identified for replacement in Tier 3 of the HFTD, SDG&E intends to accelerate the replacement including the design, engineering, and construction of the new structures faster than the required six-month time frame mandated by the general orders. This will reduce the risk of wildfire by replacing poles that fail inspection on an accelerated schedule within the highest risk areas.

**Risk Mitigation:** This program mitigates the risk of wildfire by replacing poles found in poor condition through visual or intrusive inspections.

**2019 Progress and Results:** In 2019, SDG&E replaced 725 poles found through the GO 165 visual and intrusive inspections within the HFTD.

## T. Backup Power for Resilience (WMP Section 4.3.20)

**Description from 2019 WMP:** The National Academy of Sciences defines “resilience” as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. During extreme fire threats, SDG&E will likely de-energize power lines that serve backcountry communities. To mitigate some of the impact to these communities, SDG&E intends to implement a Backup Power for Resilience project, which will provide back-up power to critical infrastructure (i.e., fire stations, Community Resource Centers, and others) in these areas. This project focuses on investing in infrastructure to provide back-up power to strategic locations. SDG&E’s plan to deploy these backup facilities furthers the integration of technology in support of the safe and reliable operation of the distribution grid. This project will help customers most impacted by extreme fire weather events receive resilience benefits.

As part of this Plan, SDG&E will continue to pursue this initiative with the intent of establishing support in areas that will help mitigate the impact of these extreme weather events on its most impacted communities, while also providing overall grid resiliency and other electrical distribution grid operations and services. Other critical service providers (i.e., water agencies, communication providers, and others) should also consider enhancements to improve their resiliency.

SDG&E is also expanding upon or developing new programs and strategies, leveraging backup power for resilience to mitigate the risk associated with Public Safety Power Shutoffs. These programs are specifically related to resilient internet connectivity at fire stations, the expansion of the Community Resource Center Network and the potential development of a grant program for portable generation targeted at residential customers are further discussed in Section 4.7.5 below.

**Risk Mitigation:** This program mitigates the risk of wildfire by focusing on investing in infrastructure to provide back-up power to strategic locations to minimize the impact that PSPS events have on the communities impacted.

**2019 Progress and Results:** In 2019, all Community Resource Centers requiring a transfer switch to facilitate backup generation were fitted with manual transfer switches. In a pilot of the generator grant program, 79 medical baseline customers were identified and offered generators. Of the 79 medical baseline customers, 65 received the generator, were trained on its use, and are considered completed cases. The remaining 14 customers did not participate in the program as three were unresponsive to outreach efforts, eight refused to participate, and three had relocated. In addition, all targeted High-Performance Wireless Research and Education Network (HPWREN) system upgrades were completed by year end, resulting in more resilient internet connectivity to select fire stations and overall stability of the system.

To date, SDG&E has evaluated a multitude of critical facilities and communities and selected three microgrids to be deployed in 2020. These locations include a community center, aerial support base and a desert community frequently affected by PSPS events. During 2019, the primary activities that occurred were preliminary engineering, site acquisition, and solution design for these three locations.

## V. Vegetation Management

### A. Tree Database (WMP Section 4.4.1)

**Description from 2019 WMP:** Early in the inception of its vegetation management program, SDG&E created an electronic database to track and manage trees in close proximity to its electric infrastructure. SDG&E's database contains records for over 460,000 known, specific trees located near its electric power lines. Inventory trees are defined as those with the potential of impacting the power lines by encroachment and/or tree failure within three years of inspection date. All trees in SDG&E's database are monitored using known species growth rates, with additional consideration given to the amount of rainfall occurring during periods affecting overall tree growth, and past pruning practices. Each inventory tree is assigned a unique alpha-numeric identification number within the electronic database, which allows the activity history of each tree to be tracked.

**Risk Mitigation:** This program mitigates the risk of wildfire by providing a schedule-driven system that enables the management of a tree population with current and historic information including the growth rates, health, and status of all trees within SDG&E's inventory. This system allows for pre-planning and documentation of all work.

**2019 Progress and Results:** To date, the SDG&E vegetation management tree database contains an inventory of 455,000 trees.

### B. Patrol and Pruning (WMP Section 4.4.2)

**Description from 2019 WMP:** To comply with Commission rules as well as state and federal laws, SDG&E developed and maintains a vegetation management work plan, which is a schedule-based approach to its operations to ensure that applicable lines within its service territory are inspected each year. SDG&E divides its service territory into distinct zones known as Vegetation Management Areas (VMA). SDG&E's activities in each VMA are driven by a master schedule that identifies specific activities that are calendared to take place in each VMA every year. The activities include: pre-inspection, audit of pre-inspection work, tree pruning and removal, pole brushing and post trim and brushing audits. This process is managed through SDG&E's Vegetation Management System, an electric tracking system which was developed to store records of the vegetation management program activities.

SDG&E has historically utilized a contractor workforce to perform the vegetation management program activities of tree pre-inspection, tree pruning and removals, pole brushing, and quality assurance. Work performed by the contractor workforce is recorded and issued via work orders within the vegetation management program electronic work management system. During pre-inspection activity, trees in proximity to SDG&E's powerlines are inspected and evaluated and the tree condition in the database is updated accordingly. Each tree is visited by a certified arborist on an annual cycle. The annual inspections are routine maintenance and hazard tree assessments are performed to verify that inventory trees will remain compliant for the duration of the cycle and/or is pruned according to accepted standards and clearances. Trees that will not maintain compliance or have the potential to impact powerlines within the annual pruning cycle are identified to be worked on by the tree contractor. After the pre-inspection activity, a quality assurance audit is performed to verify the quality and accuracy of the inspection activities and tree listing prior to initiating a tree trim work order. Based on a field inspection, the auditor randomly samples at least 10 percent of the pre-inspection work to validate

the completeness and accuracy of the data from the pre-inspection. Once the results are reviewed and the audit finalized, the trimming work is assigned to a tree contractor who completes the pruning and/or removal activity.

During the tree pruning activity, the contractor determines what pruning and/or removal is required to achieve the required clearances to maintain annual compliance. Over time, SDG&E has established, as part of its routine operations, maximum post-pruning clearances and the removal of all tree branches that overhang the conductors. Where prudent and achievable, SDG&E's contract tree crews prune vegetation back to 12 feet (or more) in alignment with CPUC GO 95, Rule 35, Appendix E guidelines. The clearances obtained are determined by factors such as species, tree growth, wind sway, and proper pruning practices. Tree growth rates can be categorized based on species. For example, species such as eucalyptus may grow 12-15 feet within a year. Therefore, fast-growing species may require a post-pruning clearance of at least 16-20 feet to remain compliant with minimum clearance requirements for the annual cycle.

SDG&E tree contractors follow American National Standards Institute (ANSI) A300 industry tree standards and the concept of directional pruning, which fosters the health of a tree while maximizing clearance and extending the pruning cycle. All tree branches overhanging conductors are considered a potential risk, therefore, SDG&E removes all branches that cross the vertical plane of the conductors from the conductor to the top of the tree. Once the work is completed, the tree crew updates the tree information and records the work performed in the database and Vegetation Management System. On average, SDG&E prunes approximately 175,000 trees each year and removes approximately 8,500 non-compatible trees.

The scoping operations for complete tree removals includes the chipping of all material and removal of the debris off-site. The only material left on site during tree removals is the larger wood (> 6-8-inch diameter). Any large debris left is positioned to prevent movement of the material by gravity. All debris associated with pruning and removal operations is removed from watercourses to prevent flooding or degradation of water quality. Tree removal operations that may occur in sensitive environmental areas are reviewed to determine protocols that must be followed to protect species and habitat.

As explained in Section 2.1 above, the Commission has refined and remapped the fire threat areas in California and established the HFTD. This also changed the areas where increased minimum clearances apply. It is within these newly-defined areas that SDG&E continues increased, annual hazard tree inspections and performs maximum post-pruning clearances. Prior to fire season, SDG&E requires vegetation management contractors to perform annual training on hazard tree assessment. This refresher training helps set the stage for a second inspection, and a corresponding tree-hazard evaluation is performed for each tree within the HFTD. The tree evaluation includes 360-degree assessment of every tree within the "strike zone" of the conductors and maximizes the time-of-trim clearances. The strike zone includes the area adjacent to powerlines with trees that are tall enough to potentially strike the overhead facilities if the tree were to fail. To the extent unsafe clearances exist, an order to clear vegetation is issued and trimming is completed prior to September 1<sup>st</sup> of each year. These activities ensure safe minimum vegetation clearances are achieved prior to the peak fire season.

**Risk Mitigation:** This program mitigates the risk of wildfire by increasing the frequency of tree inspections beyond an annual assessment of trees that have the potential to impact the overhead electrical facilities. The patrol is in addition to the routinely-scheduled inspection of trees and includes

the assessment of the hazard potential of all trees within striking distance of the lines. Patrol and Pruning activities take place before the onset of the most dangerous fire weather conditions which occur during the fall.

**2019 Progress and Results:** In 2019, SDG&E completed two separate off-cycle patrols of bamboo and one off-cycle patrol of century plant. Each of these patrols were in addition to the routine inspection activities. All work identified within these patrols has been completed.

### C. Enhanced Inspections, Patrols, and Trimming (WMP Section 4.4.3)

**Description from 2019 WMP:** In response to the ongoing and increasing threat of wildfire risk throughout California and the region, SDG&E will take steps to enhance its vegetation management program to further mitigate wildfire risk in the HFTD. In particular, SDG&E will enhance its routine inspections within the annual cycle, increase the amount of off-cycle patrols, and expand its tree trim scope.

During the annually scheduled routine inspection activity, the pre-inspection scope for all VMAs will be increased to include trees within the strike zone of transmission and distribution electric facilities. Trees tall enough to strike overhead electric lines will be assessed for hazardous conditions and tree crown height will be reduced or removed to prevent a line strike from either whole tree failure or limb break out. This would include dead, dying and diseased trees, live trees with structural defect, and locations with dense tree population that could strike as a result from wind exposure. Greater consideration will be given to environmental conditions that can impact a tree's relationship to the electric facilities such as wind sway and line sag. This same scope and criteria will be applied during an off-cycle tree patrol of all VMAs within SDG&E's service territory. These additional patrols will be timed to occur mid-cycle with the routine inspection to ensure all lines are reviewed twice annually and applying the enhanced scope.

SDG&E's tree trim scope will be increased to achieve a 25 feet clearance post-trim within the HFTD where feasible between trees and electric facilities. This is a significant increase over the average 12 feet of clearance that SDG&E currently achieves post-trim. There may be some barriers to achieving this goal. Environmental agencies, land agencies, and customers may oppose the tree pruning at this new clearance level, however, SDG&E hopes to work through these issues to achieve the desired wildfire risk mitigation. The trees targeted for enhanced trimming are the trees within the strike zone as described above. All tree operations will employ the concept of directional pruning wherein all branches growing towards the lines will be rolled back to direct the growth away from the lines and to increase the post-trim clearance. These activities are expected to incrementally decrease the risk of tree branches coming into contact with electric facilities either by encroachment by growth or limb or complete tree failure.

**Risk Mitigation:** This program mitigates the risk of wildfire by both increasing the frequency of vegetation inspections, and by increasing the minimum vegetation clearance from the lines to 25' where achievable.

**2019 Progress and Results:** In 2019, SDG&E completed off-cycle patrols throughout the entire HFTD. These patrols included an additional inspection of the 81,000 trees within the HFTD that were targeted for enhanced 25-foot post prune clearance or complete removal. The number of targeted tree species that were trimmed to the enhanced clearance and removed within the HFTD was 4,629 and 3,563 respectively.

#### D. Technology (WMP Section 4.4.4)

**Description from 2019 WMP:** As an added enhancement to the tree inspection activity, SDG&E utilizes LiDAR to assist in directing inspectors to trees that are outside the utility right of way that are tall enough to fall and strike powerlines. This helps to ensure all trees are properly assessed during the inspection. SDG&E is researching future use of LiDAR to identify change detection on poles and equipment, and as a compliance component for post construction and post pruning activities. Currently, LiDAR acquisition, classifying of the data, and modeling of the data is very time consuming and costly. The turnaround time for information has not yet proven to support such use cases in the field.

As another tool in the management of its inventory trees, SDG&E has in recent years implemented the use of Tree Growth Regulators (TGR), which is a chemical application that dramatically reduces the new shoot growth of trees. Results have shown that the use of TGR can reduce the frequency of pruning some species up to three years. An added benefit of using TGR is that it provides growth reduction, root and leaf enhancement, and in some instances can help with disease and insect protection.

SDG&E is beginning to integrate more data science into its vegetation management plan in an effort to have a more analytical approach. The first step, which is planned for 2019, is to data-mine the full vegetation management dataset and investigate additional operational uses for the database containing the full inventory of the over 460,000 trees managed. The goal of this initiative is to leverage machine learning and artificial intelligence techniques to correlate SDG&E's extensive vegetation and meteorological datasets to gain additional insights on how atmospheric conditions impact growth rate of certain species and identifying certain high-risk vegetation areas.

**Risk Mitigation:** This program mitigates the risk of wildfire by utilizing historical and contextual data to forecast where vegetation management operations may be focused or prioritized. GIS and database analyses using metrics including vegetation type, weather, topography, outage history can help predict where tree failures are likely to occur. SDG&E has implemented the use of LiDAR to enhance its inspection operations and to validate vegetation clearances. The use of this technology is intended to only supplement these activities and will be integrated on a limited basis.

**2019 Progress and Results:** In 2019, Vegetation Management continued to process and analyze LiDAR data to determine how best to integrate the information into its vegetation management operations. LiDAR data is also currently being integrated into SDG&E's Vegetation Risk Index (VRI) risk model to improve operational information. SDG&E continues to utilize its meteorological data to complete the VRI. In addition, SDG&E's PSPS Mitigation Engineering team is developing a Circuit Risk Index, which also utilizes vegetation management data for purposes of PSPS procedure and system hardening prioritization.

In 2019, SDG&E continued its use of Tree Growth Regulator (TGR) to manage targeted, fast-growing species. The following species have shown to be effective for TGR use: Eucalyptus (all species); California Pepper (Schinus mole); Chinese Elm (Ulmus parvifolia); Oak (all species); Silk Oak (Grevillea robusta); Tipu (Tipuana tipu); Jacaranda (Jacaranda mimosifolia); Acacia (all species); Liquidamber (Liquidamber styraciflua); Mulberry (Morus alba); Ailanthus (Ailanthus altissima); Brazilian Pepper (Shinus terebinthifolia); Paperbark (Melaleuca quinquenervia). In 2019, SDG&E applied TGR to 1,187 trees.

#### E. Quality Assurance (WMP Section 4.4.5)

**Description from 2019 WMP:** Upon completion of the tree pruning/removal activity within a VMA, a certified arborist performs a quality assurance (QA) audit on a representative sample of completed work to ensure compliance with scoping requirements. During the QA audit, the certified arborist also performs a cursory inspection of all the powerlines within the VMA for any trees that will not remain in compliance with applicable regulatory requirements until the next trim cycle. The results are then reviewed with SDG&E and the contractor to determine if any additional work is required.

**Risk Mitigation:** This program mitigates the risk of wildfire by measuring all work performed by contractors to validate that they meet or exceed the Scopes of Work, and are in compliance with the requirements of GO 95, Rule 35 and PRC sections 4292 and 4293. This includes the activities of pre-inspection, tree pruning and removal, and pole brush clearing. Included in the Scope of Work for Quality Assurance, the contractor performs a full patrol of all overhead primary and transmission lines to confirm minimum clearance requirements will be maintained until the next pre-inspection activity. The QA inspection serves as a de facto mid-cycle patrol of the lines and provides an additional opportunity to identify hazardous trees.

**2019 Progress and Results:** Per the Vegetation Management Master Schedule, SDG&E performs the post-trim audit activity approximately two months following the routinely-schedule tree trim activity. By the end of 2019, SDG&E had performed an audit on approximately 60% of the routine (HFTD and non-HFTD) tree work completed within all the Vegetation Management Areas (VMA).

The off-cycle HFTD patrol schedule was refined in 2019 in VMAs where patrols aligned with the routine post-trim audit activity. The audit schedule was impacted because the audit contractor performed several of the off-cycle patrols in conjunction with the post-trim audits.

The remainder of the off-cycle post-trim and inspection activities are currently underway following the Master Schedule timeframe. Per SDG&E's off-cycle HFTD schedule, a number of VMA's were performed by the pre-inspection contractor. SDG&E performed a 100% audit of the completed tree work associated with these patrols.

#### F. Hazard Tree Removal and Right Tree-Right Place (WMP Section 4.4.6)

**Description from 2019 WMP:** SDG&E implemented and maintains a system-wide tree removal program to remove problematic species such as eucalyptus and palms. In addition, SDG&E established a "Right Tree-Right Place" program to assist customers in the selection of tree species and planting locations with the goals of minimizing interference with nearby powerlines and facilities, and maximizing energy saving and environmental benefits with carbon sequestration. SDG&E also offers free tree replacements in the event that an existing tree cannot be maintained safely near powerlines and should be removed rather than trimmed. Notably, SDG&E has, for the 16<sup>th</sup> consecutive year, been recognized by the National Arbor Day Foundation as a "Tree Line USA" utility company in recognition of "best practices" combining worker education and training, public outreach, quality tree care, and system reliability.

Hazard tree evaluation is a critical component of SDG&E's vegetation management program operations in the effort to reduce tree-related outages and avoid fire ignitions. SDG&E utilizes International Society of Arboriculture-certified arborists to perform its hazard tree inspections. These individuals also receive annual hazard tree inspection training to stay current with best practices. SDG&E has actively pursued

the removal of non-compatible tree species such as eucalyptus with known tendencies for branch or trunk failure, and trees that were dead, dying or structurally defective. When a tree is considered a hazard, meaning that it poses a threat that will not hold until the scheduled trim date or is found to be out of compliance with clearance requirements, the tree is pruned on a priority basis, sooner than it would be under the Master Schedule. Such trees are generally pruned the same day as inspected, within 24-48 hours, or within a few weeks, depending on the severity of the hazard, as determined by the person evaluating the tree.

SDG&E has also initiated off-cycle, additional patrols of selected species such as bamboo and Century plants. These species are unpredictable and fast-growing and therefore pose a unique challenge to manage near powerlines. As such, these incremental patrols help target and remove such problematic species before they can become a danger. In addition, SDG&E implemented a broader scope in the removal of palms adjacent to its powerlines. SDG&E targets palms for removal that are located up to 65 feet away, that have the potential to shed fronds onto the powerlines and possibly cause an outage or fire.

**Risk Mitigation:** This program mitigates the risk of wildfire by removing hazardous trees (i.e., dead, dying, diseased, structural defective) that could shed a limb or fall onto a powerline and cause an ignition. SDG&E targets for removal those species, such as eucalyptus and palm, with known growth and failure patterns. As a standard pruning practice, SDG&E also proactively removes all tree branches overhanging the conductor to reduce the chance of impact with the power lines. SDG&E's Right Tree-Right Place program follows the concept of planting trees near powerlines that will not encroach upon or require maintenance near power lines. The Right Tree-Right Place program provides for higher reliability, public safety, reduced maintenance costs, and preserves the health of trees.

**2019 Progress and Results:** In 2019, SDG&E completed 9,884 tree removals and replaced 260 trees. Of the total completed tree removals, 3,563 were targeted species located within the HFTD. The removal of these trees greatly mitigates future threats to the power lines. The replacement trees in 2019 included those provided in association with several tree planting and Arbor Day outreach events. These events provided a venue to share the concept of "Right tree, Right Place" and other wildfire mitigation efforts.

#### G. Pole Brushing (WMP Section 4.4.7)

**Description from 2019 WMP:** SDG&E performs pole brushing in the State Responsibility Area (SRA) of the state in compliance with PRC § 4292. This requirement is regulated by CalFire, the agency with primary responsibility for fire suppression in those areas. Pole brushing involves clearing vegetation, flammable brush, and other materials around the base of electric power poles in an effort to prevent pole equipment-related ignition sources. Currently, there are approximately 84,000 distribution and transmission structures that are inspected annually to comply with PRC § 4292. SDG&E manages approximately 35,000 poles within the SRA that are designated as subject poles that carry "non-exempt" equipment. To further reduce potential ignition sources, SDG&E's Vegetation Management team works closely with SDG&E's FiRM team and engineering to reduce the number of non-exempt powerline components by replacing such equipment, where feasible, with exempt equipment, which should also reduce the potential for pole attachments to become an ignition source.

Since 2003, SDG&E uses a three-phase approach to more effectively manage subject poles. This approach includes: chemical pole brushing, mechanical pole brushing, and re-clear pole brushing. Chemical pole brushing involves clearing all vegetation from around the pole base and applying an Environmental Protection Agency (EPA) approved herbicide. SDG&E treats approximately 10,000 poles, during the fall and winter months, with a pre-emergent herbicide to minimize vegetative re-growth and reduce overall maintenance costs. Not all subject poles can be treated with herbicide due to environmental constraints, which include considerations such as slope, proximity to water, proximity to trees and other vegetation, and customer approval.

SDG&E annually performs various types of pole brushing and does so during different times of the year. Mechanical pole brushing involves the removal of vegetation from around the pole base using mechanical means. Mechanical brushing is typically performed in the spring months. Re-clear pole brushing, performed in summer months, involves removing any additional flammable vegetation which has grown into, or blown into, the required clearance area since the last maintenance activity. The need to revisit a subject pole multiple times is not uncommon due to leaf litter blown back into the managed clearance zone during windy conditions, and due to the growth of weeds and grasses that cannot be easily controlled by mechanical clearing or herbicide treatments. Trees adjacent to subject poles also require pruning to keep dead, dying or diseased tree limbs, branches, and foliage from encroaching into the radius of the cleared circle from ground up to the height of the electrical conductors.

**Risk Mitigation:** This program mitigates the risk of wildfire by performing inspection, customer communications, and multiple brushing activities within the annual cycle including mechanical brush, herbicide application and re-clear. These activities are scheduled in sequence to ensure compliance for the duration of the annual cycle. The timing of the pole brushing activities prevents vegetation from recurring within the cleared radius of the subject poles. Additionally, SDG&E conducts pole brushing on approximately 3,000 poles that are not subject to the clearance requirements in areas with flammable vegetation, steep slope, or adjacent to wildland interfaces where a fire could propagate.

**2019 Progress and Results:** In 2019, SDG&E completed 100% mechanical brushing, chemical applications, and re-clear cycles on targeted poles. This totaled to 25,230 mechanical poles, 10,908 chemical poles, and 23,337 re-clear poles. At the end of 2019, the notification process for the next cycle was 80% complete. Of the total completed brushed poles, approximately 2,200 are located within the non-State Responsibility Area. SDG&E brushes these poles as an additional fire mitigation activity within the Local Responsibility Area where fire conditions may exist.

#### H. Electric Equipment Training (WMP Section 4.4.8)

**Description from 2019 WMP:** As previously mentioned, CalFire performs inspections in compliance with PRC §§ 4292 and 4293 in the SRAs. SDG&E provides electrical equipment training to CalFire representatives so that SDG&E is maintaining proper clearances of vegetation to conductors and equipment prior to the start of the fire season. While CalFire inspections have been jointly performed with SDG&E, this training is intended for CalFire to better understand the operation of the electric system and which equipment should be targeted to best prevent an ignition source. This training can be used by CalFire while they are conducting their day to day operations and inspections.

**Risk Mitigation:** This program mitigates the risk of wildfire by jointly inspecting SDG&E facilities with CalFire to better understand wildfire risk and site-specific hazards.

**2019 Progress and Results:** This program was initiated as a collaboration with CalFire. Both SDG&E and CalFire are required to perform inspections in compliance with PRC 4292 and 4293. SDG&E and CalFire jointly perform these inspections so that CalFire better understands the electrical equipment. It also provides the opportunity for the utility and agency to assess local compliance and field conditions.

At the beginning of 2019, SDG&E offered to train CalFire employees on electrical equipment. CalFire experienced priority fire suppression activities and were not available to participate in training activities. CalFire confirmed there was a county staffing issue and expect to be able to provide additional staffing in 2020. CalFire tentatively plans to resume joint inspections with SDG&E in 2020.

#### I. Red Flag Operations (WMP Section 4.4.9)

**Description from 2019 WMP:** During elevated or extreme weather events that could lead into a designated RFW, SDG&E's vegetation management contractors are kept informed of these conditions allowing them time to relocate crews into safe work areas. In instances of emergency tree pruning during extreme fire conditions, additional fire equipment and/or support from the contracted, professional fire services may be utilized.

In advance of a forecasted RFW, vegetation management will determine if patrols are warranted to re-assess tree conditions in advance of, during, or immediately following red flag events. SDG&E's Meteorology team will work with the Fire Coordination and Vegetation Management departments to determine where this activity should occur. These inspections are incremental to the routine cyclical inspections performed by this group.

**Risk Mitigation:** This program can mitigate the risk of wildfire by proactively staging inspectors in known areas of high fire potential, such as large tree density and high wind corridors, to monitor for conditions that may cause an ignition in the upcoming red flag event.

**2019 Progress and Results:** Throughout 2019, tree trim crews were staged at various SDG&E Operational Centers in advance of and during each Red Flag Warning event at the request of the Electric Distribution Operations.

- In advance of the RFW events in late October of 2019, SDG&E's Electric Troubleshooters (ETS) performed patrols in areas of the service territory forecasted for strong winds to identify potential equipment or vegetation issues. During these ETS patrols, only a few tree-related issues were identified. All identified work was completed in advance of the event.
- During the October 2019 RFW events, SDG&E dispatched ETS patrollers to observe conditions throughout the HFTD. Additionally, approximately 25-30 Vegetation Management pre-inspectors were working in these same areas assessing trees. Vegetation Management pre-inspectors identified approximately 18 trees that required priority work. This included instances where wind was blowing trees in proximity to the lines, and trees required priority work due to a defect. All priority work was completed during the RFW event or shortly thereafter.
- Following the RFW event in late October, Vegetation Management performed a hazard tree patrol on ten circuits in areas affected. Seven trees were identified that required follow-up work. All follow-up work was completed.

## VI. Situational Awareness

### A. Fire Science and Climate Adaptation Department (WMP Section 4.5.1)

**Description from 2019 WMP:** A large part of being prepared for and mitigating the threat of fire is recognizing the fact of environmental and situational evolutions. SDG&E's service territory has experienced drought and increased tree mortality, which compound the severity of and threat of the potential for an ignition. In recognition of these changing conditions, SDG&E restructured resources and, in early 2018, established a Fire Science and Climate Adaptation (FS&CA) department comprised of meteorologists, community resiliency experts, fire coordinators, and project management personnel. The department's purpose is responding to and strategizing for the ever-changing utility industry's fire preparedness activities and programs. As climate change, community growth, and other evolutionary trends continue to impact the region, the FS&CA department must likewise evolve to address and provide situational awareness around emerging threats to utility infrastructure.

**Risk Mitigation:** This strategy mitigates risk by enhancing the ability to anticipate, prepare for, react to, and recover from significant fire weather events.

**2019 Progress and Results:** The FS&CA department was formed in 2018 and continued to grow and take shape in 2019. This department forms the foundation for situational awareness, emergency response, community resiliency to wildfire and informing hardening prioritization at SDG&E.

### B. Meteorological Capabilities and Technologies (WMP Section 4.5.2)

#### **Description from 2019 WMP:**

##### *SDG&E Meteorology Team*

SDG&E has five full-time degreed and experienced meteorologists on staff with expertise in program management, utility forecasting, data science, and Southern California fire weather. Their responsibilities include analyzing historical weather and, importantly, monitoring incoming weather data in real-time. They also provide a detailed daily forecast of weather conditions relevant to SDG&E's operations.

##### *SDG&E Weather Network*

SDG&E owns and operates a network of over 175 weather stations that are physically located on electric distribution and transmission poles and provide temperature, humidity, and wind observations every 10 minutes. This allows weather conditions to be monitored in near real-time on every distribution circuit and transmission line across the fire-prone areas of the SDG&E service territory. Each weather station location was carefully selected by SDG&E meteorologists based on their knowledge of the local terrain and its influence on meteorological conditions.

The siting process begins with a detailed examination of the terrain along a given circuit or tie line using a combination of Google Earth, topographical maps, and subject matter expertise of known local wind conditions. Once a site has been identified, a field visit is conducted to visually confirm the lay of the land and suitability for a weather station. Some circuits and tie lines cross dozens of miles through complex terrain, requiring additional weather stations to adequately monitor all areas of concern. These siting protocols ensure sufficient data granularity to provide SDG&E clear knowledge of the local

weather conditions in its service territory. This data informs day-to-day operational decision-making at all levels of the Company to enhance situational awareness and mitigate the risks associated with wildfires and other adverse weather conditions. Additionally, the SDG&E weather station network supports SDG&E's Community Fire Safety Program and SDG&E strategic initiatives. SDG&E's weather station network is set forth in Appendix D.

SDG&E's weather data is available to all SDG&E employees, weather agencies, fire agencies, educational facilities, and the general public. There are a number of locations and applications where the data may be viewed, including the publicly available SDG&E Weather Awareness System at: <http://sdgeweather.com>. This site includes graphical images to visualize data and links to additional data, camera sites, and forecasts, and is scalable for a variety of devices, including tablet or hand-held.

The SDG&E weather network will continue to evolve in the years to come to maintain effective situational awareness and data quality. As the region faces the impacts of a changing climate, plans are being made to expand the weather network into high-impact wildland urban interfaces where more extreme weather and fire conditions may occur. Strategic weather station relocations are also planned to account for changes on the landscape and an increased understanding of climatological wind patterns in the SDG&E service territory.

#### *Meteorology High-Performance Computing Program*

SDG&E owns four high-performance computing clusters that are used to generate high quality weather data that is incorporated directly into operations. Collectively, nearly 2,000 compute core hours of high-performance computing are used per day to generate operational products, including the SAWTI, FPI, and WRRM-Ops. The forecast data generated by the supercomputers is shared with several partners, including the U.S. Forest Service, who disseminate the data through their public website, and the National Weather Service.

SDG&E plans to continue the production of forecast products into the foreseeable future. As science evolves and new technologies become available, SDG&E will use its computing clusters to integrate the new methodologies in order to maintain forecast reliability and situational awareness.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by supporting the SDG&E situational awareness capabilities.

**2019 Progress and Results:** In 2019, SDG&E's team of meteorologists helped anticipate, prepare and react to numerous periods of critical fire weather conditions, leveraging data and analytics from its high-performance computing environment. SDG&E added 13 weather stations, growing its weather network from 178 to 191 weather stations, increasing its situational awareness and further deepening the understanding of how Santa Ana Winds impact the communities SDG&E serves.

#### C. Fire Potential Index (WMP Section 4.5.3)

**Description from 2019 WMP:** The FPI was developed by SDG&E subject matter experts to communicate the wildfire potential on any given day to promote safe and reliable operations. This seven-day forecast product, which is produced daily, classifies the fire potential based on weather and fuels conditions and historical fire occurrences within each of SDG&E's eight operating districts. This is also shared with local fire agencies, emergency responders, and the National Weather Service.

The FPI reflects key variables, such as the state of seasonal grasses across the service territory (green-up), fuels (ratio of dead fuel moisture component to live fuel moisture component), and weather (sustained wind speed and dew point depression). Each of these variables is assigned a numeric value and those individual numeric values are summed to generate a fire potential value from zero (0) to seventeen (17), each of which expresses the degree of fire threat expected for each of the seven days included in the forecast. The numeric values are classified as “normal,” “elevated,” and “extreme.” Further detail on the various FPI components is provided in Appendix E.

The FPI development team, consisting of SDG&E meteorologists and fire coordinators, has validated the FPI values and its usefulness by recreating historical values dating back to 2002. The historical results bore a very strong correlation to actual fire events in terms of the severity of past fires and, in particular, provided very accurate information as to when the risks of uncontrolled and large-scale fires were high. SDG&E expects to tie proactive and reactive operational practices and measures to the FPI values, with the further expectation that SDG&E will be able to reduce the likelihood its facilities and operations will be the source of ignition for a fire during times when the risk of fire as measured by the FPI elevated or extreme.

Moving forward, SDG&E will continue enhancing the predictors that contribute to the FPI, including live fuel moisture and green-up, to modernize the data inputs and better leverage the high-performance computing environment.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by classifying the fire potential based on weather and fuels conditions and historical fire occurrences within each of SDG&E’s eight operating districts. This is also shared with local fire agencies, emergency responders, and the National Weather Service.

**2019 Progress and Results:** In 2019, SDG&E enhanced the predictors that contribute to the FPI, including the integration of artificial intelligence into the Live Fuel Moisture component. SDG&E also enhanced the data inputs by better leveraging its high-performance computing environment. SDG&E had an FPI rating published for every day in 2019, with Elevated or higher condition resulting in 137/365 days or 37.5% of the time. SDG&E continues to leverage the FPI to inform its operating conditions and procedures.

#### D. Santa Ana Wildfire Threat Index (WMP Section 4.5.4)

**Description:** SDG&E, the U. S. Department of Agriculture, the U.S. Forest Service, and the University of California Los Angeles (UCLA), in collaboration with CalFire, the Desert Research Institute, and the National Weather Service unveiled a web-based tool in September 2014 to classify the fire threat potential associated with the Santa Ana winds that are directly linked to the largest and most destructive wildfires in Southern California. The SAWTI categorizes Santa Ana winds based on anticipated fire potential and uses several meteorological and fuel moisture variables generated from the Weather Research and Forecasting (WRF) Model to forecast the index out to 6 days. In addition to the index, a 30-year climatology of weather and fuels has been developed to help put current and future events into perspective.

The SAWTI calculates the potential for large wildfire activity based on the strength, extent, and duration of the wind, dryness of the air, dryness of the vegetation, and greenness of the grasses. Similar to the

hurricane-rating system (category 1-5), the SAWTI compares current environmental data to climatological data and correlates it with historical wildfires to rate the Santa Ana wind event on a scale from “marginal” to “extreme.” To help the region prepare for hazardous conditions, information from the SAWTI is issued daily to fire agencies and other first-responders, which has led to specific preparedness and operational decisions based on the likelihood of a catastrophic wildfire fueled by Santa Ana winds. The public also has access to SAWTI to make personal safety decisions.

SDG&E is committed to maintaining the data flow used in SAWTI production for the U.S. Forest Service, who now issues this product daily. As technologies in weather forecasting and fuels predictions evolve, the new science will be integrated into operations to support the ongoing production of SAWTI.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by leveraging big data and analytics to assess the wildfire potential associated with an approaching weather event and sharing that information with stakeholder in the community and the public.

**2019 Progress and Results:** In 2019, SDG&E continued to maintain the data flow used for daily SAWTI production and delivered this data to the United States Forest Service’s Predictive Services Unit. This tool allows SDG&E and others to gauge the severity of Santa Ana wind events.

#### E. Wildfire Risk Reduction Model – Operational System (WMP Section 4.5.5)

**Description of 2019 WMP:** Significant intel related to the wildfire potential is also gathered from SDG&E’s WRRM-Ops, which integrates the latest weather and GIS technology to understand wildfire growth patterns across the region (running 6,000 fire growth simulations per second on SDG&E’s super-computer and able to simulate 10 million fires in a single night). WRRM-Ops assesses the areas of highest fire danger before a wildfire begins so preventative measures can be taken to enhance public safety and ensure the reliable operation of the electric system. This model uses simulations generated from weather conditions, historical fire and outage history, and vegetation data to evaluate the wildfire risk within the SDG&E service territory.

WRRM-Ops is also able to simulate the growth and potential impact of a wildfire anywhere in the SDG&E service territory should an ignition begin. Integrating all of the aforementioned weather data developed by SDG&E, the WRRM-Ops model can conduct an analysis to determine the immediate threats, enabling quick decision making to help decrease the impacts of wildfire.

In 2019, this technology will be enhanced by migrating a fully operational version of the application to a cloud hosted environment, enabling SDG&E to operate this model through native mobile applications built for its subject matter experts and leadership. SDG&E is developing the capability to simulate wildfire growth and conduct vulnerability assessments from the field while responding to a wildfire incident.

**Risk Mitigation:** This program mitigates the risk of wildfire by assessing the areas of highest fire danger before a wildfire begins so preventative measures can be taken to enhance public safety and ensure the reliable operation of the electric system.

**2019 Progress and Results:** In 2019, SDG&E continued to enhance and further operationalized its WRRM-Ops. Specifically, the wildfire simulations now have the capability to indicate the structures, customers, and SDG&E infrastructure that is at risk due to an ignition. This tool is also increasingly being

used to prioritize hardening efforts and communicate real-time risk to inform operational and construction efforts.

#### F. Camera Networks and Fire Detection (WMP Section 4.5.6)

**Description from 2019 WMP:** Currently, SDG&E utilizes a total of 107 cameras that enhance situational awareness around wildfire. Twenty of these cameras are owned by SDG&E, while 87 cameras are supported by SDG&E in collaboration with UCSD as part of the High-Performance Wireless Research and Education Network (HPWREN). Of these 87 cameras, 72 are static and 16 are high-definition pan-tilt-zoom “Alert SDG&E Cameras,” which are capable of remote directional and zoom control.

The Alert SDG&E Camera network is a state-of-the-art camera network designed to monitor wildfire activity and enhance situational awareness for SDG&E and its first responders and the communities they serve. SDG&E partnered with UCSD and the University of Nevada to deploy this network of 16 live-stream pan-tilt-zoom mountaintop cameras, which allows for quicker identification and triangulation of wildfires. Alert SDG&E Cameras are heavily used by CalFire’s Monte Vista Dispatch Center to aid in better locating and sizing up wildfires for initial attack prior to the arrival of first responders.

SDG&E will maintain a close working relationship with UCSD in the years to come, supporting the HPWREN program and the evolution of the situational awareness cameras across the region for all wildfire community stakeholders and residents.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by enhancing situational awareness and improving SDG&E’s ability to react to wildfires on the landscape. These cameras are also heavily used by CalFire.

**2019 Progress and Results:** In 2019, SDG&E continued to build the relationship with UCSD, helping to stabilize the cameras’ communication backbone, while expanding the networks coverage into southern Orange County. The cameras were used repeatedly in 2019 by SDG&E and first responders in the community to provide situational awareness during wildfire response.

#### G. Climate Change Adaptation (WMP Section 4.6)

**Description from 2019 WMP:** Between January 1<sup>st</sup> and December 16<sup>th</sup> of 2018, 6,266 fires were reported by CalFire across the state of California with a burn area totaling 876,131 acres. This is a decrease of 16 fires during the same period in 2017, but an increase of 554,474 acres burned and stands at 111% and 375% of the 5-year averages of fires and acres burned, respectively. While these numbers are exacerbated by dry conditions produced by well-below average rainfall statewide during the winter of 2017-2018, data ranging back to 1984 across San Diego County confirms that the number of high fire potential days each year has increased since the early 2000s. These trends are projected to continue as a combination of factors leads to increases in both fire season duration and severity through the end of the century.

A 2013 study by the National Oceanic and Atmospheric Administration (NOAA) National Environmental Satellite, Data, and Information Service (NESDIS) group found that the effects of climate change will not significantly alter the frequency of Santa Ana wind events, which typically occur 2-5 days per month between October and March and have contributed to the growth of several of the largest wildfires in Southern California history. However, due to overall warming across the region, Santa Ana winds are

likely to bring higher temperatures and lower humidity that will increase the fire potential with each event. Because Santa Ana wind events typically deliver the warmest conditions to the coastal communities, increases in fire potential may also extend to the coastal canyons and wildland urban interface areas that historically have not been as high of a wildfire concern. The warmer temperatures are also expected to enhance evaporation and transpiration even outside of Santa Ana events, which will deplete fuel moistures at faster rates. When coupled with longer dry periods, increases in tree mortality due to drought, and increased warmth, this will result in longer fire seasons across the Southwest.

San Diego Foundation/SCRIPPS projects that in 2050 there will be longer and more extreme fire seasons and by 2100 the probability of large fires in Southern California could increase by 30%. Though the general consensus is that fire seasons will lengthen and become more severe through the coming century, there are still several unknowns that may alter fire behavior including shifts in vegetation type and the rebound rates of fuels in burned areas. It has been suggested that some vegetation types will be unable to adapt to the temperature increases, which would initially lead to an ample supply of dead fuels to carry fire but would eventually result in a decline in fuels coverage unless the vegetation was phased out by species more apt to handle the hotter temperatures. In addition, assuming the fires fully consume the fuels, increases in fire activity will eventually become limited until enough vegetation can grow back to support fire growth.

**Risk Mitigation:** This strategy mitigates the risk of wildfire through tracking and better understanding the impact that the changing climate is likely to have on the fire environment.

**2019 Progress and Results:** In 2019, SDG&E collaborated with the San Diego Association of Governments (SANDAG) and educational institutions to better understand the impacts of climate change and to explore how to best mitigate these impacts. SDG&E has expanded its internal climate advisory group, which was established to advise on climate change adaptation-based decisions.

#### H. Wireless Fault Indicators (WMP Section 4.6.2)

**Description from 2019 WMP:** The Wireless Fault Indicators program will install wireless fault indicators on SDG&E's electric distribution system. Wireless fault indicators are used to continuously monitor distribution circuits to locate faults more efficiently and accurately due to rapid pinpointing of line faults. When coupled with the On-Ramp Wireless system, the wireless fault indicator will communicate information to distribution system operators. This allows the operators to dispatch electric troubleshooters closer to the exact fault location, which supports quicker identification and isolation of the fault so that service restorations may begin. Wireless fault indicators provide detection and indication of electrical faults in the electric power distribution networks of the utility. Currently, the status of the indicators (tripped or reset) must be checked by visual inspection. This method takes a considerable amount of time as it involves driving to the field, patrolling the line to locate the tripped fault circuit indicator, and repairing the line. In addition, there is no way to validate that the existing indicator is working properly. The new wireless fault indicator employs wireless communications technologies to remotely monitor their status.

**Risk Mitigation:** This program mitigates the risk of wildfire by providing awareness to where faults occurred so that remote cameras can be directed to see if an ignition took place. This program helps to minimize the consequence of a fire should it occur.

**2019 Progress and Results:** In 2019, SDG&E installed 594 wireless fault indicators within its service territory.

#### I. Advanced Weather Station Integration and Forecast (WMP Section 4.6.3)

**Description from 2019 WMP:** The Advanced Weather Station Integration and Forecast program seeks to further modernize the SDG&E weather network, which is currently the most granular, fully operational network of its kind anywhere in the country. This weather network brings superior situational awareness for the weather conditions impacting SDG&E's electric and gas system, supporting daily operations and emergency operations. The weather network also serves as a data foundation for high performance computer modeling which generates multiple analytical tools that are used across the organization. SDG&E's planned modifications to the system will include the replacement of aging sensors and equipment with the latest technology. This will include new thermometers, hygrometers, anemometers, batteries, solar panels, modems, and in some cases pyranometers. These actions will help ensure the weather network will continue running efficiently into the future.

The SDG&E weather network has become an integral aspect of the Community Fire Safety Program. The weather information is used to calibrate models such as the FPI and the SDG&E Outage Prediction Model which gives the Company the ability to anticipate when critical fire weather conditions or strong storms are approaching the area, allowing proactive preparedness measures to be taken. The weather network is also one of the primary pieces of intelligence that is used when, and if, the decision is made to de-energize portions of the electric system during times of critical fire weather conditions. In addition, this information is also shared with SDG&E's stakeholders. The typical lifespan of SDG&E's meteorological instrumentation is five to ten years. Proactive maintenance of SDG&E's weather network will be an important component for the future success of its Community Fire Safety Program.

**Risk Mitigation:** This program mitigates the risk of wildfire by continuously monitoring the wildfire environment across the SDG&E service territory using the best tools available.

**2019 Progress and Results:** In 2019, SDG&E added 13 weather stations to its service territory. In addition, SDG&E installed a software enhancement on 105 of 190 weather stations, allowing for reads every 30 seconds, a significant improvement from reads every 10 minutes. This also enables better situational awareness to support real-time decision making during PSPS events.

## VII. Public Safety Power Shutoff

#### A. Strategy for Minimizing Public Safety Risk (WMP Section 4.7.1)

**Description of 2019 WMP:** SDG&E has an obligation to operate its system safely. This obligation requires SDG&E to de-energize circuits (i.e., turn off power) when necessary to protect public safety (Public Safety Power Shutoff or PSPS). SDG&E is statutorily authorized to do so under P.U. Code §§ 399.2(a) and 451, consistent with D.12-04-024 and Commission Resolution ESRB-8. Any decision to de-energize circuits for public safety is made in consultation with SDG&E's Emergency Operations Center

(EOC), Meteorology, and Electric System Operations leadership. Typically, it is expected, but not required, that the FPI would be “extreme” or there would be a “red flag warning” in effect when a PSPS decision is made.

Following any PSPS event, as specified in Resolution ESRB-8, SDG&E submits a report to SED within 10 business days after each de-energization event, as well as after high-threat events where notifications were provided to local government, agencies, and customers of possible de-energization though no de-energization occurred. Reports to SED include at a minimum the following information:

- The local communities’ representatives contacted prior to de-energization, the date on which they were contacted, and whether the areas affected by the de-energization are classified as Zone 1, Tier 2, or Tier 3 as per the definition in GO 95, Rule 21.2-D.
- If not able to provide customers with notice at least 2 hours prior to the de-energization event, an explanation is provided in the report.
- The number and nature of complaints received as the result of the de-energization event and include claims that are filed against the IOU because of de-energization.
- A detailed description of the steps taken to restore power.
- The address of each community assistance location during a de-energization event, describe the location (in a building, a trailer, etc.), describe the assistance available at each location, and give the days and hours that it was open.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by de-energizing power lines that are experiencing extreme fire weather conditions.

**2019 Progress and Results:** SDG&E continues to use PSPS as a last resort mitigation during the most extreme weather events of the year. In 2019, SDG&E activated PSPS protocols on four events and utilized PSPS all four times. One of the PSPS protocol activations included three separate Red Flag Warnings, of which PSPS was only utilized for two of the three RFWs.

#### B. Public Safety Power Shutoff Protocols (WMP Section 4.7.2)

**Description from 2019 WMP:** A PSPS is a last resort measure to reduce wildfire risk. To that end, SDG&E takes great pride of the reliable service it provides to its customers. While the FPI and the National Weather Service’s RFW declarations drive the Operating Condition, SDG&E considers a wide variety of inputs to determine whether to de-energize portions of its system. SDG&E leverages a multitude of situational awareness data and input from its subject matter experts when considering the need for a PSPS event, though experience with this program has indicated that it is not appropriate to use a prescriptive technique to determine when to use PSPS as wildfire conditions are dynamic and not every situation is the same. In determining whether to employ a PSPS in a given area of its system, SDG&E considers a variety of facts such as:

- Weather conditions
- Vegetation conditions
- Field observations
- Information from first responders
- Flying debris
- Meteorology

- Expected duration of conditions
- Location of any existing fires
- Wildfire activity in other parts of the state affecting resource availability

Utility operating experience is required to analyze all of the various inputs and make the decision how to manage risk to the communities affected.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by confirming that electrical lines are structurally sound and free of debris after the extreme fire weather conditions have ceased.

**2019 Progress and Results:** Before re-energizing customers after a PSPS event, SDG&E confirms with meteorology that the peak winds have passed, and 100% of the de-energized circuit is patrolled by ground or helicopter to ensure no damage occurred during the event.

### C. Communication Practices (WMP Section 4.7.4)

**Description from 2019 WMP:** In advance of the peak of fire season, SDG&E will conduct ongoing education campaigns in five languages (English, Spanish, Chinese, Filipino, Vietnamese) regarding how to be prepared for emergencies in the event of a wildfire, natural disaster or major outage. This education campaign will also encourage customers to sign up for outage notifications, with the goal of raising awareness about SDG&E's PSPS procedures.

In the days leading up to a potential or imminent PSPS and during an active event, SDG&E establishes and maintains contact with customers that it believes may be impacted via various channels (use in-language where possible) communicating which Community Resource Centers are open and keeping the media and the public aware of the number of customers impacted and activities/restoration efforts by SDG&E crews. Key stakeholders, elected officials, and first responders are also communicated with through a variety of channels and personnel. SDG&E has specific teams or personnel assigned to directly contact local and state elected officials and critical customers, including water utilities and agencies affected by a PSPS. SDG&E's call center, social media, and website provide ongoing and available resources for communication and education for the overall customer base.

SDG&E monitors wildfire conditions seven to ten days ahead, providing forecasts to operational management and emergency operations staff so they have knowledge and time to prepare. Additionally, in certain extreme conditions, this advanced awareness is provided to key external stakeholders. If extreme fire weather conditions are forecasted and materializing, and the National Weather Service has the potential to issue a RFW, SDG&E begins to coordinate with local government agencies, community-based organizations, and emergency responders through its key account, company relations, and fire coordination teams. These SDG&E teams maintain contact throughout the event, providing updated information and a conduit for external stakeholders to communicate to SDG&E. SDG&E will also initiate proactive communication with customers through traditional methods and social media, driving traffic to SDG&E's fire preparedness website <https://www.sdge.com/wildfire-safety> or <https://sdgenews.com/> for more information. SDG&E's call center is also available to address customer questions and concerns.

SDG&E also proactively contacts customers with the potential to be affected by a PSPS upon the issuance of a RFW or extreme fire weather conditions. SDG&E contacts these customers directly, through its Enterprise Notification System (ENS), with a message to ensure they are aware. SDG&E's

ENS sends outbound messages through phone, email, and text. These messages typically increase in urgency as the certainty of a PSPS approaches. SDG&E's social media accounts and its website are also updated with the latest information.

For medical baseline customers within an affected PSPS area, the ENS captures a positive physical response through the phone message when the customer is contacted. If no positive response is obtained, a second live attempt is made through SDG&E's call center to contact the medical baseline customer. If the second attempt fails, SDG&E will dispatch field personnel to deliver the message in person.

Critical customers, such as health, water, communication, and education facilities within a potential PSPS area are also contacted through the ENS. Contact is also made through assigned SDG&E key account personnel. Notification will take place beforehand, so these customers can prepare and plan for a potential PSPS.

Moving forward, SDG&E will continue to integrate technology and data into the ENS in an effort to provide its customers with customized, timely, and precise information regarding SDG&E's Community Fire Safety Program. The customer notification processes have recently undergone significant refinement, which will continue as SDG&E receives feedback and lessons learned from PSPS events. Specific areas of focus will be an update to the base software of the ENS that will enhance SDG&E's ability to serve its customers by adding two-way texting capabilities and synching the ENS with our GIS and weather network to provide more targeted and timely alerting.

**Risk Mitigation:** This program mitigates the risk of wildfire by its association to de-energizing power lines that are experiencing extreme fire weather conditions.

**2019 Progress and Results:** In 2019, SDG&E implemented its wildfire safety public education campaign and notification procedures in eight languages (English, Spanish, Mandarin, Cantonese, Korean, Vietnamese, Tagalog and Russian) to keep customers informed of potential and impending PSPS events utilizing multiple channels of communication as outlined in SDG&E's wildfire mitigation plan. The public education campaign included, but was not limited to, the following focus areas: Updating contact information and signing up for notifications; Emergency preparedness and planning and emergency kit development; and Community/look after neighbors.

Additionally, special efforts were taken to ensure elected officials, first responders, public safety partners, medical baseline and critical customers were communicated to directly by assigned SDG&E personnel.

#### D. Mitigating the Public Safety Impact of PSPS Protocols (4.7.5)

**Description from 2019 WMP:** SDG&E manages and mitigates the impacts of a PSPS event through collaborations with key stakeholders in the wildfire response community. SDG&E has collaborated with approximately 40 stakeholders representing local schools, water districts, disability rights advocates, consumer groups, and fire departments.

SDG&E partners on a regular and ongoing basis with the following agencies to address a range of fire prevention and emergency activities:

- **San Diego County Fire Chiefs' Association** – provide monthly written and oral updates while encouraging feedback and comments on planning, response, recovery, and communications programs;
- **CalFire and the San Diego County Fire Authority** – engage in daily communications related to aerial firefighting and contract management of the year-round Aircrane program;
- **County Unified Disaster Council** – receive and provide quarterly updates on regional planning and response programs while building relationships with 18 cities, the County of San Diego, and participating Special Districts;
- **County Office of Emergency Services** – as needed, but no less than quarterly to discuss and agree on emergency planning, response, recovery, and communications needs;
- **All Fire Agencies in San Diego County** – including cities, fire districts, military, and tribal annually to provide in-service training on electric and natural gas safety, response, Incident Command integration with utilities, and communications to ensure response coordination during wildfire and other emergencies; and
- **Fire Dispatch Centers** – provide bi-annual communications training and requirements related to electric and natural gas incidents and emergencies.

SDG&E is and will continue to be a member of the California Utilities Emergency Association (CUEA), a collaboration between electric, natural gas, water, and telecommunications utilities in California. CUEA serves as a point of contact for critical infrastructure utilities and the California Office of Emergency Services and other governmental agencies before, during and after an event.

SDG&E has and continues to collaborate with UCSD on the development and maintenance of HPWREN, the UCSD partnership project led by the San Diego Supercomputer Center and the Scripps Institution of Oceanography's Institute of Geophysics and Planetary Physics, supporting internet-data applications in the research, education, and public safety realms. In addition to the camera network discussed in Section 4.5.6 above, SDG&E has also worked with UCSD to leverage HPWREN to provide internet connectivity to fire stations across remote portions of San Diego County. SDG&E will continue to collaborate with UCSD, investing in this critical communication backbone, providing resilient situational awareness, and communications during PSPS events.

In 2018, SDG&E held customer meetings with those affected by PSPS events to garner feedback on customers' thoughts and feelings before, during, and after a PSPS event. Overwhelmingly customers voiced a need to have a gathering place in the area affected that would be reasonably easy to get to and would have a place for them to charge cell phones and obtain current information about the PSPS event. By September 1, 2018, SDG&E, in working with the communities most affected, developed the concept of a Community Resource Center and located 9 centers in areas most likely to be affected by a PSPS. These centers offered affected customers a place to gather, charge cell phones, obtain current information and obtain things like bottled water, light snacks, and ice for temporary refrigeration. These centers were powered by portable generation provided by SDG&E and were in areas where there was not a reasonably close place to travel to where power was not shut off. This was highly successful and welcomed by affected customers. For 2019, SDG&E intends to examine the northern area of its service territory to determine where additional centers can be established. These centers would be similar to the ones in the south except for the need for generation as the communities affected by PSPS events in the north are likely near areas that are not subjected to PSPS. In those cases, the centers would be opened primarily for cell phone charging and obtaining up to date information on the PSPS event.

SDG&E has also received feedback from residential customers impacted by PSPS events that the desire to obtain smaller generators for their homes but do not possess the financial capability to acquire one. Therefore, SDG&E is considering the potential of the creation of a Generator Grant Program (GGP), administered by a neutral third party, to grant residential customers the funding for the express need to acquire and be able to use a portable generator during outages, in particular PPS events. SDG&E foresees the current greatest need to be in the residential customer grouping that is currently residing in the back country of San Diego, likely subject to a PPS event, for example those customers currently under the medical base line tariff or who are dependent on well water. This program is currently in the conceptual phase and carries with it the need to identify all aspects of cost recovery.

**Risk Mitigation:** This strategy mitigates the risk of wildfire by mitigating the risk associated with PPS.

**2019 Progress and Results:** In 2019, as stated in the backup power for resilience update, SDG&E fitted all Community Resource Centers with transfer switches for backup power and provided generators to 65 medical baseline customers. SDG&E has and continues to communicate with key stakeholders as outlined in SDG&E's Wildfire Mitigation Plan in order to further mitigate the public safety impacts of PPS protocols.

**Attachment B**

**ALJ Thomas' April 8, 2020 Email**

## Fucci-Ortiz, Lisa

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**From:** Thomas, Sarah R. <sarah.thomas@cpuc.ca.gov>  
**Sent:** Wednesday, April 8, 2020 9:51 AM  
**To:** Fucci-Ortiz, Lisa; Wildfire Safety Division; Caroline Thomas Jacobs; Mike.Wilson@fire.ca.gov; AAmirali@Starwood.com; AM@MadisonAvelp.com; AnnMarie.Lett@LibertyUtilities.com; ATK4@pge.com; AVanega@EQ-research.com; Pena, Bryan; bugadi@comcast.net; CBarry@iwpnews.com; Clay, Christopher; Hook, Charlyn A.; Christi.Hogin@bbkLaw.com; CJM@JudsonLLC.com; Moore, Christopher; corky.whipple@southwire.com; cpuc@DuceraPartners.com; CPUCdockets@EQ-research.com; CSkelding@Reorg.com; Cynthia.Hansen@PacifiCorp.com; Dan.Marsh@LibertyUtilities.com; DavidJMiller@att.com; DCoty@bpmnj.com; DHuard@manatt.com28; Diane Conklin; DNguyen1@Jefferies.com; DRA@DuncanAllen.com; Edwin@Newtyn.com; EKahl@Buchalter.com; Eli@MadisonAvelp.com; End2EndConsulting@gmail.com; Daye, Fadi; Gerron.Blackwell@LibertyUtilities.com; GMorris@emf.net; Greg.Campbell@LibertyUtilities.com; Gregory.Reiss@CentenusLP.com; HansLaetz@gmail.com; Irene@igc.org; ivan@utilityadvocates.org; jaimer.garcia@ladwp.com; JaneTerjung@gmail.com; Jason.Hoppin@SantaCruzCounty.us; Pereira, Joceline; JCrozier@LuminusMgmt.com; Jeffery.Richard@CountyOfNapa.org; Jeffery.Williams@ladwp.com; Jerome@CalCable.org; JHawley@FH2.com; jim.rainey@LATimes.com; JimRoss@r-c-s-inc.com; JIG@ESLawFirm.com; John.Todd@Fire.LAcounty.gov; John@clfp.com; Weber, Joan E.; JWiseman@AkinGump.com; Kavya@NewsData.com; Kavya@UtilityDive.com; KMills@CFBF.com; Tomassian, Koko M.; kpalmquist@exponent.com; Raagas, Kirstie; kswitzer@gswater.com; KWilliams@inyoCounty.us; LCottle@Winston.com; Lenneal.Gardner@TransBayCable.com; LGill@TownOfParadise.com; LMH@ESLawFirm.com; Luisa.Elkins@SanJoseCa.gov; lwhouse@innercite.com; maguirre@amslawyers.com; MAlcantar@Buchalter.com; Malinda@ProtectOurCommunities.org; marcos; mcallahan@mcecleanenergy.org; Meghan.Dewey@pge.com; Michael@MBrownLaw.net; MJSanders@SMCgov.org; Karle, Matthew; MRW@MRWassoc.com; MSomogyi@GoodinMacBride.com; NSheriff@Buchalter.com; NWilliams@reorg.com; Peter\_Smith@CitizensEnergy.com; rachel.gold@arb.ca.gov; regulatory@cal-cca.org; ricardo.vega@nexteraenergy.com; RKoss@AdamsBroadwell.com; RL@eslawfirm.com; RLMitchell@Trans-Elect.com; Russell.Archer@SCE.com; SDunbar@KeyesFox.com; Sharon.Yang@LibertyUtilities.com; SHEaton@RCRCnet.org; SKuhn@Counsel.LAcounty.gov; SLazerow@cbeal.org; Steve@UtilityArborist.net; Steven.Greco@NextEraEnergy.com; Team@Cameron-Daniel.com; Tiffany.M.Lin@CCO.SCCgov.org; Tim.Clark@pacificorp.com; TLindl@KeyesFox.com; TLong@turn.org; Tracy.C.Davis@NextEraEnergy.com; vpryor@zone7water.com; wag9@pge.com; William.Rostov@SFcityAtty.org; Wynne@BraunLegal.com; Louie, Aaron; Chamarty, Amy B.; Biggs, Andie; Durvasula, Anand; ade@cpuc.ca.gov; Fisher, Arthur (Iain); AGraf@AdamsBroadwell.com; Mulqueen, April; ariel@utilityadvocates.org; AVCrawford@AkinGump.com; Yip-Kikugawa, Amy C.; Blanchard, Billie C.; BFinkelstein@turn.org; Korpics, Brian; Stevens, Brian; BStrottman@BaronBudd.com; Case.Admin@sce.com; CCannon@AkinGump.com; Contreras, Carolina; Central Files; TerKeurst, Charlotte; Hogan, Christopher; Charles.Middlekauff@pge.com; Morey, Candace; Parkes, Christopher; Lukins, Chloe; connor.flanigan@sce.com; Rizzo, Colin; Rucker, Catherine; Chow, Christopher; Lee, Diana; Goldberg, Daphne; DKarpa@PeninsulaCleanEnergy.com; Douglass@EnergyAttorney.com; EBorden@turn.org; Gekker, Elena; Eric.Cardella@bves.com; Esther.Northrup@cox.com; FredYanney@gmail.com; Gary.Stern@sce.com; Ermann, Gary C.; GRSL@pge.com; Burton, Henry; imandelbaum@smcgov.org; James@UtilityAdvocates.org; Jasso, Norma G; JCapitolo@CalWaterAssn.com; jesus.g.roman@verizon.com; Frost, Jonathan; Koltz, Jonathan; Rahman, Junaid; Ormond, Jamie; John.Leslie@dentons.com; JQCH@pge.com; jr8@cpuc.ca.gov; JWiedman@PeninsulaCleanEnergy.com; Joseph Mitchell; Steingass, Joyce; Reiger, J. Jason; Stockton, Katherine; KMorsony@turn.org; Nguyen, Karin; Laura.Genao@sce.com; Palmer, Leslie L.; Tesfai, Leuwam; Morgans, Lucy; Lyons, Christopher M; Manzuk, Chuck; marc.stern@bves.com;

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**Cc:** ALJ Docket Office

**Subject:** [EXTERNAL] Re: SDG&E's 2019 Wildfire Mitigation Plan Report - R.18-10-007

\*\*\* EXTERNAL EMAIL - Be cautious of attachments, web links, and requests for information \*\*\*

Ms. Fucci-Ortiz - please file this in Docket R1810007. Refer to this email when you file.

Sarah R. Thomas, Esq.  
Administrative Law Judge

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**From:** Fucci-Ortiz, Lisa <LOrtiz@sdge.com>

**Sent:** Wednesday, April 1, 2020 3:15 PM

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**Subject:** SDG&E's 2019 Wildfire Mitigation Plan Report - R.18-10-007

To Caroline Thomas Jacobs,

Pursuant to Section 8386.3(c)(1) of the Public Utilities Code, San Diego Gas & Electric Company submits the attached report addressing its compliance with its Wildfire Mitigation Plan during calendar year 2019. A copy of this report is being served to the R.18-10-007 Service List.

Thank you.

*Lisa Fucci-Ortiz*

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