

# **Risk Assessment Mitigation Phase Risk Mitigation Plan Public Safety Events - Electric (Chapter SDG&E-15)**

November 30, 2016



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## Executive Summary

The Public Safety Events – Electric risk involves public safety and/or property damage related to SDG&E infrastructure, employees or third parties. Injuries to the public or equipment damage or failure can happen in a variety of ways such as motor vehicle accidents, intentional sabotage, construction site activity and non-compliance with safety procedures. SDG&E’s 2015 baseline mitigation plan for this risk consists of three controls:

1. Physical Security – activities that maintain the safety of employees, contractors, the public, and SDG&E facilities, through the use of systems, personnel, policies, and procedures. This includes physical security systems, security guards, and the Critical Asset Security Team.
2. Communications and Outreach – efforts designed to increase public awareness of safety with regard to electric assets and services.
3. Design, Operations and Maintenance – SDG&E designs, constructs, maintains, and operates its system in a manner that aims to minimize safety risks to employees, contractors and the public in accordance with the General Orders.

These controls focus on safety-related impacts (i.e., Health, Safety, and Environment) per guidance provided by the Commission in Decision 16-08-018 as well as controls and mitigations that may address reliability. The 2015 baseline mitigations will continue to be performed in the proposed plan. In addition, two of the physical security mitigation activities will expand, with the proposed implementation of additional security systems, security guards at more locations and the increased cost of obtaining contract security.

The risk spend efficiency was developed for Public Safety Events – Electric. The risk spend efficiency is a new tool that was developed to attempt to quantify how the proposed mitigations will incrementally reduce risk. The assessment was completed at a risk portfolio level where the mitigation activities (Physical Security; Communications and Outreach; and Design, Operations and Maintenance) were combined and assessed as one, aggregated mitigation. The metric used to determine the risk spend efficiency of the mitigations was based on physical security data, which evaluates the vulnerabilities facing SDG&E’s facilities from a security perspective.

## **Risk: Public Safety Events – Electric**

### **1 Purpose**

The purpose of this chapter (or plan) is to present the mitigation plan of San Diego Gas & Electric Company (SDG&E or Company) for the risk of Public Safety Events – Electric. The Public Safety Events – Electric risk involves public safety and/or property damage related to SDG&E infrastructure, employees or third parties. Injuries to the public or equipment damage or failure can happen in a variety of ways such as motor vehicle accidents, intentional sabotage, construction site activity and non-compliance with safety procedures.

This risk is a product of SDG&E’s September 2015 annual risk registry assessment cycle. Any events that occurred after that time were not considered in determining the 2015 risk assessment, in preparation for this Report. Note that while 2015 is used a base year for mitigation planning, risk management has been occurring, successfully, for many years within the Company. SDG&E and Southern California Gas Company (SoCalGas) (collectively, the utilities) take compliance and managing risks seriously, as can be seen by the number of actions taken to mitigate each risk. This is the first time, however, that the utilities have presented a Risk Assessment Mitigation Phase (RAMP) Report, so it is important to consider the data presented in this plan in that context. The baseline mitigations are determined based on the relative expenditures during 2015; however, the utilities do not currently track expenditures in this way, so the baseline amounts are the best effort of each utility to benchmark both capital and operations and maintenance (O&M) costs during that year. The level of precision in process and outcomes is expected to evolve through work with the California Public Utilities Commission (Commission or CPUC) and other stakeholders over the next several General Rate Case (GRC) cycles.

The Commission has ordered that RAMP be focused on safety related risks and mitigating those risks.<sup>1</sup> In many risks, safety and reliability are inherently related and cannot be separated, and the mitigations reflect that fact. Compliance with laws and regulations is also inherently tied to safety and the utilities take those activities very seriously. In all cases, the 2015 baseline mitigations include activities and amounts necessary to comply with the laws in place at that time. Laws rapidly evolve, however, so the RAMP baseline has not taken into account any new laws that have been passed since September 2015. Some proposed mitigations, however, do take into account those new laws.

The purpose of RAMP is not to request funding. Any funding requests will be made in the GRC. The forecasts for mitigation are not for funding purposes, but are rather to provide a range for the future GRC filing. This range will be refined with supporting testimony in the GRC. Although some risks have overlapping costs, the utilities have made efforts to identify those costs.

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<sup>1</sup> Commission Decision (D.) 14-12-025 at p. 31.



The utilities continue to evolve with respect to their risk identification process. In doing so through this RAMP process, SDG&E recognized that the mitigation activities of this risk significantly overlap with those of other identified risks. The other risks include: Employee, Contractor and Public Safety,<sup>2</sup> Physical Security of Critical Electric Infrastructure,<sup>3</sup> and Electric Infrastructure Integrity. Accordingly, the Public Safety Events – Electric mitigation activities will be moved and incorporated into the mitigation plans for these other identified risks post-2015.

## 2 Risk Information

As stated in the testimony of Jorge M. DaSilva in the Safety Model Assessment Proceeding (S-MAP) Application (A.) 15-05-002, “SDG&E is moving towards a more structured approach to classifying risks and mitigations through the development of its new risk taxonomy. The purpose of the risk taxonomy is to define a rational, logical and common framework that can be used to understand analyze and categorize risks.”<sup>4</sup> The Enterprise Risk Management (ERM) process and lexicon that SDG&E has put in place was built on the internationally-accepted ISO 31000 risk management standard. In the application and evolution of this process, the Company is committed to increasing the use of quantification within its evaluation and prioritization of risks.<sup>5</sup> This includes identifying leading indicators of risk. Sections 2 – 8 of this plan describe the key outputs of the ERM process and resultant risk mitigations.

In accordance with the ERM process, this section describes the risk classification, possible drivers and potential consequences of the Public Safety Events – Electric risk.

### 2.1 Risk Classification

Consistent with the taxonomy presented by SDG&E and SoCalGas in A.15-05-002, SDG&E classifies this risk as an electric, operational risk as shown in Table 1.

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<sup>2</sup> The Employee, Contractor and Public Safety risk from 2015 has now been split into three distinct safety risks: Employee Safety; Contractor Safety; and Customer Safety.

<sup>3</sup> In 2015, the Health, Safety, and Environmental score for the Physical Security of Critical Electric Infrastructure risk did not meet the minimum threshold for the RAMP Report. Accordingly, SDG&E did not include Physical Security of Critical Electric Infrastructure in the RAMP.

<sup>4</sup> A.15-05-002, filed May 1, 2015, at p. JMD-7.

<sup>5</sup> Testimony of Diana Day, Risk Management and Policy (SDG&E-02), submitted on November 14, 2014 in A.14-11-003.

**Table 1: Risk Classification per Taxonomy**

Risk Type	Asset/Function Category	Asset/Function Type
OPERATIONAL	ELECTRIC	SUBSTATION/ELECTRIC TRANS/DIST

## 2.2 Potential Drivers<sup>6</sup>

When performing the risk assessment for Public Safety Events – Electric, SDG&E identified potential indicators of risk, referred to as drivers. These include, but are not limited to:

- **Failure of security systems** – SDG&E uses variety of security systems (e.g., gates, card readers, etc.) to prevent the public from gaining access to SDG&E infrastructure. There could be a break down or a breach of one or more of these systems that could allow a member of the public to gain entry. This potential contact could lead to a public safety event.
- **Non-compliance with security procedures** – SDG&E has many safety procedures and policies which include security protocols. These are designed to keep employees, contractors, customers and the public safe. If an employee or contractor fails to follow a Company policy or procedure, this could lead to breach of the security of an SDG&E facility that, in turn, could lead to a public safety event.
- **Intentional and unintentional acts involving SDG&E electric infrastructure** – It is possible for the public to come into contact with SDG&E infrastructure either intentionally or unintentionally, regardless of the safeguards SDG&E puts in place. Intentional acts can include sabotage, terrorism, theft, and burglary. An example of an unintentional act could include someone losing control of a motor vehicle and crashing into utility equipment. Either could lead to an incident that has public safety implications.

Table 2 maps the specific drivers of Public Safety Events – Electric to SDG&E’s risk taxonomy.

**Table 2: Operational Risk Drivers**

Driver Category	Public Safety Events - Electric Driver(s)
Asset Failure	<ul style="list-style-type: none"> <li>• Failure of security systems</li> </ul>
Asset-Related Information Technology Failure	<ul style="list-style-type: none"> <li>• Failure of security systems</li> </ul>
Employee Incident	<ul style="list-style-type: none"> <li>• Non-compliance with security procedures</li> </ul>
Contractor Incident	<ul style="list-style-type: none"> <li>• Non-compliance with security procedures</li> </ul>

<sup>6</sup> An indication that a risk could occur. It does not reflect actual or threatened conditions.



<b>Public Incident</b>	<ul style="list-style-type: none"><li>• Intentional acts involving SDG&amp;E electric infrastructure</li><li>• Unintentional acts involving SDG&amp;E electric infrastructure</li></ul>
<b>Force of Nature</b>	Not applicable

### **2.3 Potential Consequences**

If one of the risk drivers listed above were to occur, resulting in an incident, the potential consequences, in a reasonable worst case scenario, could include:

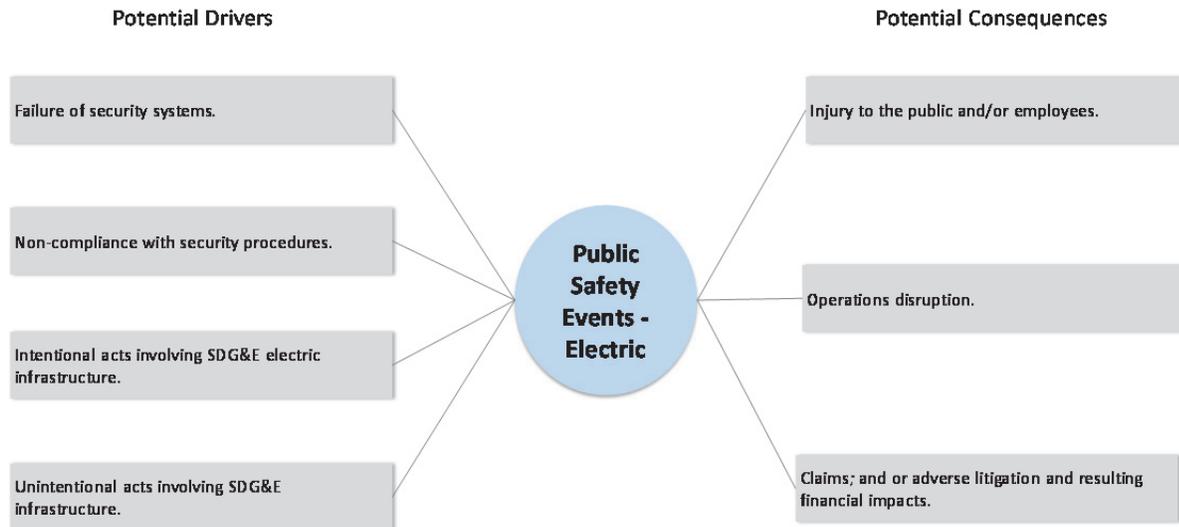
- Injury to the public and/or employees;
- Disruption to operations;
- Claims; and/or
- Adverse litigation and resulting financial impacts.

These potential consequences were used in the scoring of Public Safety Events – Electric that occurred during SDG&E’s 2015 risk registry process. See Section 3 for more detail.

### **2.4 Risk Bow Tie**

The risk “bow tie,” shown in Figure 1, is a commonly-used tool for risk analysis. The left side of the bow tie illustrates potential drivers that lead to a risk event and the right side shows the potential consequences of a risk event. SDG&E applied this framework to identify and summarize the information provided above.

**Figure 1: Risk Bow Tie**



### 3 Risk Score

The SDG&E and SoCalGas ERM organization facilitated the 2015 risk registry process, which resulted in the inclusion of Public Safety Events – Electric as one of the enterprise risks. During the development of the risk register, subject matter experts assigned a score to this risk, based on empirical data to the extent it is available and/or using their expertise, following the process outlined in this section.

#### 3.1 Risk Scenario – Reasonable Worst Case

There are many possible ways in which a public safety event can occur. For purposes of scoring this risk, subject matter experts used a reasonable worst case scenario to assess the impact and frequency. The scenario represented a situation that could happen, within a reasonable timeframe, and lead to a relatively significant adverse outcome. These types of scenarios are sometimes referred to as low frequency, high consequence events. The subject matter experts selected a reasonable worst case scenario to develop a risk score for Public Safety Events – Electric:

- Members of the public trespass on SDG&E property in an attempt to steal copper wire. The individuals come into contact with SDG&E equipment resulting in serious injuries and operational disruptions.

Note that the following narrative and scores are based on this scenario; they do not address all consequences that can happen if the risk occurs.



### 3.2 2015 Risk Assessment

Using this scenario, subject matter experts then evaluated the frequency of occurrence and potential impact of the risk using SDG&E’s 7X7 Risk Evaluation Framework (REF). The framework (also called a matrix) includes criteria to assess levels of impact ranging from Insignificant to Catastrophic and levels of frequency ranging from Remote to Common. The 7X7 framework includes one or more criteria to distinguish one level from another. The Commission adopted the REF as a valid method to assess risks for purposes of this RAMP.<sup>7</sup> Using the levels defined in the REF, the subject matter experts applied empirical data to the extent it is available and/or their expertise to determine a score for each of four residual impact areas and the frequency of occurrence of the risk.

Table 3 provides a summary of the Public Safety Events – Electric risk score in 2015. This risk has a score of 4 or above in the Health, Safety, and Environmental impact area and, therefore, was included in the RAMP. These are residual scores because they reflect the risk remaining after existing controls are in place. For additional information regarding the REF, please refer to the RAMP Risk Management Framework chapter within this Report.

**Table 3: Risk Score**

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
5	3	3	3	3	2,344

### 3.3 Explanation of Health, Safety, and Environmental Impact Score

When an attempted theft of copper wire occurs, there is potential for the public, employees and/or contractors to be seriously injured by SDG&E equipment. Subject matter experts gave this possible impact a score of 5 (extensive). Intruders from the public may incur a range of injuries ranging from slips and falls to contact with energized equipment. According to an assessment released in October 2010 by the United States Department of Energy (DOE), Office of Electricity Delivery and Energy Reliability (2010 DOE Assessment), the theft of copper wire theft can endanger the safety of utility employees, as the damage may cause them to unknowingly touch undergrounded wires and equipment.”<sup>8</sup>

<sup>7</sup> D.16-08-018 Ordering Paragraph 9.

<sup>8</sup> An Updated Assessment of Copper Wire Thefts from Electric Utilities, United States Department of Energy, Office of Electricity Delivery and Energy Reliability, at p. 6:  
<https://www.oe.netl.doe.gov/docs/Updated%20Assessment-Copper-Final-101210%20c.pdf>.

### 3.4 Explanation of Other Impact Scores

Based on the selected reasonable worst case risk scenario, SDG&E gave the other residual impact areas each a score of 3 (moderate) for the following reasons:

- **Operational and Reliability:** The 2010 DOE Assessment found that, “Copper wire theft can affect the reliability of electrical service and cause customers to lose power, but the amount and duration of the outages to date has been minor...Power outages due to copper wire theft are typically in the 2,000-3,000 customer range.”<sup>9</sup> According to the 7X7 matrix, a score of 3 is defined as potentially effecting more than 1,000 customers; impacting a single *critical* location or customer; or disrupting service for one day. Note that the severity of the operational impact is dependent on the type of asset from which the copper is removed.
- **Regulatory, Legal, and Compliance:** It is possible that a trespassing occurrence at a SDG&E facility could result in litigation or regulatory actions. In accordance with the definitions in the 7X7 matrix, the consequence for this action was deemed to be moderate based on experience with regulatory enforcement and knowledge of current and planned regulation.
- **Financial:** The 2010 DOE Assessment noted that, “A thief typically steals an amount of copper valued at several hundred dollars; the utility normally spends just over one thousand dollars to make the repairs.”<sup>10</sup> Material and repair costs resulting from copper theft are relatively minor, particularly given that current copper prices are low, resulting in less demand. Additionally, injuries from copper theft occur infrequently. When considering the potential litigation and regulatory consequences from multiple incidents of this caliber occurring in a given year, SDG&E estimated that the financial impact could be between \$1 million and \$10 million.

### 3.5 Explanation of Frequency Score

Subject matter experts used empirical data to the extent available and/or their expertise to determine that the likelihood of an electric public safety incident occurring that would result in many severe injuries to the public or employees was considered to be 3 (infrequent), which is defined in SDG&E’s 7X7 matrix as having the potential to occur every 10-30 years in its service territory. While copper theft can occur rather often,<sup>11</sup> it was estimated that the frequency has been reduced considerably because of low copper prices and the mitigation activities SDG&E has implemented to prevent the occurrence of an event.

## 4 Baseline Risk Mitigation Plan<sup>12</sup>

As stated above, Public Safety Event – Electric risk entails injuries to the public and/or property damage related to SDG&E infrastructure. The 2015 baseline mitigations discussed below include the current evolution of the utilities’ risk management of this risk. The baseline mitigations have been developed

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<sup>9</sup> *Id.*, at p. 5.

<sup>10</sup> *Id.*, at p. 4.

<sup>11</sup> *Id.*, at p. iv.

<sup>12</sup> As of 2015, which is the base year for purposes of this Report.

over many years to address this risk. They include the amount to comply with laws that were in effect at that time.

SDG&E’s baseline mitigation plan for this risk consists of three controls: (1) Physical Security, (2) Communications and Outreach, and (3) Design, Operations and Maintenance. Subject matter experts from the Safety, Corporate Security, Real Estate and Planning, Customer Communications, Electric Transmission and Distribution Engineering departments collaborated to identify and document them. These controls focus on safety-related impacts<sup>13</sup> (i.e., Health, Safety, and Environment) per guidance provided by the Commission in D.16-08-018<sup>14</sup> as well as controls and mitigations that may address reliability. Accordingly, the controls and mitigations described in Sections 4 and 5 address safety-related impacts primarily. Note that the controls and mitigations in the baseline and proposed plans are intended to address various Public Safety Events – Electric, not just the scenario used for purposes of risk scoring.

### 1. Physical Security

The purpose of physical security is to maintain the safety of employees, contractors, the public, and SDG&E facilities, through the use of systems, personnel, policies, and procedures. Physical security at SDG&E supports the maintenance and improvement of safety through the implementation of proactive threat identification and mitigation measures and more effective access control, detection, and interdiction capabilities. Three physical security mitigation activities in this risk mitigation plan align with this purpose: physical security systems, contract security (security guards), and the Critical Asset Security Team (CAST).

*Physical security systems* provide protection enhancements to infrastructure to improve access control, intrusion detection, and interdiction capabilities to deter, detect, delay, or prevent undesirable events at Company facilities. The type and extent of security upgrades varies by facility, but several have been completed, including, fences, gates and cameras. These upgrades are largely under the jurisdiction of the Federal Energy Regulatory Commission (FERC), with 90% of the costs associated with FERC assets.

In addition to security systems, SDG&E employs *contract security* (security guards) to secure and physically protect assets and people. These security guards are located at critical facilities and work locations. Company policies and procedures outline physical security procedures, including access control, officer post orders and incident reporting.

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<sup>13</sup> The Baseline and Proposed Risk Mitigation Plans may include mandated, compliance-driven mitigations.

<sup>14</sup> D.16-08-018 at p. 146 states “Overall, the utility should show how it will use its expertise and budget to improve its safety record” and the goal is to “make California safer by identifying the mitigations that can optimize safety.”

The *Critical Asset Security Team (CAST)*, composed of personnel from multiple business units, including Corporate Security, Engineering, Operations, Legal and Environmental assists with enhancing security at all of SDG&E's facilities. This cross-functional team was created to assess current security countermeasures across the SDG&E and SoCalGas infrastructure and to make incremental and long-term security recommendations. This team manages the implementation of many of the physical security systems.

## 2. Communications and Outreach

The activities in the Communication and Outreach mitigation are designed to increase public awareness of safety with regard to electric assets and services. They aim to improve the effectiveness of safety programs by providing the public with useful knowledge and tools to potentially avoid an incident related to SDG&E infrastructure. Some of these communications and outreach campaigns are mandated pursuant to Commission directives. SDG&E uses a variety of channels to communicate and educate its customers and the public about safety. These include: bill inserts, print media, television, radio, web and social media. Also, SDG&E maintains a significant presence in the community through information booths it staffs at many local events.

Examples of the communications and outreach campaigns include:

- Provision of safety and basic operational information about SDG&E's facilities and response as they relate to First Responder operations.
- General safety communications to inform the public about safe practices through a variety of messages, including the 'don't touch downed power lines' campaign.

The efforts listed above are a subset of the cross-cutting campaigns (i.e., support both gas and electric risk mitigation) intended to mitigate the Employee, Contractor and Public Safety risk.

## 3. Design, Operations and Maintenance

SDG&E designs, constructs, maintains, and operates its system in a manner that aims to minimize safety risks to employees, contractors and the public. SDG&E adheres to the CPUC's General Orders (GO), which establish regulatory requirements. Applicable General Orders for this risk include:

- GO 95 (Rules for Overhead Electric Line Construction);
- GO 128 (Rules for Construction of Underground Electric Supply and Communication Systems);
- GO 165 (Inspection Requirements for Electric Distribution and Transmission Facilities);
- GO 167 (Enforcement of Maintenance and Operation Standards for Electric Generating Facilities); and
- GO 174 (Rules for Electric Utility Substations).

Pursuant to these GOs, SDG&E's standard practices include risk-mitigating activities such as routinely inspecting and maintaining electric infrastructure through the Corrective Maintenance Program (CMP),

and constructing overhead power lines and appurtenances to the technical specifications outlined by the GOs and other national and local safety codes.

Further, SDG&E develops and applies internal best practices that are maintained by SDG&E's engineering and operations departments. These include Standard Operating Procedures (SOP), Transmission Maintenance and Construction (TMC) procedures, Distribution Operating Procedures (DOP), Construction Standards, and Electric Standard Practices (ESP). All contribute to protecting employees, contractors, and the public from potential safety risks associated with electric infrastructure.

SDG&E's design and construction activities incorporate safety risk considerations in order to proactively address the risk driver of unintentional acts involving SDG&E electric infrastructure. These considerations, where feasible, include constructing electric facilities (e.g., electric substations) in areas of the community that are not easily visible or accessible by the general public, and where electric workers could perform their maintenance and operational functions safely. When electric facilities are constructed in areas clearly visible to the public, SDG&E displays visible signage to inform the public of potential dangers associated with coming in contact with electric equipment.

In addition to adhering to GO requirements and evolving, applying and maintaining internal engineering and operations best practices, SDG&E continually collaborates with other utilities in order to understand and adopt the latest engineering, design, and safety standards for constructing and operating electric equipment under various conditions.

## **5 Proposed Risk Mitigation Plan**

The 2015 baseline mitigations outlined in Section 4 will continue to be performed in the proposed plan, in most cases, to maintain the current residual risk level. In addition, two of the physical security mitigation activities will expand, with the proposed implementation of additional security systems, security guards at more locations and the increased cost of obtaining contract security. These incremental changes, along with updates about other controls are described in below.

### **1. Physical Security**

Generally, the baseline projects described above have been completed and placed into service. SDG&E is proposing to complete similar security projects to increase protection, such as installing cameras and gates at additional locations. Similarly, the presence of security guards increases protection with the aim of reducing the likelihood of an intentional event.

There are two expanded activities, as compared to the baseline, with respect to security guards. First, SDG&E proposes to add security guards to new locations. The increased number of security guards is needed to respond to risks posed by recent breaches of substation security experienced nationally by other utilities (e.g., incident of intentional damage to Entergy transmission substation and towers in 2013). This kind of risk also could occur within SDG&E's service territory. Second, SDG&E must



comply with Senate Bill (SB) 3, which will become effective January 1, 2017. The resulting effects are increases in costs above the GRC standard escalation. In other words, the cost associated with doing business (i.e., employing security guards) has increased, sometimes referred to as non-standard escalation.

## 2. Communications and Outreach

The Communications and Outreach mitigations will be largely unchanged through 2019 as SDG&E anticipates the continuation of the majority of the safety-related campaigns currently underway.

## 3. Design, Operations and Maintenance

The Design, Operations and Maintenance mitigation is expected to remain unchanged from the baseline controls described in the previous section. There may be revisions or updates to the General Orders and/or similar requirements, or changes if new requirements are developed. SDG&E will follow and abide by the effective directives and mandates.

# 6 Summary of Mitigations

Table 4 summarizes the 2015 baseline risk mitigation plan, the risk driver(s) a control addresses, and the 2015 baseline costs for Public Safety Events – Electric. While control or mitigation activities may address both risk drivers and consequences, risk drivers link directly to the likelihood that a risk event will occur. Thus, risk drivers are specifically highlighted in the summary tables.

SDG&E does not account for and track costs by activity, but rather, by cost center and capital budget code. So, the costs shown in Table 4 were estimated using assumptions provided by SMEs and available accounting data.



**Table 4: Baseline Risk Mitigation Plan<sup>15</sup>**  
(Direct 2015 \$000)<sup>16</sup>

ID	Control	Risk Drivers Addressed	Capital <sup>17</sup>	O&M	Control Total <sup>18</sup>	GRC Total <sup>19</sup>
1	Physical Security	<ul style="list-style-type: none"> <li>• Failure of security systems</li> <li>• Non-compliance with security procedures</li> <li>• Intentional acts involving SDG&amp;E electric infrastructure</li> </ul>	\$18,440	\$6,600	\$25,040	\$6,820
2	Communications and Outreach*	<ul style="list-style-type: none"> <li>• Unintentional acts involving SDG&amp;E electric infrastructure</li> </ul>	n/a	730	730	730
3	Design, Operations and Maintenance*	<ul style="list-style-type: none"> <li>• Unintentional acts involving SDG&amp;E electric infrastructure</li> </ul>	Mitigation activities associated with GOs and other mandates are accounted for in other RAMP risks (e.g., Electric Infrastructure Integrity)			
	<b>TOTAL COST</b>		\$18,440	\$7,330	\$25,770	\$7,550

\* Includes one or more mandated activities

<sup>15</sup> Recorded costs were rounded to the nearest \$10,000.

<sup>16</sup> The figures provided in Tables 4 and 5 are direct charges and do not include Company overhead loaders, with the exception of vacation and sick. The costs are also in 2015 dollars and have not been escalated to 2016 amounts.

<sup>17</sup> Pursuant to D.14-12-025 and D.16-08-018, the Company is providing the “baseline” costs associated with the current controls, which include the 2015 capital amounts. The 2015 mitigation capital amounts are for illustrative purposes only. Because projects generally span several years, considering only one year of capital may not represent the entire mitigation.

<sup>18</sup> The Control Total column includes GRC items as well as any applicable non-GRC jurisdictional items. Non-GRC items may include those addressed in separate regulatory filings or under the jurisdiction of the Federal Energy Regulatory Commission (FERC).

<sup>19</sup> The GRC Total column shows costs typically presented in a GRC.

### 1. Physical Security

Subject matter experts forecasted the costs for the physical security systems and contract security mitigations from a review of historical internal costs and applying high-level assumptions for applicable labor costs.

### 2. Communications and Outreach

The cost estimates for the baseline Communications and Outreach mitigations were based on applicable, historical costs of campaigns. The costs for communication and outreach will be requested and defended in the Test Year 2019 GRC.

### 3. Design, Operations and Maintenance

SDG&E's costs associated with Design, Operations and Maintenance of its assets (i.e., through projects and programs associated with the GOs and other mandates) are described and accounted for in other RAMP risks, such as Electric Infrastructure Integrity. Accordingly, these costs are not included here.

While all the controls and baseline costs presented in Table 4 mitigate Public Safety Events – Electric, these controls also may mitigate other risks presented in this RAMP Report. For example, the security guards and one security system project are included in the RAMP risk of Workplace Violence as well. Additionally, the general communications about safety to the public support the mitigation of the RAMP risk of Employee, Contractor and Public Safety. Because these activities benefit Public Safety Events – Electric as well as these other risks, both the costs and risk reduction benefits are included in all applicable RAMP chapters.

Table 5 summarizes SDG&E's proposed mitigation plan, associated projected ranges of estimated O&M expenses for 2019, and projected ranges of estimated capital costs for the years 2017-2019. It is important to note that SDG&E is identifying potential ranges of costs in this plan, and is not requesting funding approval. SDG&E will request approval of funding, in its next GRC. There are non-CPUC jurisdictional mitigation activities addressed in RAMP; the costs associated with these will not be carried over to the GRC. As set forth in Table 5 the utilities are using a 2019 forecast provided in ranges based on 2015 dollars.

**Table 5: Proposed Risk Mitigation Plan<sup>20</sup>**  
(Direct 2015 \$000)

ID	Mitigation	Risk Drivers Addressed	2017-2019 Capital <sup>21</sup>	2019 O&M	Mitigation Total <sup>22</sup>	GRC Total <sup>23</sup>
1	Physical Security	<ul style="list-style-type: none"> <li>Failure of security systems</li> <li>Non-compliance with security procedures</li> <li>Intentional acts involving SDG&amp;E electric infrastructure</li> </ul>	\$41,090 - 49,920	\$8,040 - 9,180	\$49,130 - 59,100	\$11,380 - 12,960
2	Communications and Outreach*	<ul style="list-style-type: none"> <li>Unintentional acts involving SDG&amp;E electric infrastructure</li> </ul>	n/a	630 - 760	630 - 760	630 - 760
3	Design, Operations and Maintenance*	<ul style="list-style-type: none"> <li>Unintentional acts involving SDG&amp;E electric infrastructure</li> </ul>	Mitigation activities associated with GOs and other mandates are accounted for in other RAMP risks (e.g., Electric Infrastructure Integrity)			
	<b>TOTAL COST</b>		\$41,090 - 49,920	\$8,670 - 9,940	\$49,760 - 59,860	\$12,010 - 13,720

<input type="checkbox"/>	Status quo is maintained
<input checked="" type="checkbox"/>	Expanded or new activity
*	Includes one or more mandated activities

### 1. Physical Security

<sup>20</sup> Ranges of costs were rounded to the nearest \$10,000.

<sup>21</sup> The capital presented is the sum of the years 2017, 2018, and 2019 or a three-year total. Years 2017, 2018 and 2019 are the forecast years for SDG&E's Test Year 2019 GRC Application.

<sup>22</sup> The Mitigation Total column includes GRC items as well as any applicable non-GRC items.

<sup>23</sup> The GRC Total column shows costs typically represented in a GRC.

The capital cost estimates for physical security systems were zero-based, derived from initial project projections. The O&M costs were estimated as a percentage of the capital costs using subject matter expertise and experience with historical projects.

The physical security systems are largely capital projects. While the projects will change (e.g., expansion to additional locations), the projected annual spend is expected to be in line with historical spending. The costs for security guards are based on a five-year average labor cost, plus the cost of complying with (SB) 3, plus the cost of additional guarded locations. The cost of CAST was estimated using a base-year forecast methodology, as the activity and related costs are not anticipated to change significantly from 2015 levels.

## 2. Communications and Outreach

For the Communications and Outreach mitigation, SDG&E used a base year (2015) forecast methodology as the mitigation activities are not anticipated to change from those implemented in 2015.

## 3. Design, Operations and Maintenance

As in 2015, there are no forecasted costs for the Design, Operations and Maintenance mitigation. Activities and costs associated with mitigating potential safety risks associated with electric infrastructure *failures* and coincident injuries to employees, contractors, or the public, are detailed in the Electric Infrastructure Integrity risk plan.

# 7 Risk Spend Efficiency

Pursuant to D.16-08-018, the utilities are required in this Report to “explicitly include a calculation of risk reduction and a ranking of mitigations based on risk reduction per dollar spent.”<sup>24</sup> For the purposes of this Section, Risk Spend Efficiency (RSE) is a ratio developed to quantify and compare the effectiveness of a mitigation at reducing risk to other mitigations for the same risk. It is synonymous with “risk reduction per dollar spent” required in D.16-08-018.<sup>25</sup>

As discussed in greater detail in the RAMP Approach chapter within this Report, to calculate the RSE the Company first quantified the amount of Risk Reduction attributable to a mitigation, then applied the Risk Reduction to the Mitigation Costs (discussed in Section 6). The Company applied this calculation to each of the mitigations or mitigation groupings, then ranked the proposed mitigations in accordance with the RSE result.

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<sup>24</sup> D.16-08-018 Ordering Paragraph 8.

<sup>25</sup> D.14-12-025 also refers to this as “estimated mitigation costs in relation to risk mitigation benefits.”

## 7.1 General Overview of Risk Spend Efficiency Methodology

This subsection describes, in general terms, the methods used to quantify the *Risk Reduction*. The quantification process was intended to accommodate the variety of mitigations and accessibility to applicable data pertinent to calculating risk reductions. Importantly, it should be noted that the analysis described in this chapter uses ranges of estimates of costs, risk scores and RSE. Given the newness of RAMP and its associated requirements, the level of precision in the numbers and figures cannot and should not be assumed.

### 7.1.1 Calculating Risk Reduction

The Company's SMEs followed these steps to calculate the Risk Reduction for each mitigation:

1. **Group mitigations for analysis:** The Company "grouped" the proposed mitigations in one of three ways in order to determine the risk reduction: (1) Use the same groupings as shown in the Proposed Risk Mitigation Plan; (2) Group the mitigations by current controls or future mitigations, and similarities in potential drivers, potential consequences, assets, or dependencies (e.g., purchase of software and training on the software); or (3) Analyze the proposed mitigations as one group (i.e., to cover a range of activities associated with the risk).
2. **Identify mitigation groupings as either current controls or incremental mitigations:** The Company identified the groupings by either current controls, which refer to controls that are already in place, or incremental mitigations, which refer to significantly new or expanded mitigations.
3. **Identify a methodology to quantify the impact of each mitigation grouping:** The Company identified the most pertinent methodology to quantify the potential risk reduction resulting from a mitigation grouping's impact by considering a spectrum of data, including empirical data to the extent available, supplemented with the knowledge and experience of subject matter experts. Sources of data included existing Company data and studies, outputs from data modeling, industry studies, and other third-party data and research.
4. **Calculate the risk reduction (change in the risk score):** Using the methodology in Step 3, the Company determined the change in the risk score by using one of the following two approaches to calculate a Potential Risk Score: (1) for current controls, a Potential Risk Score was calculated that represents the increased risk score if the current control was not in place; (2) for incremental mitigations, a Potential Risk Score was calculated that represents the new risk score if the incremental mitigation is put into place. Next, the Company calculated the risk reduction by taking the residual risk score (See Table 3 in this chapter.) and subtracting the Potential Risk Score. For current controls, the analysis assesses how much the risk might increase (i.e., what the potential risk score would be) if that control was removed.<sup>26</sup> For incremental mitigations, the analysis assesses the anticipated reduction of the risk if the new mitigations are implemented. The change in risk score is the risk reduction attributable to each mitigation.

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<sup>26</sup> For purposes of this analysis, the risk event used is the reasonable worst case scenario, described in the Risk Information section of this chapter.

### 7.1.2 Calculating Risk Spend Efficiency

The Company SMEs then incorporated the mitigation costs from Section 6. They multiplied the risk reduction developed in subsection 7.1.1 by the number of years of risk reduction expected to be realized by the expenditure, and divided it by the total expenditure on the mitigation (capital and O&M). The result is a ratio of risk reduction per dollar, or RSE. This number can be used to measure the relative efficiency of each mitigation to another. Figure 2 shows the RSE calculation.

**Figure 2: Formula for Calculating RSE**

$$\text{Risk Spend Efficiency} = \frac{\text{Risk Reduction} * \text{Number of Years of Expected Risk Reduction}}{\text{Total Mitigation Cost (in thousands)}}$$

The RSE is presented in this Report as a range, bounded by the low and high cost estimates shown in Table 5 of this chapter. The resulting RSE scores, in units of risk reduction per dollar, can be used to compare mitigations within a risk, as is shown for each risk in this Report.

### 7.2 Risk Spend Efficiency Applied to This Risk

SDG&E analysts used the general approach discussed in Section 7.1, above, in order to assess the RSE for the Public Safety Events – Electric risk. The RAMP Approach chapter in this Report, provides a more detailed example of the calculation used by the Company.

As mentioned above, the Public Safety Events - Electric risk is related to the public’s exposure to electrical assets and facilities. As such, the controls in place to manage this risk include communication efforts to warn the public of electric hazards, physical security measures that prevent the public from coming in contact with electrical facilities, and standards and processes that adhere to applicable General Orders from the Commission. The current controls were combined and assessed as one grouping. The incremental mitigations (Physical Security; Communications and Outreach; and Design, Operations and Maintenance) were combined and assessed as one grouping, also. The analysis addressed: (1) The value of continuing existing activities in terms of maintaining the level of the risk; and (2) The value of the proposed incremental spend in terms of further reducing the risk. Of the total funding proposed for the mitigations, approximately 90% is a continuation of existing activities, whereas the remaining 10% represents an expansion of existing activities.

The approach used to estimate the risk reduction from incremental mitigations was based on an assessment methodology developed by Sempra Energy’s Corporate Security department, within SDG&E’s parent company. This assessment evaluates the vulnerabilities facing SDG&E’s facilities from a security perspective.

The difference in baseline scores indicates that if current activities were not in place, the likelihood of the Public Safety Events – Electric risk could increase four-to-five times. Sempra Corporate Security’s

team determined that the proposed mitigations could potentially further reduce the likelihood between 25% and 35%.

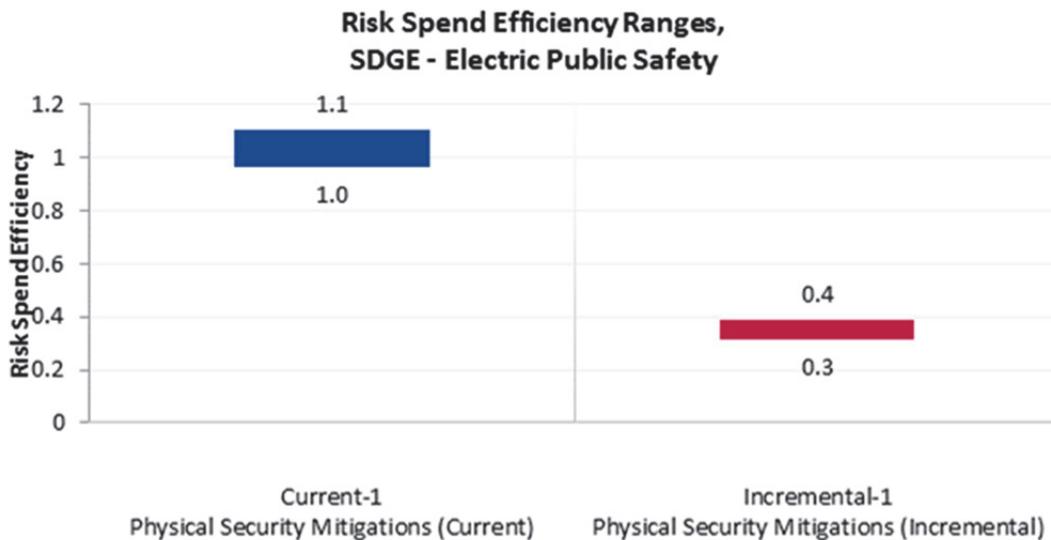
### 7.3 Risk Spend Efficiency Results

Based on the foregoing analysis, SDG&E calculated the RSE ratio for each of the proposed mitigation groupings. Following is the ranking of the mitigation groupings from the highest to the lowest efficiency, as indicated by the RSE number:

1. Physical Security Mitigations (current controls)
2. Physical Security Mitigations (incremental mitigations)

Figure 3 displays the range<sup>27</sup> of RSEs for each of the SDG&E Public Safety Events – Electric risk mitigation groupings, arrayed in descending order.<sup>28</sup> That is, the more efficient mitigations, in terms of risk reduction per spend, are on the left side of the chart.

**Figure 3: Risk Spend Efficiency**



<sup>27</sup> Based on the low and high cost ranges provided in Table 5 of this chapter.

<sup>28</sup> It is important to note that the risk mitigation prioritization shown in this Report, is not comparable across other risks in this Report.



## 8 Alternatives Analysis

SDG&E considered alternatives to the proposed mitigations as it developed the proposed mitigation plan for the Public Safety Events – Electric risk. Typically, alternatives analysis occurs when implementing activities, and with vendor selection in particular, to obtain the best result or product for the cost. The alternatives analysis for this risk plan also took into account modifications to the proposed plan and constraints, such as budget and resources.

### *8.1 Alternative 1 – Physical Security Tradeoffs*

Physical security systems (e.g., cameras, fences) and guards could be used as alternatives to each other in some locations for some threats. This would mean that some SDG&E locations would have security guards only while others would have security systems only. The main benefit of this alternative is potential cost savings; however, the use of only one type of mitigation also may increase the risk. Accordingly, this alternative was dismissed in favor of the proposed plan, which includes both physical security systems and guards. Implementing physical security systems and guards together often can reduce risk and provides mutual back-up protection. This alternative is believed to balance affordability with reducing risk.



## **8.2 *Alternative 2 – Security Guard Modifications***

SDG&E is proposing to add locations at which it will staff security guards. SDG&E considered maintaining the status quo, meaning no incremental additions of security guards. This alternative would be more cost effective as the additional resources would increase costs; however, similar to the first alternative, this cost savings would result in a potential increase in risk. Accordingly, this alternative was rejected, as the additional locations to be staffed by security guards are mainly needed due to the identification of substantiated threats throughout the industry associated with substation safety.