

Risk Assessment Mitigation Phase Risk Mitigation Plan Overview and Approach (RAMP – A)

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Overview and Approach

1 Overview

The California Public Utilities Commission’s (Commission) new Risk Assessment Mitigation Phase (RAMP) requires SoCalGas and SDG&E to identify and quantify risks and risk mitigation in a different manner from the past. SoCalGas and SDG&E have always routinely assessed and mitigated risk to the public, employees and their infrastructure as part of their everyday business and take seriously their obligation to provide safe and reliable service. The utilities will continue to do so within the new RAMP framework, which will keep the Commission and the public informed as to how risk assessment and mitigation activities are indeed occurring within the utilities. This first formal RAMP filing identifies SoCalGas and SDG&E’s baseline assessment of safety risks to the public, their employees and their systems, and what potential mitigation measures have been considered. Based on those potential mitigation measures, the utilities then propose certain mitigation measures to further reduce identified risks. The costs of reducing identified risks are then quantified in the “Risk Spend Efficiency” or the “RSE.”

The Commission has ordered that RAMP be focused on safety-related risks and mitigating those risks. As a starting point, SoCalGas and SDG&E used the risk assessment that was conducted in 2015. That risk assessment across both utilities became the individual risk registry for each company. This RAMP filing is a product of SoCalGas and SDG&E’s September 2015 annual risk registry assessment. As such, any events that occurred after September 2015 do not impact the risk registry or the 2015 risk assessment that was completed in September 2015. As with any useful risk assessment, the subsequent risk registry is not static and changes annually. Risks that were separate may be combined, new risks may appear and the level of the risk may change over time.

In each risk chapter contained in the RAMP filing, SoCalGas and SDG&E have quantified and/or identified several baseline mitigation activities that have already been taken by the utilities. The baseline mitigation activities, sometimes referred to as controls, reduce the risk to the level identified in the filing, which is why each risk in the RAMP filing is a residual risk after taking into account the 2015 baseline mitigation activities. The RAMP filing includes a reasonable worst case scenario for each risk to provide context for the risk score and the proposed mitigation measures to address that risk. The reasonable worst case scenario is not intended to include all potential scenarios. The 2015 baseline mitigation activities have been cumulative over time and continue to change as new risks appear to the safety of the system, such as cybersecurity risks. As new technology is available to mitigate risks, SoCalGas and SDG&E have proposed to use technology such as enterprise asset management to enhance communication between different systems that contain records. 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 compliance activities very seriously.

This first-ever RAMP filing presents cost data in the best manner currently available, which is expected to evolve and mature over time. 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 the utility to benchmark both capital and operations and maintenance (O&M) costs during that year. For all risks, the 2015 baseline mitigations include activities and amounts necessary to comply with the laws in place at that time, but do not take into account activities and costs to comply with new laws passed since September 2015. Some proposed mitigations, however, do take into account those new laws. The utilities' level of cost-tracking precision continues to develop and is expected to mature through experience over the next several General Rate Case (GRC) cycles.

The purpose of RAMP is not to request funding. Any funding requests will be made in the GRC. RAMP mitigation forecasts are provided only to estimate a range that will be refined with supporting testimony in the GRC. SoCalGas and SDG&E have made efforts to identify where overlapping costs for mitigation measures could mitigate more than one risk. This RAMP filing identifies costs associated with SoCalGas' and SDG&E's largest risks as of September 2015 but will not define the utilities' GRC requests, where the utilities will seek to mitigate other risks in addition to those identified in the RAMP filing.

SoCalGas and SDG&E look forward to working with the Commission on this RAMP filing.

2 Approach

As the first two utilities to file a RAMP in accordance with Decision 14-12-025 (Decision), SoCalGas and SDG&E developed an approach to meet the Commission's requirements as set out in the Decision. Representatives from SoCalGas and SDG&E have met with Commission staff and other California utilities to share the approach.

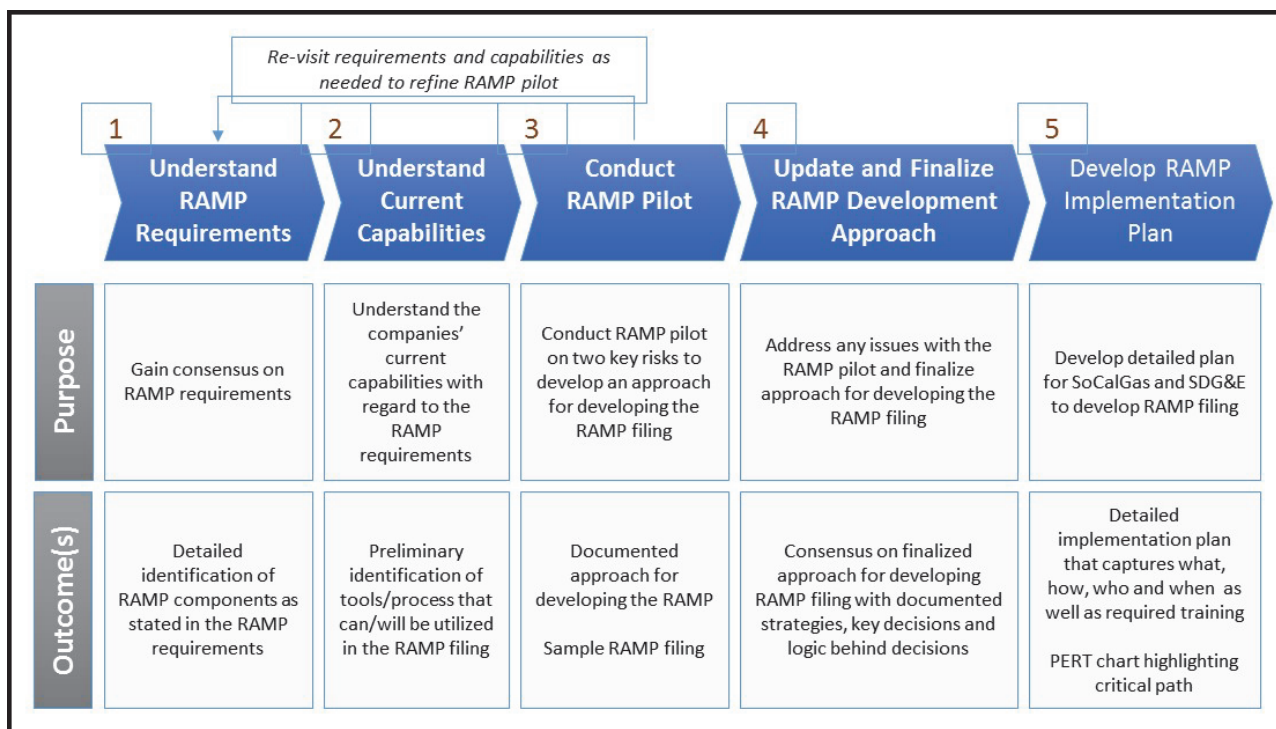
The approach adopted by SoCalGas and SDG&E and reviewed with Commission staff integrates the following:

- SoCalGas and SDG&E are not requesting dollar approval as part of the RAMP filing.
- In order to provide a comprehensive view of the risks addressed within the RAMP filing certain non-CPUC jurisdictional risks and associated costs (e.g. Federal Energy Regulatory Commission or FERC) have been included in the filing, but these will not carry over to the GRC filing.
- The analysis and the resulting order of priority of mitigations were performed at the individual risk level, not across all risks.
- The RAMP filing includes mandated compliance controls and mitigations, as well as ones identified by the Utilities.
- Ongoing spending on controls is needed to maintain the current levels of residual risks.

The Decision recognizes that there may be changes in RAMP filings as the process matures.¹ SoCalGas and SDG&E began the development of their approach in July 2015. Initially, SoCalGas and SDG&E pilot-tested how to meet the Commission’s RAMP filing requirements. From the pilots, SoCalGas and SDG&E developed a process to complete the RAMP filing for 28 risks.

The diagram below summarizes the pilots:

Diagram 1, Summary of Pilot Process



Through the pilots, SoCalGas and SDG&E identified a six-step process for completing the RAMP filing. The six steps are summarized below:

1. Agree on the risks to be included in the RAMP filing.
2. Identify the controls and mitigations for each risk.
3. Develop, using SoCalGas and SDG&E data, third-party data and/or subject matter expertise, the estimated range of risk reduction derived from implementing each control and mitigation.
4. Review spending in historical years with a base year of 2015 (baseline) capital expenditures and O&M expenses and then estimating, using ranges, the anticipated capital forecasts (2017-2019) and estimated operations and

¹ Decision 16-08-018 pg. 132

maintenance forecasts for 2019 (forecast) for each control and mitigation. 2019 is the next Test Year for SoCalGas and SDG&E's next GRC.

5. Calculate the risk spend efficiency.
6. Create the risk mitigation plan describing the risk, associated controls and mitigations, baseline and forecast costs, risk reduction anticipated from proposed controls and mitigations, and risk spend efficiency.

In order to internally introduce the RAMP process within SDG&E and SoCalGas, training sessions were held with all of the participants (e.g., financial planners, risk managers subject matter experts, directors and leadership.) SoCalGas and SDG&E Enterprise Risk Management (ERM) and Regulatory Departments established a multi-level project organization structure that included an Executive Officer Committee, a senior team oversight committee made up of ERM, Regulatory and Legal Leaders, Project Management, Risk Managers, and Project team members to address the specific risks. Project dashboards were implemented to identify challenges and to monitor the status of each element of the RAMP approach.

Each of these steps required multiple planning sessions at the director and officer level, where opportunities were provided to discuss the assumptions, the costs and risk reduction benefits, and the material used to support the risk spend efficiency calculations. The steps are described in greater detail below.

Throughout the process, SoCalGas and SDG&E have used ranges to estimate costs, risk reduction and risk spend efficiency. Given the newness of RAMP and its associated requirements, exact precision in the numbers and figures cannot and should not be assumed.

3 Risks to Be Incorporated into the RAMP Filing

SoCalGas and SDG&E's risk framework uses a 7X7 matrix where the Safety, Health and Environment category is weighted at 40% as compared to 20% for each of the other three risk categories. For each of the categories, the utilities assigned a score ranging from one (1) ("Insignificant") to a seven (7)² ("Catastrophic"). Since, in general, the primary focus of the Commission and, in particular, the RAMP is understanding and mitigating safety risks, SoCalGas and SDG&E selected for inclusion in the RAMP all risks that received a score of four (4) or more in the Safety, Health and Environment category. The risks that qualified for inclusion in the RAMP are referred to as "RAMP Risks." SoCalGas and SDG&E have a total of 28 RAMP Risks; eight for gas, eight for electric and 12 cross-cutting risks.

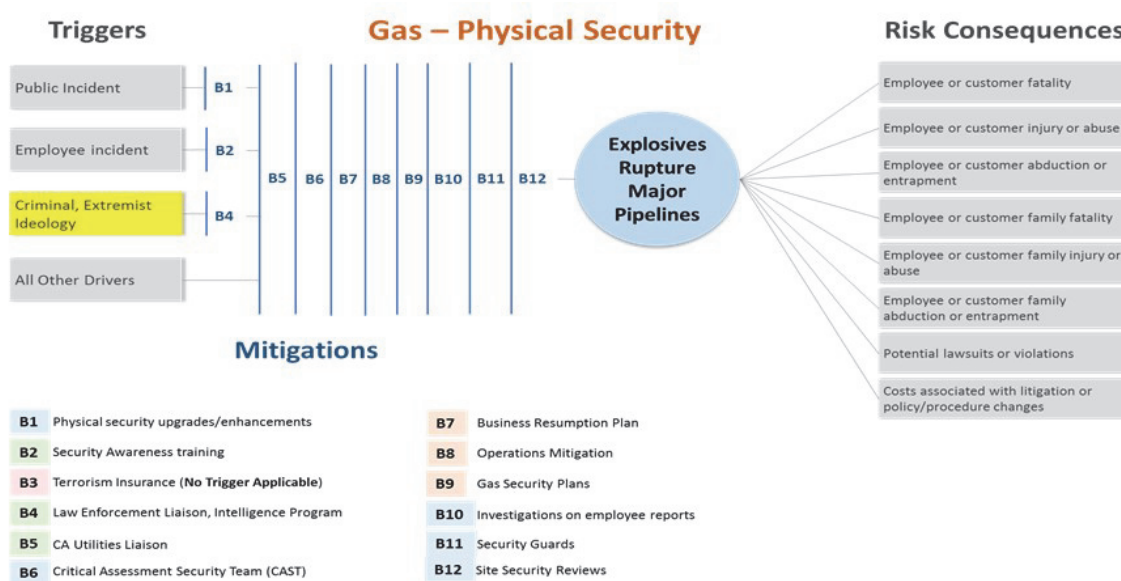
4 Controls and Mitigations for Each Risk

For each risk, the ERM team met with Risk Managers and leadership from each functional area (referred to as "subject matter experts" or "SMEs") to identify the existing controls and proposed mitigations for each of the 28 risks. In some cases, a risk may have a large number of controls or

² These are nonparametric labels and not intended to imply a ratio relationship.

mitigations (e.g., Physical Security of Critical Gas Infrastructure). As illustrated in Figure 1 these subject matter experts identified 12 existing controls (Baseline – B 1-12) for the triggers.

Figure 1: Example of Risk Triggers, Controls and Mitigations

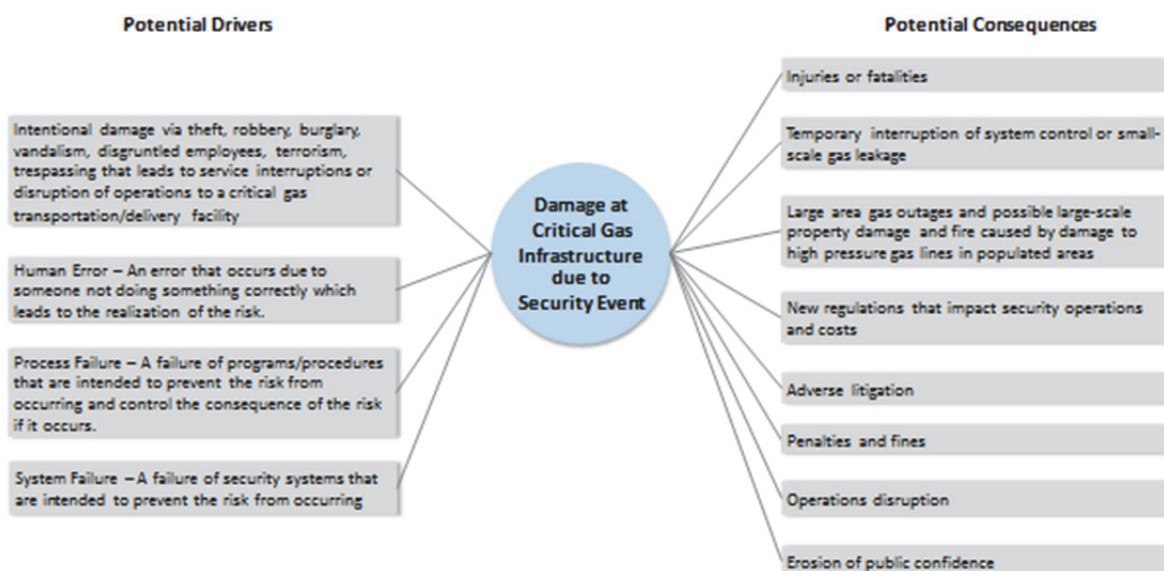


For each RAMP Risk, the proposed controls and mitigations were often further organized into logical mitigation groupings to support further analysis. The Company “grouped” the proposed mitigations: (1) By proposed mitigations in the Proposed Risk Mitigation Plan; (2) By similarities in potential triggers (or drivers), consequences, assets, or dependencies (e.g., software and training on software); or (3) As one portfolio (i.e., to cover a range of activities associated with the risk). This grouping created approximately 80 controls and mitigations across all 28 risks.

The ERM team used a Risk Bow-tie, shown in Figure 2 to group the controls and mitigations.³ The utilities apply this approach to the Physical Security of Critical Gas Infrastructure (Physical Security) Risk as an example. The Physical Security Risk has four controls (Bs) and two mitigations (Proposed or Ps). The Physical Security Risk Bow-tie appears is provided below.

³ As explained in the RAMP Risk chapters, the Risk Bow Tie is a commonly-used tool for risk analysis. Typically, the right side will illustrate the drivers that lead to a risk event for a particular risk and the right side will show the potential consequences of a risk event. The utilities applied this framework for the RAMP analysis.

Figure 2: Example of Risk Bow Tie Analysis



5 Baseline 2015 and Forecast 2017-2019 Capital and 2019 O&M Ranges

SoCalGas and SDG&E’s accounting systems are not configured to capture costs by the types of risk-management activities as anticipated by the RAMP process. Therefore, in order to determine expenditures, whether capital or O&M, SoCalGas’ and SDG&E’s financial planners and ERM team applied a variety of approaches to identify costs. Generally, the planners and ERM team used the following process:

1. Considered each control or mitigation effort in light of current or planned operations.
2. Selected a methodology to estimate the cost impact of adopting the mitigation strategy (expressed in terms of 2015 dollars), whether O&M expense programs or capital projects. That methodology would generally fall into three types:
 - a. Selected a like-kind current activity, and then applied historical costs/expenses;
 - b. Selected a similar proxy activity, and then applied historical costs and adjusted as required; or
 - c. Developed a zero-based cost estimate for the mitigation activity.
3. Developed a range estimate considering the likelihood of variations in scope, schedule and resource availability.

4. Developed the costs in such a way to identify, where possible, the jurisdiction of those expenses whether CPUC, FERC (such as for electric transmission and grid control) or other.

In some cases, controls and mitigations may address more than one risk included in the RAMP. For these controls and mitigations, *all* costs and reduction benefits associated with a control or mitigation were presented in each applicable risk chapters (i.e., the costs and associated risk reductions were not allocated – e.g., pro rata or by percentage, etc. – among risks).

6 Risk Spend Efficiency

Pursuant to D.16-08-018, the utilities are required in the RAMP submission to “explicitly include a calculation of risk reduction and a ranking of mitigations based on risk reduction per dollar spent.”⁴ SDG&E and SoCalGas define Risk Spend Efficiency (RSE) as a ratio developed to quantify and compare the estimated effectiveness of a mitigation at reducing risk to other mitigations for the same risk, or “risk reduction per dollar spent,” as D.16-08-018 requires.⁵

The calculation of the RSE includes the quantification of the amount of Risk Reduction attributable to a mitigation, and the identification of the anticipated costs to achieve the reduction. SoCalGas and SDG&E determined the RSE for each RAMP Risk, using the mitigation groupings and ranges of costs identified, as referenced above. The utilities then ranked the proposed mitigations for each RAMP Risk in accordance with the RSE results, as shown in the last chapter of each Risk Mitigation Plan.

6.1 Calculating Risk Reduction

The SoCalGas and SDG&E used the following approach to calculate the Risk Reduction for each mitigation for each RAMP risk. The quantification process was designed to accommodate the variety of mitigations and variation in accessibility to data pertinent to calculating risk reductions.

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.

⁴ D.16-08-018 Ordering Paragraph 8.

⁵ D.14-12-025 also refers to this as “estimated mitigation costs in relation to risk mitigation benefits.”

3. **Identify a methodology to quantify the impact of each mitigation grouping.**
 The Company identified the most pertinent methodology to determine the potential risk reduction from a mitigation grouping 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 (or change in the risk score).** Using a pertinent methodology, 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 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.⁶ 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 annual risk reduction attributable to each mitigation.

Following is an example of how the ERM and Risk Manager applied this approach to calculating the risk reduction for the SoCalGas Dig-Ins Risk.

1. The ERM and Risk Manager used the risk bow tie, to form mitigation groupings. Mitigations were grouped based on similarity of risk drivers, or inter-dependency. For example, Public Awareness and Dig-In Prevention activities, were grouped together because if public awareness activities were discontinued, there would be far fewer, if any, calls for locate and mark; conversely, if locate and mark activities were discontinued, public awareness alone would not be effective in reducing dig-ins.
2. Next, the team identified which of these mitigations were current controls or incremental mitigations. The four mitigation groupings that emerged were:
 - In-Field Activities and Public Awareness (current activities)
 - In-Field Activities and Improvements (incremental activities)
 - Incremental Public Awareness (incremental activities)
3. Analysis (incremental activities) Using Incremental In-Field Activities and Improvements to represent the risk reduction analysis conducted for each mitigation grouping: ERM and the risk manager determined that a combination of

⁶ For purposes of this analysis, the risk event used is the reasonable worst case scenario, described in the Risk Information section of this chapter.

SoCalGas dig-in data and subject matter expertise was the most applicable method of determining the level of risk after implementing this mitigation. The Company data identified the number of dig-in damages, by cause category. The subject matter experts used this data to calculate the proportion of each cause category potentially impacted by this incremental mitigation and thus the number of potentially preventable dig-ins. Next they estimated the effectiveness of each component of this incremental mitigation at reducing dig-ins. Multiplying the effectiveness by the number of potentially preventable dig-ins resulted in a percentage of the total number of dig-ins that this mitigation could reduce. In this case, this mitigation was estimated to reduce dig-ins by 12%.

4. Finally, the subject matter experts calculated a risk score based on this 12% reduction. The residual risk score for the SoCalGas dig-in risk was 233,365 points. Reducing this score by 12% yielded a calculated score of 205,361 points. The difference between these two scores, 28,004 points, is the annual risk reduction attributable to this mitigation.

6.2 Calculating Risk Spend Efficiency

The ERM team developed estimates and ranges for the risk spend efficiency using the risk reduction amounts and the costs referenced above. Figure shows the formula used to calculate the RSE. The *Annual Risk Reduction* is the number developed through the process described above. It is multiplied by the number of years for which the benefits from the risk reduction are expected.

The *Total Mitigation Cost* is the forecasted 3-year capital expenditure plus the annual O&M expenses multiplied by the number of years for which benefits from the risk reduction are expected. There is both a low estimate and high estimate of forecast capital and O&M costs for each mitigation.

The result of this calculation is units of risk reduction per dollar. It is shown as a range, reflecting the low and high mitigation cost estimates. This number can be used to measure the relative efficiency of each mitigation to another.

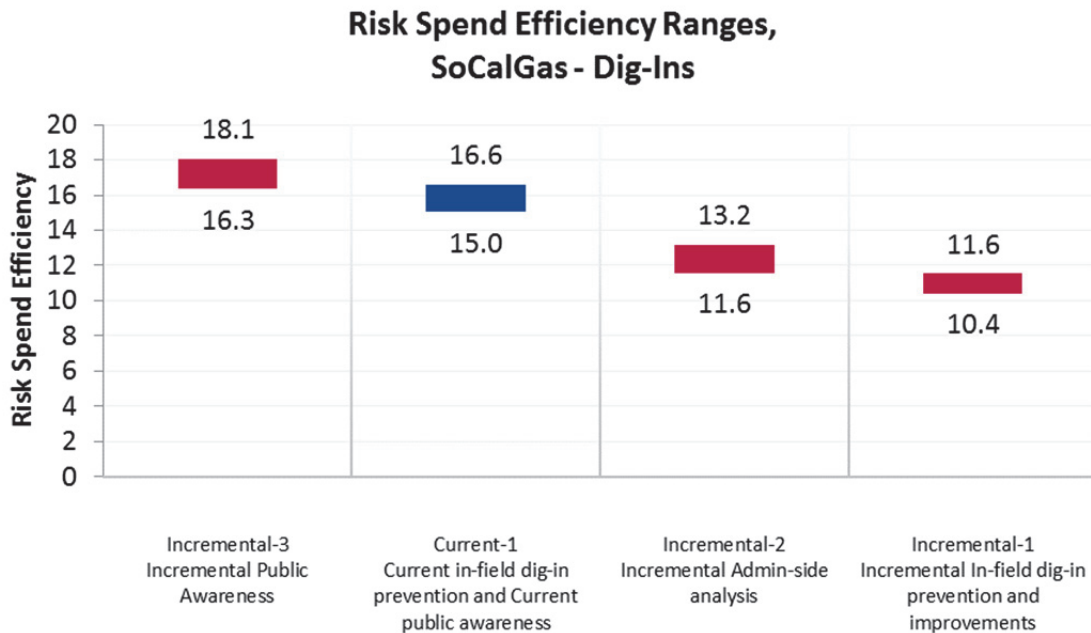
Figure 3: Formula for Calculating RSE

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

Again, using the SoCalGas Dig-Ins risk as an example, the ERM and Risk Managers used the risk reduction score for Incremental In-Field Activities and Improvements to calculate the risk reduction per dollar, or risk spend efficiency (RSE). For this mitigation, the expenditure is expected to yield 7 years of risk reduction, or a total of 196,028 points. These points were divided by the range of costs, in thousands, provided by SoCalGas, resulting in a RSE range of 10.4 – 11.6. This process was repeated to calculate the RSE for each of the SoCalGas Dig-Ins

risk mitigations. Figure 4 below presents the results for each of the mitigations for the SoCalGas Dig-Ins risk.

Figure 4: RSEs for SoCalGas Dig-Ins Risk



7 Risk Mitigation Plan

There is a risk mitigation plan for each of the 28 risks in this Report. The plan incorporates all of the information and analysis described above, organized into the following sections:

1. Purpose – The definition of the risk
2. Background –Additional information to provide factual and where appropriate, legal context for the RAMP Risk
3. Risk Information – Description of the risk classification, potential risk drivers, and potential consequences, and how these components work into each respective Risk Bow Tie
4. Risk Score – Description of the reasonable worst case scenario (event) chosen to develop the risk score, an explanation of the assigned risk scores by impact area and frequency
5. Baseline Risk Pan – The controls and mitigations established as of 2015 to address the risk
6. Proposed Risk Plan – The controls and mitigations proposed to enhance or expand risk management activities

7. Summary of Mitigations – The baseline (2015) and forecast (in 2015 dollars) range of costs to implement the controls and mitigations
8. Risk Spend Efficiency – An explanation of the Annual Risk Reduction as applied to the specific risk, the calculation of the RSE, and the RSE results
9. Alternatives – The two alternatives considered as part of the risk evaluation

When reviewing each risk mitigation plan, the reader should take into consideration the following:

- This is the very first RAMP filing by any utility.
- The risk narratives are not meant to be comprehensive, but have been determined based on the risk as defined, available data, and other factors as discussed in the narrative.
- The RAMP is based on controls and mitigations in place in 2015, but safety activities cannot be fully captured by viewing one moment in time. As a practical matter, SoCalGas and SDG&E have always striven to improve safety protocols and processes and will continue to do so.
- The expenditure forecasts are provided in ranges, in 2015 dollars.
- The filing includes estimated ranges for costs, risk reduction benefit and risk spend efficiency, which may overlap with estimated cost ranges for other risks. The reader should not assume the same level of precision in the RAMP filing as there is with a GRC request.
- Each risk also had its own assumptions (e.g., what change would occur if baseline mitigation wasn't done), sources of data (industry benchmarks, subject matter expert estimates or some combination of both), and methodology of estimation, so cross-risk comparisons would be uncalibrated.