

Risk Assessment Mitigation Phase Risk Mitigation Plan

Employee, Contractor, Customer, and Public Safety (Chapter SCG-2)

November 30, 2016'



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Executive Summary

The purpose of this chapter is to present the mitigation plan of Southern California Gas Company (SoCalGas or the Company) for the risk to Employee, Contractor, Customer, and Public Safety. The Employee, Contractor, Customer, and Public Safety risk covers the risk of conditions and practices which may result in severe harm to employee, contractor, customer, and/or public safety such as driving, customer premises, and appliance conditions, as well as non-adherence to company safety policies, procedures, and programs. SoCalGas' 2015 baseline mitigation plan for this risk consists of eleven controls:

1. Health and safety policies including an Environmental and Safety Compliance Management Program (ESCMP).
2. Mandatory employee skills training.
3. Employees receive supplemental training, retraining, and refresher training. Employees participate in annual reviews of safety- and risk-related policies and procedures (e.g., Gas Standards, defensive driving training, ergonomic training, etc.).
4. Assign, plan, and monitor work contracted to third-party contractors so that it is performed in conformance with contractual quality standards.
5. Conduct ongoing Quality Assurance (QA) activities, job observations, and field rides to assess employee work practices; provide performance feedback and coach employees in their work practices to verify conformance to policy.
6. Undertake activities to educate employees, contractors, and the public on gas safety topics. Heighten customer and public awareness of potential gas hazards via various communication channels, including electronic and hard copy educational materials and community activities.
7. Include standard health, safety, and environmental requirements in purchase and service contracts; conduct due diligence reviews of third-party waste disposal sites; administer industrial hygiene, hazard communication, and safety data sheet programs.
8. Safety, Wellness, and Emergency Services support staff provide services to positively influence safety culture and safety best practices, administer Department of Transportation (DOT) drug testing requirements, assist employees with wellness issues, and administer utility emergency response and incident reporting.
9. Use equipment and programs to protect the safety and well-being of employees (e.g., Personal Protective Equipment (PPE), uniforms, Hearing Conservation, and Respiratory Protection); use equipment and intrinsically safe non-capital tools to conduct safety-related work.
10. Conduct regular inspections and surveys of both above-ground and below-ground gas pipelines and facilities to assess their integrity. (Many of these risk mitigation activities are also addressed in the Catastrophic Damage Involving Medium-Pressure or High-Pressure Failure risks.)
11. Inspect and investigate gas leaks at customer facilities where unusual consumption is identified to detect potentially hazardous conditions; address employee, contractor, customer, and public safety concerns.

These controls focus on safety-related impacts (i.e., Health, Safety, and Environment) per guidance provided by the California Public Utilities Commission (CPUC or Commission) in Decision (D.) 16-08-

018 as well as controls and mitigations that may address reliability. SoCalGas' proposed mitigation plan comprises both baseline and new mitigation activities.

The 2015 baseline mitigations will continue to be performed in the proposed plan to, in most cases, maintain the current residual risk level. In addition, SoCalGas proposes to expand and add new mitigation activities in the 2017 to 2019 timeframe. The incremental activities are as follows; those mitigations that do not have incremental activities are anticipated by SoCalGas to be consistent with their historical levels.

1. Policy, procedures, standards and ESCMP
2. Employee skills training
 - a. Expand "Situation City" training props at Skills Training facility
 - b. Expand Skills training classes by 10% to include wellness and fitness training (45 minutes/day)
 - c. Expand initial training courses that currently include Smith System® Defensive Driver training by 1 day
 - d. Conduct Smith System® Defensive Driver training for employees who drive on company business less than 3,000 miles annually (10% of eligible drivers per year)
3. Employee refresher training
 - a. Expand in-vehicle defensive drivers training to one day per employee per year
4. Contractor management and traffic control
 - a. Close-call, near-miss, and lessons learned program for contractors
 - b. Increased contractor inspections and audits
 - c. Increased oversight of construction contractors
 - d. Improved analysis of construction contractor inspection information
 - e. Membership fees for ISNetworld (contractor safety and Operator Qualification (OpQual) performance evaluation service)
5. QA, job observations, field rides, and job monitoring
 - a. Additional inspectors to audit employees in jobs not currently in the QA program
6. Safety communications and first responder liaison
 - a. Program to update customer contact information to get premise access for pipeline and facility inspections
7. Environmental services monitoring
8. Safety, Wellness, and Emergency Services activities and programs
 - a. Implementation of DMV Pull Notice Program for all fleet vehicle drivers (currently only commercial drivers)
 - b. Telematics system to provide in-cab feedback to fleet vehicle drivers
 - c. Emergency responder website with external access features and security
 - d. High-frequency radio system for emergency communications
 - e. Safety engineers for contract reviews, safety training, and incident investigations
9. PPE and safety equipment
 - a. Deployment of new drop-test tool for low flow measurements
 - b. Deployment of confined space monitoring systems for field personnel

- c. Technology to mitigate risks associated with intermittently electrified facilities
 - d. Upgrades to Nomex coveralls and fresh air equipment
 - e. Deployment of lone worker safety systems in remote areas
10. Gas facility and pipeline inspections
- a. Increased costs associated with full implementation of the program to inspect above-ground Meter Set Assemblies (MSAs), pipelines, and facilities
11. Safety-related field orders (leaks, appliance check, and unusual use, etc.)
- a. Data analytics and field investigations based upon Advanced Meter information
 - b. Increased inspections (Natural Gas Appliance Testing (NGAT)) associated with energy efficiency programs

Next, SoCalGas developed the risk spend efficiency (sometimes referred to as RSE). The risk spend efficiency is a new tool that SoCalGas developed to attempt to quantify how the proposed mitigations will incrementally reduce risk. The RSE was determined using the proposed mitigations and resulted in prioritizing mitigation activities.

Finally, SoCalGas considered three alternatives to the proposed mitigations for the Employee, Contractor, Customer, and Public Safety risk, and summarizes the reasons that the three alternatives were not selected as a proposed mitigation.

Risk: Employee, Contractor, Customer, and Public Safety

1 Purpose

The purpose of this chapter (or plan) is to present the mitigation plan of SoCalGas for the risk to Employee, Contractor, Customer, and Public Safety. The Employee, Contractor, Customer, and Public Safety risk covers the risk of conditions and practices which may result in severe harm to employee, contractor, customer, and/or public safety such as driving, customer premises, and appliance conditions, as well as non-adherence to company safety policies, procedures, and programs.

This risk is a product of SoCalGas' 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. SoCalGas and San Diego Gas & Electric Company (SDG&E) (collectively, the Companies) 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 Companies 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 Companies do not currently track expenditures in this way, so the baseline amounts are the best effort of each company 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 Commission 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.¹ 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 Companies 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 Companies have made efforts to identify those costs.

¹ D.14-12-025 at p. 31.

2 Risk Information

As stated in the testimony of Jorge M. DaSilva in the Safety Model Assessment Proceeding (S-MAP) Application (A.) 15-05-004, “SoCalGas 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.”² The Enterprise Risk Management (ERM) process and lexicon that SoCalGas has put in place was built on the internationally-accepted ISO 31000 risk management standard. In the application and evolution of this process, SoCalGas is committed to increasing the use of quantification within its evaluation and prioritization of risks.³ 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, potential drivers, and potential consequences of the Employee, Contractor, Customer, and Employee Safety risk.

2.1 Risk Classification

Consistent with the taxonomy presented by SoCalGas and SDG&E in A.15-05-004, SoCalGas classifies this risk as a cross-cutting risk as shown in Table 1.

Table 1: Risk Classification per Taxonomy

Risk Type	Asset/Function Category	Asset/Function Type
CROSS-CUTTING	PEOPLE	EMPLOYEE CONDUCT

2.2 Potential Drivers⁴

When performing the risk assessment for Employee, Contractor, Customer, and Public Safety, SoCalGas identified potential indicators of risk, referred to as drivers. These include, but are not limited to:

- **Deviation from policies or procedures, fundamental safety principles, or general safety rules, or other legal or regulatory safety requirements** – SoCalGas’ Company policies and procedures are defined in Gas Standards. Similarly, the Company’s general safety rules are defined in the Employee Responsibilities section of the Illness and Injury Prevention Program (IIPP). An employee or contractor not adhering to such Company safety policies and procedures could result in a safety-related event.

² A.15-05-004, filed May 1, 2015, at p. JMD-7.

³ Testimony of Diana Day, Risk Management and Policy (SDG&E-02), submitted on November 14, 2014 in A.14-11-003.

⁴ An indication that a risk could occur. It does not reflect actual or threatened conditions.

- **Workplace hazards posed to employees** – Unsafe work environments, including work locations, roadways and parking places, customer premises, gas equipment condition, PCBs, lead from paint, asbestos, fumigation chemicals, etc. could lead to a safety event.
- **Gas hazards are not identified or untimely response to identified gas hazards** – Hazards, such as damage to gas infrastructure and facilities, could cause an unpredictable environment and thus, can lead to a safety incident.
- **Effective corrective actions to prevent a reoccurrence are not instituted** – If an issue is identified and no corrective actions to remedy the situation are completed, a safety incident could result.
- **Motor vehicle laws or safe driving practices are not followed** – Non-adherence to the law and or other applicable safety practices could result in a safety incident.

2.3 Potential Consequences

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

- Employee and/or public injuries or fatalities;
- Property damage;
- Operational and reliability impacts;
- Adverse litigation and related penalties; and
- Erosion of public confidence.

These potential consequences were used in the scoring of Employee, Contractor, Customer, and Public Safety that occurred during SoCalGas' 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 drivers that lead to a risk event and the right side shows the potential consequences of a risk event. SoCalGas applied this framework to identify and summarize the information provided above.

Figure 1: Risk Bow Tie



3 Risk Score

The SoCalGas and SDG&E ERM organization facilitated the 2015 risk registry process, which resulted in the inclusion of Employee, Contractor, Customer, and Public Safety as one of the enterprise risks. During the development of the risk registry, subject matter experts (SMEs) assigned a score to this risk, based on empirical data to the extent it was 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, SMEs 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 SMEs selected the following reasonable worst case scenario to develop a risk score for Employee, Contractor, Customer, and Public Safety:

- Employees and/or contractors did not follow a policy or procedure that results in fatalities – whether an employee, contractor, customer, or a member of the public. This could also have operational and regulatory impacts, and litigation and financial costs could also stem from this type of occurrence.

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, SMEs then evaluated the frequency of occurrence and potential impact of the risk using SoCalGas’ 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.⁵ Using the levels defined in the REF, the SMEs applied empirical data to the extent it was 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 2: Risk Score

Table provides a summary of the Employee, Contractor, Customer, and Public Safety 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 2: Risk Score

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
6	4	3	4	5	233,365

3.3 Explanation of Health, Safety, and Environmental Impact Score

The assessment of the score provided in the Health, Safety, and Environmental impact area is based upon the risk scenario, which is expected to result in fatalities. Consequently, a score of 6 (Severe) in this category was selected due to the potential for life-threatening injuries or a fatality that involves an employee, contractor, customer, or member of the public.

3.4 Explanation of Other Impact Scores

Based on the selected reasonable worst case risk scenario, SoCalGas gave the other residual impact areas each a score for the following reasons:

- **Operational and Reliability:** The potential for an operational disruption impacting more than 10,000 customers, one critical location or customer, or temporarily disrupting gas service as defined in the 7X7 Risk Matrix was assessed as very likely. The risk scenario describes a fatality, which could be the result of an explosion to a company gas facility, which would cause

⁵ D.16-08-018 Ordering Paragraph 9.

operational impacts until such time as the facility is repaired. Accordingly, SoCalGas scored this risk a 4 (Major).

- **Regulatory, Legal, and Compliance:** The safety incident selected would likely result in a Cal Occupational Safety and Health Administration (OSHA) investigation and, depending on the outcome, a financial consequence. This warrants the score of a 3 (Moderate).
- **Financial:** A score of 4 (Major) was given for this impact area because a fatal event could potentially result in litigation, which in turn has monetary impacts. Although rare, some legal outcomes involving other companies have resulted in financial impacts as great as \$20 million per instance. However, the risk scenario used to score the impact area at SoCalGas was a \$1 – \$10 million financial impact, as this would be reflective of a reasonable worst case scenario.

3.5 Explanation of Frequency Score

SMEs used empirical data to the extent available to determine the frequency of an event occurring due to an employee or contractor not following policies or procedures. Based on the examples listed in the Potential Drivers section, these scenarios are assumed to occur once every 1-3 years as defined in SoCalGas' 7X7 matrix, which justifies a score of 5 (Frequent).

4 Baseline Risk Mitigation Plan⁶

At SoCalGas, the safety of employees, contractors, customers, and the public in the communities it serves is a core value. The Company safety culture has evolved over more than 140 years, and underpins the Company's programs, policies, procedures, guidelines, and best practices. SoCalGas endeavors to foster a work environment where employees are focused on and engaged in sustaining a culture that emphasizes safety – from initial employee training, to the installation, operation, and maintenance of utility infrastructure, and the commitment to provide safe and reliable service to customers. This allows the Company to be proactive and accountable in the safe delivery of natural gas and supporting services. The Company encourages its employees at all levels to raise pipeline infrastructure, customer safety, and employee safety concerns and to offer suggestions for improvement.

SoCalGas provides employees with training to perform their job responsibilities. The Company further reinforces the need to follow the procedures in which employees were trained by including safety performance measures and results in employees' performance appraisals. SoCalGas regularly assesses its safety culture⁷ and encourages dialogue between employees and management as a means of identifying and managing safety risks. In addition to the reporting of pipeline and occupational safety incidents, management has created multiple methods for employees to report Close Calls and Stop-the-Job situations. A "Close Call" is a circumstance "where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred."

In addition to promoting safety within the Company, SoCalGas also seeks to supplement its workforce by using contractors who are also committed to safety. SoCalGas, through its contractor safety management activities, endeavors to monitor the occupational and pipeline safety records and performance of contractors and utilize contractors that meet the Company's safety standards. Contractors are informed of operational, regulatory, and procedural changes affecting their work. Two-way communication between the Company and its contractors positions all parties to learn about safety issues, share lessons learned, draw from near miss events, and convey the outcomes of incident analysis. All parties leverage the information shared as a means to preventing future incidents.

⁶ As of 2015, which is the base year for purposes of this Report.

⁷ SoCalGas uses the National Safety Council Barometer Safety Culture Survey, the Employee Engagement Survey, and other participative programs to surface workforce culture as it pertains to safety.

In order to create a focus on critical mitigating policies, programs, and activities, this risk analysis uses a decision tree. The answers to the questions that follow determine if a mitigating policy, program, or activity is included in this risk assessment:

1. Is the **primary** driver behind this policy, program, or activity the safety of employees, contractors, or the public?
(If “yes” include it, if “no”, go to Q2.)
2. Does this policy, program, or activity serve to identify the actions that should be taken to ensure the safety of employees, contractors, or the public?
(If “yes” include, if “no”, go to Q3.)
3. Is this policy, program or activity driven by regulatory safety policy (OSHA, PHMSA, DOT, or CPUC)?
(If “yes” include, if “no”, go to Q4.)
4. Does this policy, program or activity educate or alert employees, contractors, customers, or the public to potential safety hazards?
(If “yes” include, if “no”, exclude.)

The above questions provided the initial threshold assessment determining the scope of this risk. Details about the 2015 controls and mitigations that are included are discussed in the Base Year Activities and Baseline Costs section that follows. Key assumptions regarding what is not included in this chapter, or were considered out of scope, include:

- Activities performed to satisfy customer service requests (even though safety tasks are performed when completing the service request) are excluded. Although work elements within some service requests are performed for safety purposes, if the service request (work order) was not generated to specifically address safety, that service request was not included.
- Activities performed to maintain, repair, or operate the gas pipeline infrastructure are excluded. These activities are captured in other RAMP risk chapters.
- Computer systems (both hardware and software) used to support operations performed to mitigate safety hazards are excluded.
- Lease costs for motor vehicles used to support operations performed to mitigate safety hazards are excluded.
- The capital equipment used to mitigate safety hazards (and associated depreciation expenses) are excluded.

As stated above, the Employee, Contractor, Customer, and Public Safety risk entails an employee and/or contractor who does not adhere to Company policies or procedures which then results in a safety-related incident. The 2015 baseline mitigations discussed

below include the current evolution of the SoCalGas' risk management of this risk. The baseline mitigations have been developed over many years to address this risk. They include the amount to comply with laws that were in effect at that time.

Workforce planning systems and processes are in place to determine personnel and business associate needs. Once employee or contractor candidates are identified, they are screened to verify they are qualified to perform the work assigned them. The qualifications include formal training, on-going refresher training, and procedural reviews both in the classroom and at the jobsite. More details on workforce planning are discussed in the RAMP chapter of Workforce Planning.

Although employees and contractors are equipped to perform their work, substandard work can occur. When identified, the source of error is addressed. Unfortunately, these errors sometimes result in injury to employees, contractors, or the public. Similar to the CPUC, whose Overarching Safety Mission states "we are striving to achieve a goal of zero accidents and injuries across all the utilities,"⁸ SoCalGas continues to explore more effective methods for eliminating human error.

SoCalGas' 2015 risk controls consist of the following eleven mitigations:

1. Health and safety policies including an ESCMP.
2. Mandatory employee skills training.
3. Employees receive supplemental training, retraining, and refresher training. Employees participate in annual reviews of safety- and risk-related policies and procedures (e.g., Gas Standards, defensive driving training, ergonomic training, etc.).
4. Assign, plan, and monitor work contracted to third-party contractors so that it is performed in conformance with contractual quality standards.
5. Conduct ongoing QA activities, job observations, and field rides to assess employee work practices; provide performance feedback and coach employees in their work practices to verify conformance to policy.
6. Undertake activities to educate employees, contractors, and the public on gas safety topics. Heighten customer and public awareness of potential gas hazards via various communication channels, including electronic and hard copy educational materials and community activities.

⁸ http://www.cpuc.ca.gov/uploadedfiles/cpuc_public_website/content/safety/visionzero4final621014_5_2.pdf.



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7. Include standard health, safety, and environmental requirements in purchase and service contracts; conduct due diligence reviews of third-party waste disposal sites; administer industrial hygiene, hazard communication, and safety data sheet programs.
8. Safety, Wellness, and Emergency Services support staff provide services to positively influence safety culture and safety best practices, administer DOT drug testing requirements, assist employees with wellness issues, and administer utility emergency response and incident reporting.
9. Use equipment and programs to protect the safety and wellbeing of employees (e.g., PPE, uniforms, Hearing Conservation and Respiratory Protection); use equipment and intrinsically safe non-capital tools to conduct safety-related work.
10. Conduct regular inspections and surveys of both above-ground and below-ground gas pipelines and facilities to assess their integrity. (Many of these risk mitigation activities are also addressed in the Catastrophic Damage Involving Medium-Pressure or High-Pressure Failure risks.)
11. Inspect and investigate gas leaks at customer facilities where unusual consumption is identified to detect potentially hazardous conditions; address employee, contractor, customer, and public safety concerns.

These controls focus on safety-related impacts⁹ (i.e., Health, Safety, and Environment) per guidance provided by the Commission in D.16-08-018,¹⁰ as well as controls and mitigations that may address reliability.¹¹ Accordingly, the controls and mitigations described in Sections 4 and 5 primarily address safety-related impacts. Note that the controls and mitigations in the baseline and proposed plans are intended to address various Employee, Contractor, Customer, and Public Safety-related incidents, not just the scenario used for purposes of risk scoring.

SoCalGas' existing safety programs and safety culture, however, are continuously evolving. SoCalGas assumes that this evolution will continue into the future. For example, in May of this year, 6,609 employees (80% of the employee population) took part in a survey that measured employee perceptions about the safety culture at SoCalGas. The survey was administered by the National Safety Council (NSC), an independent nonprofit organization that has been around for over 100 years. In its report, the NSC described SoCalGas' safety culture as "world-class," and among the top 6% of the 580 companies that have taken the NSC survey.

These results are a tribute to the commitment and personal leadership of front-line employees and supervisors, including all of the Local Safety Committee members and Safety Champions, who work very hard to embed safety as a core value in SoCalGas' work culture. A close look at the results demonstrates that SoCalGas has made improvements in many areas since the last safety culture survey was conducted in 2013.

According to the NSC, SoCalGas scored high in all six areas of safety excellence covered by the survey, including:

- **Organizational Climate** items probe general conditions that interact with the safety program to affect its ultimate success, such as teamwork, morale, and employee turnover (SoCalGas scored in the top 7%);

⁹ The Baseline and Proposed Risk Mitigation Plans may include mandated, compliance-driven mitigations.

¹⁰ 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."

¹¹ Reliability typically has an impact on safety. Accordingly, it is difficult to separate reliability and safety.

- **Management Participation** items describe ways in which top and middle management demonstrates their leadership and commitment to safety in the form of words, actions, organizational strategy, and personal engagement with safety (SoCalGas scored in the top 7%);
- **Supervisory Participation** items consider six primary roles through which supervisors communicate their personal support for safety: leader, manager, controller, trainer, organizational representative, and advocate for workers (SoCalGas scored in the top 7%);
- **Safety Support Climate** items ask employees across an organization for general beliefs, impressions, and observations about management's commitment and underlying values with regard to safety (SoCalGas scored in the top 7%),
- **Employee Participation** items specify selected actions and reactions that are critical to making a safety program work. Emphasis is given on personal engagement, responsibility, and compliance (SoCalGas scored in the top 11%), and
- **Safety Support Activities** items probe the presence or quality of various safety program practices. This focuses on communications, training, inspection, maintenance, and emergency response (SoCalGas scored in the top 13%).

An important benefit to conducting the NSC safety culture survey is that the results enable SoCalGas employees to identify meaningful, measurable, and actionable improvement opportunities that can help improve safety performance. These types of risk mitigation activities, while important, are not listed as alternatives to those presented within this chapter because SoCalGas has assumed they will continue.

1. Policies, Procedures, Standards and Environmental and Safety Compliance Management Program.

There is a clear assignment of officer level accountability and organizational responsibilities at all levels and dedicated Health and Safety and Environmental Services professional staffs to guide/support the operating groups on a daily basis. Activities are performed to promote safe employee work facilities and environments that are hazard free and compliant with regulatory rules or the law. This includes monitoring of Health and Safety and Environmental regulatory changes at the federal, state, and local levels.

SoCalGas has formal procedures, processes, and standards it maintains. These materials provide guidance to employees and document that manner in which work is to be performed. Systems are in place to track employee training, OpQual certification, facility site inspections (Uniform Building Code requirements per Assembly Bill (AB) 32) and administration of the Company's Environmental and Safety Compliance Management Program (ESCMP). ESCMP is an environmental, health, and safety

management system to plan, set priorities, inspect, educate, train, and monitor the effectiveness of environmental, health, and safety activities in accordance with the internationally accepted standard, ISO 14001. SoCalGas also conducts self-assessments and inspections for potentially hazardous environmental factors, investigates environmental exposure incidents, and monitors Proposition 65 compliance activities.

2. Employee Skills Training

Training is an integral part of how SoCalGas mitigates the Employee, Contractor, Customer, and Public Safety risk. New hires, transfers, or newly assigned employees must complete and pass initial mandatory training. Smith System® defensive driver's training is included in this requirement for positions where the employee is expected to drive more than 3,000 miles per year on Company business. Activities associated with skills training provided to employees are included in this category.

3. Employee Refresher Training

Safety and environmental meetings are important to SoCalGas and, therefore, are scheduled on a regular basis. Safety and environmental meetings include: Weekly reviews of relevant policies and procedures, safety tailgates to discuss workplace hazards, work plans and responsibilities, safety stand-downs to discuss safety incidents, close calls, bulletins or other safety topics, safety committee meetings to develop and present material on various safety topics, and dialogue meetings with Company and department leadership. Employee refresher training and procedure reviews are included in this category.

4. Contractor Management and Traffic Control

Contractor selection is based upon specific Company needs and contractor qualifications. Contractor safety records are examined prior to selection. Job requirements are specified in the Company's contracts with third parties, and contractors are required to meet all legal, regulatory, and contractual requirements. Contractor work performance is monitored during the course of their work for the Company. Activities associated with contractor qualification, selection, and oversight are included in this category.

5. QA, Job Observations, Field Rides, and Job Monitoring

SoCalGas maintains a QA program to assess the work quality of many of its field personnel. Job observations and field rides are conducted by management personnel based upon Behavior Based Safety (BBS) principles. SoCalGas' BBS program is a proactive approach to safety and health management, focusing on principles that recognize at-risk behaviors as a frequent cause of both minor and serious injuries. The purpose of the job observation and field ride process is to reduce the occurrence of at-risk

behaviors by modifying an individual's actions through observation, feedback, and positive interventions aimed at developing safe work habits. Employees are also provided feedback and coaching so that their work conforms to policy and procedure.

6. Safety Communications and First Responder Liaison

SoCalGas prepares and distributes safety-related communications for employees, contractors, customers, and the general public. Safety-related messages are delivered using multiple communication channels, including bill inserts, print, radio, web, and social media. Messages include, but are not limited to, carbon monoxide safety, fumigation safety, furnace safety, and pipeline safety (which is part of federal pipeline safety regulations). Emergency Management provides safety and basic operational information about SoCalGas facilities as they relate to First Responder operations and activities. Activities associated with developing and distributing materials that educate people on gas safety are included in this category.

7. Environmental Services Monitoring

The Company's Environmental Services department works closely with third-party contractors to evaluate compliance with all applicable laws and regulations pertaining to the environment. The Industrial Hygiene staff interfaces with contractors and administers the Safety Data Sheet (SDS) program so that only approved chemicals are introduced into the workplace. Activities associated with environmental and industrial hygiene activities are included within this category.

8. Safety, Industrial Hygiene, Wellness, and Emergency Services/Programs

The costs associated with the Safety, Wellness, and Emergency Services department operations are included in this category. SoCalGas' Safety, Wellness, and Emergency Services department manages its overall Health and Safety framework through an organization dedicated to employee, contractor, customer, and public safety.

Safety Services

The Safety Services department functions to:

- Reduce or eliminate incidents resulting in injury, property damage, or outages;
- Raise awareness of safety concerns and incidents through programs, regular safety campaigns, and communications;
- Provide oversight and regulatory guidance to confirm adherence to policies and procedures; and
- Provide resources to integrate safety into everyday business decisions to promote the importance of safety to the overall organization's success.

Safety Services has developed policy and training programs including, but not limited to:

- Injury and Illness Prevention Program;
- Emergency Action Plan and Fire Prevention;
- Job observations;
- Incident investigation and analysis;
- Defensive driving;
- Body mechanics;
- Ergonomics;
- Contractor safety;
- Hazard communication;
- Confined spaces;
- Asbestos and lead;
- Hearing conservation, respiratory protection, and PPE; and
- Public safety and substance abuse awareness and prevention programs.

Safety Services supports field safety compliance audits, major safety programs, communications, management, and statistical analysis. In an effort to reduce or eliminate incidents, the department provides safety training, conducts job observations, investigates and analyzes incidents, assists with the development of corrective actions, and promotes defensive driving, body mechanics, and ergonomically protective workplaces.

SoCalGas establishes leading indicators to support injury prevention. One mechanism for capturing leading indicators is by conducting a periodic Safety Barometer Survey to assess the overall health of our safety climate and identify areas of opportunity that can help eliminate injuries and improve our focus and commitment to safety. The goal of this assessment is to increase employee participation in, and contribution to, SoCalGas' ongoing efforts to continually improve its safety performance. The Safety Services department interprets and advises field operations regarding safety-related rules and regulations, and provides reviews of potential legislation that would impact field operations.

Safety Services provides operational support by conducting compliance audits, sponsoring company-wide safety programs, developing and conveying safety communications, managing incidents, and performing statistical analysis. The department conducts job observations, incident investigation and root cause analysis, promotes defensive driver training, body mechanics training, and ergonomics training. The Safety Services department interprets and advises field operations regarding safety-related rules and regulations and provides reviews of potential legislation that could impact field operations. Safety Services works with field operations to prevent incidents, perform self-audits; identify corrective actions following incidents, and conduct safety training. Safety Services is responsible for compliance with safety regulations, as well as establishing and managing programs, policies, and guidelines for the safety of employees. The Safety Services department also manages company-wide Occupational Health Nurse (OHN) services. Occupational health nursing is a specialty practice that delivers health and safety programs and services to employees. The practice focuses on promotion and restoration of health, prevention of illnesses and injuries, and protection from work-related and environmental hazards.

Employee Assistance Program (EAP) and Wellness

The EAP and Wellness department promotes the physical and mental well-being of all Company employees. EAP and Wellness is committed to providing health and wellness programs to motivate and promote safe and healthy lifestyles by providing programs, resources, information, and supportive services. EAP and Wellness coordinates on-site employee assistance services for employees and work groups including:

- Health and Education Seminars (Stress Management, Weight Management, Nutrition, Heart Disease, High Blood Pressure, etc.);
- Fitness Subsidy Program (Company subsidy for gym membership);
- Annual Flu Immunizations;
- Video and Book Lending Library;
- Health Screenings (e.g., Body Fat, Cholesterol, Blood Pressure, Carotid Artery, Abdominal Aneurysm);
- Work-site programs (e.g., Weight Watchers, Yoga, Walking Class, Chair Massages, Reflexology);
- Special Events (Health Fairs, Walk-a-thons, Blood Drives);
- Educational pamphlets/brochures on a variety of health and wellness topics;
- Administration of the Substance Abuse Awareness and Drug and Alcohol Testing Program; and
- Employee Assistance Programs.

The EAP and Wellness department also serves as a liaison during CPUC, DOT, California Highway Patrol (CHP), or Cal/OSHA related audits or citations. The DOT-regulated and non-regulated Company Drug and Alcohol (D&A) testing programs are administered by the EAP and Wellness department. The department also provides oversight of all pre-employment, random, and other required D&A testing of employees in safety sensitive positions at SoCalGas per DOT regulations. In addition, this group addresses unique and highly complex employee issues which include, but are not limited to:

- Workplace substance abuse;
- Rehabilitation case management; and
- Mental health behaviors affecting job performance, critical incidents, and fitness for duty determination.

Emergency Services

The Emergency Services department manages company-wide emergency preparedness via the maintenance of Emergency Response Plans and Business Resumption Plans. Emergency Services is responsible for emergency incident reporting, maintenance of mutual assistance plans, staffing the Emergency Operations Center, conducting Incident Command Center (ICS) and Incident Management System (IMS) training, and coordinating liaison meetings with First Responders. The Emergency Response Plan, along with referenced documents and procedures, outlines how the Company prepares for, responds to, and recovers from gas-related emergencies. The Emergency Response Plan has three major elements:

- Emergency Preparedness;
- Crisis Management; and
- Business Resumption.

The Emergency Services department is also responsible for the following activities:

- Complying with governmental regulations for emergency planning;
- Training employees to know their specific role, duties, and responsibilities;
- Establishing relationships and providing emergency response information to other emergency organizations;
- Facilitating inter-organizational assistance;
- Coordinating proper communications – both internal and external;
- Using effective emergency management technology;
- Conducting training and exercises;



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- Engaging in Continuous Improvement; and
- Supporting internal and external educational efforts.

9. PPE and Safety Equipment

SoCalGas provides its employees with the PPE required to safely perform work (e.g., flame-retardant suits, eye protection, gloves, etc.). Additionally, job-specific small tools are provided as required to perform work safely. A Tools and Materials (T&M) Committee is in place to review and evaluate proposed changes and support continuous improvement. The T&M Committee works closely with potential suppliers and various operations work groups to verify needs are effectively met. The Company maintains processes and procedures so that employee hearing and respiratory functions are not impaired due to exposure to harmful environmental conditions. When work is performed that could expose customers or the public to injury, controls are implemented to mitigate risk. The costs associated with equipment and specific occupational safety programs are included in this category.

10. Gas Facility and Pipeline Inspections

SoCalGas inspects its pipeline systems pursuant to Gas Pipeline Safety Rules and Regulations (49 CFR 191-193 and General Order (GO) 112). These requirements compel each operator of a Distribution/Transmission system to conduct periodic leakage surveys in accordance with the guidelines outlined in § 192.723 Distribution systems: Leakage surveys and § 192.706 Transmission lines: Leakage surveys. As described in the RAMP chapters of Catastrophic Damage Involving a High-Pressure or Medium-Pressure Pipeline Failure, SoCalGas maintains and operates its pipelines pursuant to safety regulations, including, but not limited to, implementation of the following:

- Leak Surveys
- Pipeline Patrols
- Exterior Corrosion Control
- Internal Corrosion Control
- Valve Inspection
- Underground Vaults
- Pipeline Crossings
- Pressure-Relief Devices



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Maintenance or repair activities are not included in this mitigation. It is included in the RAMP chapters of Catastrophic Damage Involving a High-Pressure Pipeline Failure, Catastrophic Damage Involving a Medium-Pressure Pipeline Failure, and Catastrophic Event Related to Storage Well Integrity.

11. Safety-Related Field Orders (leaks, appliance check and unusual use, etc.)

Customers call SoCalGas' call center for many reasons. Some of those reasons are safety related, including:

- Gas Leaks (customers report smelling gas odor);
- Checks of Appliance Operational Safety;
- Read and Verify orders (those associated with unusual gas usage);
- Fumigation;
- Carbon monoxide (CO) testing¹²
- Energy Diversion Investigations – Meter tampering and meter bypass investigation and remediation. Bypasses or unauthorized attachments create unsafe conditions. These connections present the potential for fire or explosion involving SoCalGas employees, law enforcement, firefighters, city or county officials, occupants of the residence, and/or community.

Specific current risk mitigation activities within in this category include: (a) Customer Contact Center and field response to reported gas leaks; (b) Customer service operations (CSO) safety checks; (c) Investigation of unusual gas consumption conditions; (d) Natural Gas Appliance Tests – checks for the safe functioning of gas appliances after energy efficiency work is performed.

¹² SoCalGas conducts CO testing on homes weatherized through the Energy Savings Assistance (ESA) Program in accordance with Statewide Energy Savings Assistance Program Installation Standards and the Statewide Energy Savings Assistance Program Policy and Procedures Manual. CPUC directives order SoCalGas to charge the costs for the NGAT program to base rates rather than to the public purpose funds.

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, SoCalGas proposes to expand and add new mitigation activities in the 2017 to 2019 timeframe. The incremental activities are as follows; those mitigations that do not have incremental activities are anticipated by SoCalGas to be consistent with their historical levels.

1. Policy, procedures, standards, and ESCMP
2. Employee skills training
 - a. Expand “Situation City” training props at Skills Training facility
 - b. Expand Skills training classes by 10% to include wellness and fitness training (45 minutes/day)
 - c. Expand initial training courses that currently include Smith System® Defensive Driver training by 1 day
 - d. Conduct Smith System® Defensive Driver training to employees who drive on company business less than 3,000 miles annually (10% of eligible drivers per year)
3. Employee refresher training
 - a. Expand in-vehicle defensive drivers training to one day per employee per year
4. Contractor management and traffic control
 - a. Close-call, near-miss, and lessons learned program for contractors
 - b. Increased contractor inspections and audits
 - c. Increased oversight of Transmission, Storage, Engineering, and Pipeline Integrity contractors
 - d. Improved analysis of construction contractor inspection information
 - e. Membership fees for a contractor safety and OpQual performance evaluation service
5. QA, job observations, field rides, and job monitoring
 - a. Additional inspectors to audit employees in jobs not currently in the QA program
6. Safety communications and first responder liaison
 - a. Program to update customer contact information to get premise access for pipeline and facility inspections
7. Environmental services monitoring
8. Safety, Wellness, and Emergency Services activities and programs
 - a. Implementation of DMV Pull Notice Program for all fleet vehicle drivers (currently only commercial drivers)
 - b. Telematics system to provide in-cab feedback to fleet vehicle drivers



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- c. Emergency responder website with external access features and security
 - d. High-frequency radio system for emergency communications
 - e. Safety engineers for contract reviews, safety training, and incident investigations
9. PPE and safety equipment
- a. Deployment of new drop-test tool for low flow measurements
 - b. Deployment of confined space monitoring systems for field personnel
 - c. Technology to mitigate risks associated with intermittently electrified facilities
 - d. Upgrades to Nomex coveralls and fresh air equipment
 - e. Deployment of lone worker safety systems in remote areas
10. Gas facility and pipeline inspections
- a. Increased costs associated with full implementation of the program to inspect above-ground MSAs, pipelines, and facilities
11. Safety-related field orders (leaks, appliance check and unusual use, etc.)
- a. Data analytics and field investigations based upon Advanced Meter information
 - b. Increased inspections (NGAT) associated with energy efficiency programs

These incremental projects and programs are further described below.

2a. Broaden “Situation City” Skills Training

Construct additional props, equipment types, working environments, and hazardous condition simulation capabilities at the skills center training facility to broaden employee exposure to real-world conditions. Increase class size and provide mobile class rooms to meet changing needs. Expand hands-on crew training as well as provide varied training locations for field representatives. Provide additional digging sites and operating conditions. Provide a strong connectivity to meet the computer activity and needs in the situation city vicinity. These changes would enable the Company to better prepare students for work in different environments, with different equipment, and on a wider variety of infrastructure components so they do not make inappropriate decisions in the work environment.

2b. Integrate Wellness and Fitness Training into Skills Training

Expand skills training periods by 10% (the equivalent of 45 minutes per day) for wellness and fitness training. Currently, all new hires are expected to attend, demonstrate proficiency, and pass initial training for most field-related entry level positions in the Company. This enhancement is designed to introduce wellness and fitness training (e.g., body mechanics, hydration, nutrition, sleep, stretching, cardio exercises, weight training, etc.) into the existing curriculum. By integrating the wellness and training curriculum into the skills training program, the Company anticipates employees would develop work methods and a lifestyle that would enable them to avoid future bodily injury.

2c. Expand Initial Smith System Defensive Driving

Expand initial training by one day (the current initial training periods vary by position – from 10 to 30 days) for all new hires or office employees who bid into jobs that require driving. This change in practice should help new employees improve their driving skills and more consistently apply defensive driver principles. As a consequence, the additional training should enable the Company to decrease the number of controllable motor vehicle incidents that occur at the Company and improve the safety of employees, customers, and the general public. By expanding initial Smith System Defensive Driving training, the Company would be better able to break engrained driving habits, reinforce what it means to be a “professional” driver, and familiarize employees with the operation of vehicles that can be very different from those with which they are familiar (e.g., many Company vehicles are significantly larger in size than employees’ personal “compact” vehicles). A pilot study performed in the Meter Reading department in 2014 and 2015 yielded an average reduction in Controllable Motor Vehicle Incident (CMVI) rates of approximately 20% per year (from 5.69 CMVIs per million miles driven in 2013 to 3.43 CMVIs per million miles driven at year-end 2015).

2d. Expand Smith System of Defensive Driving to Employees Driving less than 3,000 miles per year

Currently, the Company has a policy of requiring employees who drive more than 3,000 per year to complete a 1-day Smith System of Defensive Driving® class, and also complete a 1-hour Smith System of Defensive Driving refresher course annually. This mitigation expands the program to those who drive on company business, but less than 3,000 miles per year (~2,500 employees). The cost forecast is based upon 10% of eligible employees being trained each year. Implementing this program would better equip our drivers to drive safely (9 of the 327 CMVIs that occurred in the 2014-2015 period involved employees who drive less than 3,000 miles annually). By expanding its current training program, the Company would also expand its safety

culture when it comes to defensive driving and safe driving practices. This would aid in facilitating peer-to-peer coaching and feedback programs, including “Close Call” reporting.

3a. Expand In-Vehicle Instruction to 1 day per field employee (4,500 employees) per year

Currently, Smith System of Defensive driving does not include a complete familiarization with an employee’s assigned vehicle. Many of the Company’s vehicle incidents involve hitting stationary objects. This safety program enhancement involves augmenting defensive driver coaching with “refresher” training that focuses upon defensive driving principles and application of those principles while operating a motor vehicle. The “refresher” course would include eight hours of in-vehicle demonstration, practice (with coaching and feedback) and an in-vehicle testing to confirm knowledge transfer and skill acquisition. The aforementioned pilot test conducted by the Meter Reading department demonstrated positive results. The Meter Reading department, however, differs from other SoCalGas field operations because meter reader turnover has been about 100% per year. In the organizations where employees work for longer periods, annual “1-day refresher” training is expected to positively impact rates, albeit not by 20% as it did for meter readers. By expanding the time spent reinforcing defensive driving practices, supervisors would be better able to simulate day-to-day driving conditions, conduct demonstrations, simulate “what if” conditions, and observe employees in different situations. When supervisors spend only a short time with employees, employees may often exhibit only their “best” driving behaviors.

4a. Close Call, Stop-the-Job, and Lessons Learned Program for Contractors

Contractors need to actively promote reporting of occupational and pipeline safety Near Misses, Close Calls, and Stop-the-Job situations. The experience gleaned from these incidents as well as from the findings from safety incident investigations need to be shared with other contractors and with Company personnel to better avoid future incidents. It has been difficult to get contractors to share what may have gone wrong on their jobs because it can be embarrassing, lead others to perceive them not to be safety-focused, or potentially reduce the amount of work requested of them. By expanding the Company’s existing programs to include contractors, the Company’s safety culture can be broadened. With a common platform for sharing and learning, the identity of contractors reporting what may have gone wrong can be protected.

4b. Increased Distribution Contractor Inspections and Audits

In addition to existing periodic contractor audits, there is a need for an expanded program for conducting on-site and in-field contractor inspections and audits – at both contractor job sites and Company construction offices to assess compliance with safety and quality protocols. More frequent hands-on observation of contractor operations would enable the Company to have greater confidence each member of the contractor workforce has a process safety mindset and consistently employs safety best practices.

These inspections and audits would enrich safety exchanges and provide a more meaningful platform for process safety improvement. The costs associated with this risk mitigation enhancement are based upon the addition of two FTEs for contractor audits. It is estimated that these two FTEs would be able to complete 500 – 1,000 site visits annually.

4c. Increased Oversight of Transmission, Storage, Engineering, and Pipeline Integrity Contractors

Similar to the enhanced Distribution department contractor oversight program described above, SoCal Gas would expand the existing Inspection and Audit program scope to include work performed by Transmission, Storage, Engineering, and Pipeline Integrity contractors. The quarterly review meetings currently conducted with Distribution contractors would be extended to include the contractors performing work for these additional departments. These meetings would facilitate program level conformance discussions regarding safety, quality, compliance, and cost management, identify opportunities for improvement and facilitate the development of implementation plans. The costs associated with this risk mitigation enhancement are associated with the addition of 3 FTEs.

4d. Improved Analysis of Contractor Construction Inspection Information

Detailed pipeline construction contractor inspection data is currently discussed with contractors at quarterly performance review meetings. This data needs to be tracked over time so trends can be identified and reviewed in more comprehensive manner. A database that maintains safety-related inspection information would provide greater completeness and consistency – both for each contractor and across all contractors. More efficient data collection processes, in-depth analysis, and follow-up with contractors would enhance process safety and assist in avoiding injuries.

4e. Contractor Safety Performance Screening and Monitoring

Implement an established program for evaluating and monitoring the safety performance of potential and existing contractors. Acquire rights to use a screening, pre-qualifying, and monitoring system that would provide the Company information regarding how well contractors meet health and safety requirements. ISNetwork would help the Company in pre-qualifying contractors based on pre-defined criteria (i.e., injury rates, safety incidents, OSHA citations, experience modification rate, etc.). Improve contractor oversight by maintaining current contractor information and (posted) job evaluations. The system would enable the Company to share industry performance data and safety metrics via their benchmarking efforts with other companies.



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5a. Add QA auditors to monitor the performance of employees working in job classifications not currently audited

The Quality Assurance function involves sampling completed field work to better assess employee work quality and compliance with Company policies and procedures. Since 2014, a QA program has been initiated within Distribution Operations to more formally assess how well the Leakage Survey and Locate and Mark functions are performed. The results of this QA effort show improved consistency in adherence to policies and processes and a reduction in work errors. By expanding QA audits to include the Transmission and Storage department operations, as well as additional Gas Distribution activities, the Company would improve adherence to its standards, work methods, and safety rules. The costs associated with this risk mitigation activity are based upon an additional five FTEs. However, the role and breadth of QA within various operational departments is being further evaluated; the incremental funding request is within the scope of the upcoming GRC filing and is subject to change.

6a. Program to update customer contact information for premises access

This mitigation would improve facility access processes supporting leakage survey and inspection of above-ground pipelines. With the recent automation of the meter reading function, it has not been necessary for customers to provide the Company with regular access to its meters (although this is a regulatory requirement) for up to 36 months. This program would provide additional time for Company representatives to collect e-mail addresses and mobile phone numbers from customers when handling all types of live calls. With this information SoCalGas would be able to contact customers in a timely manner, inspect facilities to identify any pipeline hazards, and take prompt corrective action. Without facility access, hazardous conditions may go undetected and potentially injure customers or the public.

8a. DMV Pull Notice Program for all fleet vehicle drivers

The Employer Pull Notice (EPN) program is currently used to monitor the driving records of the Company's commercial drivers (approximately 250 employees). The EPN is designed to promote driver safety through the ongoing review of driver records. Exception reporting includes: failure to appear in court, accidents, suspensions/revocations, and any other action taken against the driving privilege. Expanding this program to include all drivers (approximately 4,250 additional drivers) of SoCalGas fleet vehicles would increase driver accountability, and help the Company evaluate that its employees are legally qualified to operate a motor vehicle on Company business.

8b. Vehicle telematics system to provide in-cab feedback to fleet vehicle drivers

Telematics systems provide real-time safety feedback to drivers via the identification and communication of at-risk behaviors. These systems have been implemented at other California utilities, including Southern California Edison Company and Pacific

Gas & Electric Company. Pilot testing of various telematics systems at SoCalGas have resulted in improvements in participant driving behaviors (as measured by reductions in driver alerts). A survey of 28 drivers who participated in SoCalGas' most recent pilot test of telematics technology revealed that 91% increased their attention to driving.

This technology is expected to improve driving safety, reduce motor vehicle incidents, and help protect both employees and the public. People who use this technology report that it keeps them focused on driving when they are behind the wheel. This is important in enabling people to react quickly when the unexpected occurs. Additionally, the technology reinforces adherence to the speed limit, which can reduce the severity an incident if it does occur. Furthermore, telematics technology reinforces a defensive driver mindset, which can aid in avoiding accidents and injuries.

8c. Emergency Responder website with external access features and security

Currently, First Responder briefings are only conducted live. Manual logs are used to record the First Responders who have attended live training. The proposed website would enable the Company to post training materials for First Responders, track website traffic, and provide opportunity for data analytics. The website would allow SoCalGas to post quizzes and track results. Additionally, the website would enable the Company to securely post files (maps, pipeline information, Pipeline Association for Public Awareness brochures, etc.) that First Responders can download for ease in identifying the location of gas lines. This capability would be particularly important when responding to brush fires.

8d. High-frequency radio system for emergency communications

The radio system being proposed is designed to keep public health, public safety, and critical industry operations and leadership connected to First Responders in the field in the event of an emergency. The radio network involves "one-touch" communication to interconnect other radio users in the event land-line, cellular, or other communication services are non-functional. This system would enable the Company's Emergency Operations Center to communicate with its headquarters offices, district offices, and the city, county, and state Office of Emergency Management and any other Operations Centers that implement this technology.

8e. Safety Engineers for contract reviews, safety training, and incident investigations

Safety Engineers are needed to perform detailed contract reviews and to actively participate in contractor governance. This program is expected to enhance the Company contractor safety program by adding four to six safety professionals to engage in supervisor and QA representative development and participate in all incident investigations. As a result of this program, field

supervisors would be able to more rapidly develop and maintain the skills needed to positively influence safety culture and prevent injuries.

9a. Drop test tool for low flow measurements

With the installation of its automated metering infrastructure, SoCalGas plans to deploy technologies currently used by others in the industry to leak test customer-owned gas pipes prior to turning on gas service. The Low Flow Meter (LFM) would enable more accurate leak tests to be conducted than possible using the current 2-minute clock test. Use of the LFM process would require more time to complete than the current 2-minute clock test method. The more accurate LFM process would be adopted as the standard leak test method at SoCalGas in late 2016. When the LFM process cannot be used due to MSA configuration (e.g., under house meter set), a 5-minute clock test would become the default method used within the Company. While the 5-minute clock test is not as accurate as the LFM, it is more accurate than the 2-minute clock test method currently employed.

9b. Confined space air monitoring system for field personnel

This program would involve replacement of the current confined space and H₂S monitoring equipment system-wide. Affected departments include: Transmission, Storage, M&R, Gas Operations, Operations Training, and various other support services departments. Age-related equipment failures currently present a potential risk to the safety of employees working in gaseous atmospheres warranting acquisition and deployment of new equipment. The new equipment and associated training would encompass both regular and occasional users who have been identified as performing duties in confined spaces or where the potential for H₂S exposure exists.

9c. Technology to mitigate risks associated with intermittently electrified facilities

Field personnel are currently required to test for electricity using an approved voltage tester prior to making physical contact with an MSA. No further testing is currently performed if voltage is not detected at the time of the test. Situations have occurred when the MSA has subsequently become energized when an appliance, solar panel, or other device that is improperly grounded cycles on. There is also the potential for stray current or damage to an electrical facility to cause an MSA to become intermittently energized. New equipment designed to detect changes in voltage and provide an audible and/or visual real-time alarm to employees can prevent field personnel from contacting an electrified MSA. The new equipment and associated training would be provided to all employees who perform duties at an MSA.

9d. Upgrade Nomex coveralls and fresh air equipment

Field personnel working in Immediately Dangerous to Life or Health (IDLH) environments or in flammable atmospheres must wear gas extraction suits and a Supplied Air Respirator (SAR) with an escape bottle or a Self-Contained Breathing Apparatus (SCBA). The manufacturer of the currently used SAR kits no longer supports the equipment. System-wide replacement of the SAR kits with SCBA kits prior to failure would create consistency among operating groups. The fire resistant gloves currently used with the gas extraction suits provide minimal dexterity making it difficult for field personnel to handle small tools and equipment. Replacement of these gloves would reduce the risks associated with working in potentially hazardous atmospheres for extended periods of time.

9e. Lone worker safety system

Lone worker communications technology provides safety monitoring capability for employees who typically work alone in remote locations. The system typically employs 3G and satellite communications. The technology provides features such as: True Fall Detection; no-motion detection; emergency latch; silent alert, worker check-in, etc. It can be configured to include indoor location technology for those who work alone indoors. The devices transmit electronic alerts regarding emergency situations to a 24-hour call center that monitors communications and reacts accordingly. The system would provide the Company the ability to better monitor the safety and security of its employees and provide a means for employees to contact the Company should the need arise when they are working in remote locations.

10a. Increased costs for inspection of above-ground pipe and facilities

Meter readers historically performed the DOT-mandated above-ground pipe atmospheric corrosion inspection function for MSAs. Many of the meter reader inspections were conducted when meter readers were located a long distance from the gas facilities. The virtual elimination of manual meter reading due to deployment of an advanced metering infrastructure (AMI) resulted in the need to transition the function to a new organization comprised of employees at a higher skill and wage level than the meter readers who previously performed the work. This organization now has sole responsibility for performing the DOT-mandated every-3-year inspections. At the same time, the Company increased the scope of the inspections to include more safety elements that can only be conducted when the person performing the inspection is in close proximity to the facility. Facility access challenges have resulted in an increase in costs. These costs have exceeded pre-AMI deployment forecasts.

11a. Data Analytics and field investigations based upon Advanced Meter information

Advanced Meter data analytics enable the Company to identify unusual gas consumption patterns that require field investigation and downstream follow-up work. The AMI system monitors and reports tamper alarms that can indicate when there has been meter tampering. By investigating either of the aforementioned conditions, Company personnel can identify root causes and take action to avoid public injury or property damage and potentially gas theft. This program includes a data analytics staff and the field personnel needed to investigate and address potentially unsafe conditions, such as equipment failures, gas leaks at unoccupied facilities, or unsafe energy diversion activities.

11b. Increased inspections (NGAT) associated with energy efficiency programs

Following the completion of energy efficiency work, gas appliance inspections are conducted to verify conditions are safe for building occupants. The frequency of NGAT is expected to increase in proportion to the forecast increase in energy efficiency work.

6 Summary of Mitigations

Table 3 summarizes the 2015 baseline risk mitigation plan, the risk driver(s) a control addresses, and the 2015 baseline costs for Employee, Contractor, Customer, and Public Safety. 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.

SoCalGas does not account for and track costs by activity, but rather, by cost center and capital budget code. So, the costs shown in Table 3 were estimated using assumptions provided by SMEs and available accounting data.

Table 3: Baseline Risk Mitigation Plan¹³
(Direct 2015 \$000)¹⁴

ID	Control	Risk Drivers Addressed	Capital ¹⁵	O&M	Control Total ¹⁶	GRC Total ¹⁷
1	Policy, procedures, standards, and ESCMP*	<ul style="list-style-type: none"> • Deviation from policies or procedures, or other legal, regulatory, or safety requirements • Workplace hazards posed to employees • Gas hazards are not identified or untimely response to identified gas hazards • Effective corrective actions to prevent a reoccurrence are not instituted • Motor vehicle safe driving practices are not followed 	n/a	\$5,300	\$5,300	\$5,300
2	Employee skills training*	<ul style="list-style-type: none"> • Deviation from policies or 	n/a	11,470	11,470	11,470

¹³ Recorded costs were rounded to the nearest \$10,000.

¹⁴ The figures provided in Tables 3 and 4 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.

¹⁵ 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.

¹⁶ 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).

¹⁷ The GRC Total column shows costs typically presented in a GRC.

ID	Control	Risk Drivers Addressed	Capital ¹⁵	O&M	Control Total ¹⁶	GRC Total ¹⁷
		<p>procedures, or other legal, regulatory, or safety requirements</p> <ul style="list-style-type: none"> • Workplace hazards posed to employees • Gas hazards are not identified or untimely response to identified gas hazards • Motor vehicle safe driving practices are not followed 				
3	Employee refresher training*	<ul style="list-style-type: none"> • Deviation from policies or procedures, or other legal, regulatory, or safety requirements • Workplace hazards posed to employees • Gas hazards are not identified or untimely response to identified gas hazards • Motor vehicle safe driving practices are not followed 	1,050	8,840	9,890	9,890
4	Contractor management and traffic control*	<ul style="list-style-type: none"> • Deviation from policies or procedures, or other legal, regulatory, or safety requirements • Gas hazards are not identified or untimely response to identified gas hazards • Effective corrective actions to prevent a reoccurrence are not instituted 	4,570	6,910	11,480	11,480

ID	Control	Risk Drivers Addressed	Capital ¹⁵	O&M	Control Total ¹⁶	GRC Total ¹⁷
		<ul style="list-style-type: none"> Motor vehicle safe driving practices are not followed 				
5	QA, job observations, field rides, and job monitoring	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, regulatory, or safety requirements Workplace hazards posed to employees Gas hazards are not identified or untimely response to identified gas hazards Effective corrective actions to prevent a reoccurrence are not instituted Motor vehicle safe driving practices are not followed 	60	6,270	6,330	6,330
6	Safety communications and first responder liaison*	<ul style="list-style-type: none"> Workplace hazards posed to employees Gas hazards are not identified or untimely response to identified gas hazards Effective corrective actions to prevent a reoccurrence are not instituted 	n/a	3,830	3,830	3,830
7	Environmental services monitoring*	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, regulatory, or safety requirements Workplace hazards posed to 	n/a	900	900	900

ID	Control	Risk Drivers Addressed	Capital ¹⁵	O&M	Control Total ¹⁶	GRC Total ¹⁷
		employees <ul style="list-style-type: none"> Gas hazards are not identified or untimely response to identified gas hazards 				
8	Safety, industrial hygiene, wellness, and emergency services/programs*	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, regulatory, or safety requirements Workplace hazards posed to employees Gas hazards are not identified or untimely response to identified gas hazards Effective corrective actions to prevent a reoccurrence are not instituted Motor vehicle safe driving practices are not followed 	n/a	7,800	7,800	7,800
9	PPE and safety equipment*	<ul style="list-style-type: none"> Workplace hazards posed to employees 	n/a	2,580	2,580	2,580
10	Gas facility and pipeline inspections*	<ul style="list-style-type: none"> Gas hazards are not identified or untimely response to identified gas hazards 	480	54,200	54,680	54,680
11	Safety-related field orders* (leaks, appliance check and unusual use, etc.)	<ul style="list-style-type: none"> Gas hazards are not identified or untimely response to identified gas hazards 	n/a	20,250	20,250	20,250
	TOTAL COST		\$6,160	\$128,350	\$134,510	\$134,510

* Includes one or more mandated activities

While all the controls and baseline costs presented in Table 3 mitigate the Employee, Contractor, Customer, and Public Safety risk, some of the controls also mitigate other risks presented in this RAMP Report. The risks that are also impacted by Employee, Contractor, Customer, and Public Safety mitigation activities include:

- Catastrophic Damage Involving Gas Infrastructure (Dig-Ins);
- Catastrophic Damage Involving High-Pressure Pipeline Failure;
- Catastrophic Damage Involving Medium-Pressure Pipeline Failure;
- Catastrophic Event Related to Storage Well Integrity;
- Climate Change Adaptation;
- Workforce Planning;
- Workplace Violence; and
- Records Management.

Risk mitigation activities performed to address the aforementioned risks may also serve to mitigate the Employee, Contractor, Customer, and Public Safety risk.

Pipeline and other facility *inspection* activities (performed to identify the need for maintenance), were included as risk mitigation activities addressing this risk. Activities associated with the maintenance or replacement work on pipelines or other utility infrastructure were *not* included as costs associated with the Employee, Contractor, Customer, and Public Safety risk. In this risk mitigation, “Locate and Mark” activities were not considered to be “inspections.” Although these activities are driven by regulatory safety policy and impact public safety, the “Locate and Mark” activities were deemed to be most closely associated with “Catastrophic Damage Involving Gas Infrastructure (Dig-Ins),” and the costs are quantified in that chapter.

The costs associated with 2015 risk mitigation activities were developed using historical (2011 – 2015) information. Where possible, SoCalGas used accounting data based upon Internal Orders (I/Os), cost centers and capital budget codes. In some cases Federal Energy Regulatory Commission (FERC) accounts were referenced. Where 2015 activities were only a subset of I/Os, cost centers, or

budget codes, SMEs used high level assumptions, such as an assumed percentage of costs within the I/O, cost center, or budget code. For new risk mitigation activities, a zero-based approach was used to forecast most costs.

Table 4 summarizes SoCalGas’ 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 SoCalGas is identifying potential ranges of costs in this plan, and is not requesting funding approval. SoCalGas 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 4, SoCalGas used a 2019 forecast provided in ranges based on 2015 dollars.

Table 4: Proposed Risk Mitigation Plan¹⁸
(Direct 2015 \$000)

ID	Mitigation	Risk Drivers Addressed	2017-2019 Capital ¹⁹	2019 O&M	Mitigation Total ²⁰	GRC Total ²¹
1	Policy, procedures, standards, and ESCMP	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, regulatory, or safety requirements 	n/a	\$4,710 - 5,760	\$4,710 - 5,760	\$4,710 - 5,760
2	Employee skills training	<ul style="list-style-type: none"> Workplace hazards posed to employees 	n/a	12,090 - 16,530	12,090 - 16,530	12,090 - 16,530
3	Employee refresher	<ul style="list-style-type: none"> Gas hazards are not 	2,850 - 3,480	10,500 -	13,350 - 16,310	13,350 -

¹⁸ Ranges of costs were rounded to the nearest \$10,000.

¹⁹ 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 SoCalGas’ Test Year 2019 GRC Application.

²⁰ The Mitigation Total column includes GRC items as well as any applicable non-GRC items.

²¹ The GRC Total column shows costs typically represented in a GRC.

	training	identified or untimely response to identified gas hazards		12,830		16,310
4	Contractor management and traffic control	<ul style="list-style-type: none"> Effective corrective actions to prevent a reoccurrence are not instituted 	8,270 - 10,110	8,290 - 10,130	16,560 - 20,240	16,560 - 20,240
5	QA, job observations, field rides, and job monitoring	<ul style="list-style-type: none"> Motor vehicle safe driving practices are not followed 	160 - 190	6,000 - 7,330	6,160 - 7,520	6,160 - 7,520
6	Safety communications and first responder liaison	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, regulatory, or safety requirements 	n/a	3,700 - 4,530	3,700 - 4,530	3,700 - 4,530
7	Environmental services monitoring	<ul style="list-style-type: none"> Workplace hazards posed to employees 	n/a	980 - 1,200	980 - 1,200	980 - 1,200
8	Safety, industrial hygiene, wellness, and emergency services/programs	<ul style="list-style-type: none"> Gas hazards are not identified or untimely response to identified gas hazards 	2,030 - 2,480	11,760 - 14,380	13,790 - 16,860	13,790 - 16,860
9	PPE and safety equipment	<ul style="list-style-type: none"> Motor vehicle safe driving practices are not followed 	2,260 - 2,770	4,090 - 5,000	6,350 - 7,770	6,350 - 7,770
10	Gas facility and pipeline inspections	<ul style="list-style-type: none"> Deviation from policies or procedures, or other legal, 	n/a	77,720 - 91,360	77,720 - 91,360	77,720 - 91,360



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		regulatory, or safety requirements				
11	Safety-related field orders (leaks, appliance check and unusual use, etc.)	<ul style="list-style-type: none"> Workplace hazards posed to employees 	n/a	20,930 - 25,580	20,930 - 25,580	20,930 - 25,580
	<i>TOTAL COST</i>		15,570 - 19,030	160,770 - 194,630	176,340 - 213,660	176,340 - 213,660

Status quo is maintained
 Expanded or new activity
 * Includes one or more mandated activities

The incremental risk mitigation costs were forecast based upon both the labor and non-labor required to perform the function. Where training is proposed, the cost forecast includes incremental student time and also instructor time, if required. Where a system, technology, tool, or material is required, costs were based upon vendor estimates.

7 Risk Spend Efficiency

Pursuant to D.16-08-018, the Companies 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.”²² 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.16-08-018.²³

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.

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.

²² D.16-08-018 Ordering Paragraph 8.

²³ D.14-12-025 also refers to this as “estimated mitigation costs in relation to risk mitigation benefits.”

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 2 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.²⁴ 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.

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 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 4 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

SoCalGas analysts used the general approach discussed in Section 7.1, above, in order to assess the RSE for the Employee, Contractor, Customer, and Public Safety risk. The RAMP Approach chapter in this Report provides a more detailed example of the calculation used by the Company.

The Company used two standard metrics it current tracks to estimate the potential risk reduction of the proposed mitigations: OSHA Recordable Incident rates and CMVI rates. OSHA Recordable Incident rates reflect the number of OSHA Recordable Incidents per 200,000 hours while conducting Company work. CMVI incident rates reflect the number of Controllable Motor Vehicle Incidents per 1,000,000 miles driven during Company operations. These metrics are suitable for use at this point in time, as

²⁴ For purposes of this analysis, the risk event used is the reasonable worst case scenario, described in the Risk Information section of this chapter.

OSHA Recordable Incident and CMVI data are commonly available – both internally and externally across utilities. This supports a data-driven and comparable assessment.

For purposes of quantifying the potential risk reduction, SoCalGas organized both the current controls and incremental mitigations into two groups, respectively: ones that address work-related incidents that do not involve motor vehicles and one that addresses motor vehicle incidents. Analysts used historical safety performance and incident trends in combination with subject matter expertise as the basis for estimating risk reduction from these mitigations.

- ***Current 2015 Controls that Address Occupational Incidents***

The risk reduction from current controls was measured by considering the change in likelihood (i.e., risk frequency) of an incident if those controls were no longer in place. By examining industry OSHA Recordable Incident rates, management assumed without current controls, SoCalGas' OSHA Recordable Incident rate would increase to the worst rate in the industry. Based on 2011-2015 data, SoCalGas' average OSHA Recordable Incident rate was at 3.6 while the peer utility with the greatest rate in 2015 was at 8.1, which is 123% greater than SoCalGas' rate. Additionally, without current controls, SoCalGas assumes it would lose the average 2.6% improvement rate seen since 2007. Lastly, a time component was added that assumes three years must pass before SoCalGas would reach the worst state. As a result, the estimated percentage increase in risk frequency is approximately 40%.

- ***Incremental Mitigations that Address Occupational Incidents***

The risk reduction from SoCalGas' incremental mitigations was determined by examining the data trends in the OSHA Recordable Incident rates achieved through continuous improvement efforts and past investments over the years. As mentioned, SoCalGas has seen a 3-year average improvement rate of 2.6% since 2007 and is anticipating an increase in that improvement rate based on incremental mitigations SoCalGas is proposing to implement. The impact of incremental activities was based on SME input with an estimated increase of 50% in the rate of improvement. The estimated potential reduction in risk frequency is approximately 4%.

- ***Current Controls that Address Motor Vehicle Incidents***

Similar to the OSHA Recordable Incident benchmarking, an estimated percentage increase in risk frequency was calculated based on the assumption that if current activities were not in place, SoCalGas' CMVI rate would increase to the worst CMVI rate in the industry. Based on 2011-2015 data, SoCalGas' average CMVI rate was at 3.4 and the peer utility with the greatest CMVI rate in 2015 had a CMVI rate of 7.6²⁵ which is 125% greater than SoCalGas' rate. A time component was added that assumes three years must pass before SoCalGas would reach the worst state. The estimated potential increase in risk frequency is approximately 40% if current controls were discontinued.

²⁵ Outliers were excluded.

- ***Incremental Mitigations that Address Motor Vehicle Incidents***

The risk reduction from proposed mitigations was estimated based on SME input about the impact of these activities on Controllable Motor Vehicle Incidents. Based on SME input, an estimated decrease of 5% was used to calculate the potential reduction in risk frequency relating to Controllable Motor Vehicle Incidents.

7.3 Risk Spend Efficiency Results

Based on the foregoing analysis, SoCalGas 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:

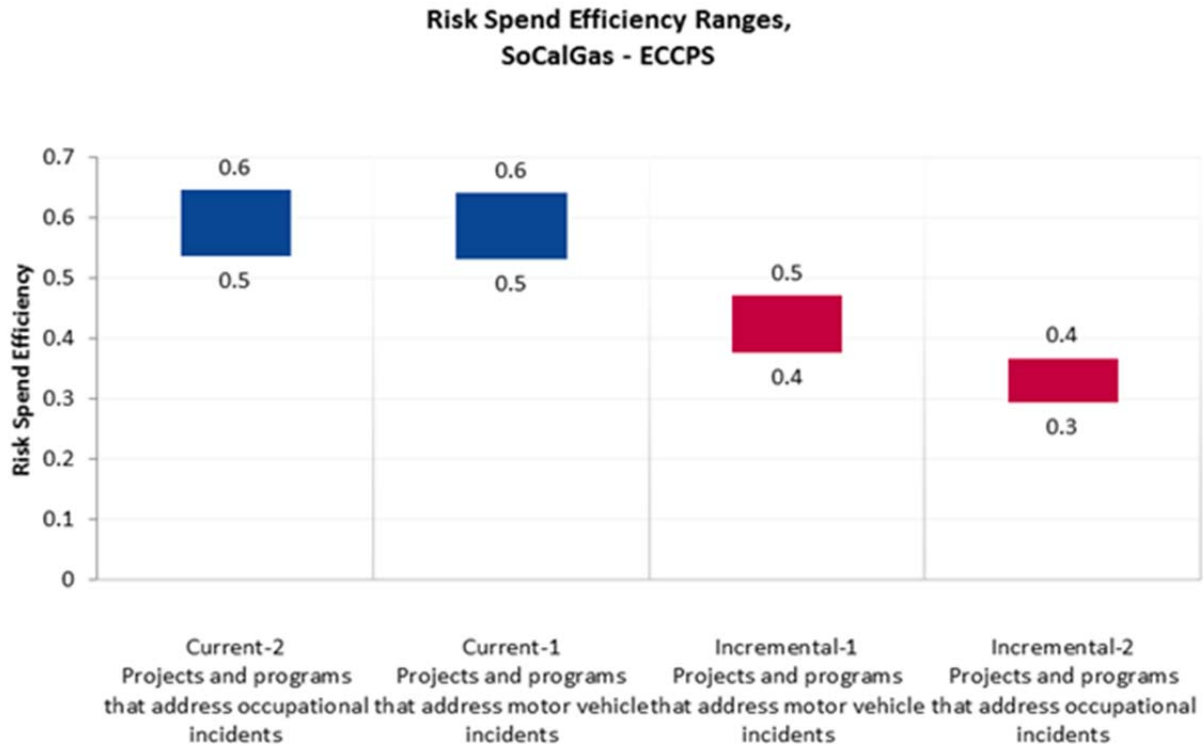
1. Projects and programs that address occupational incidents (current controls)
2. Projects and programs that address motor vehicle incidents (current controls)
3. Projects and programs that address motor vehicle incidents (incremental mitigations)
4. Projects and programs that address occupational incidents (incremental mitigations)

Figure displays the range²⁶ of RSEs for each of the SoCalGas Employee, Contractor, Customer, and Public Safety risk mitigation groupings, arrayed in descending order.²⁷ That is, the more efficient mitigations, in terms of risk reduction per spend, are on the left side of the chart.

²⁶ Based on the low and high cost ranges provided in Table 4 of this chapter.

²⁷ It is important to note that the risk mitigation prioritization shown in this Report, is not comparable across other risks in this Report.

Figure 3: Risk Spend Efficiency



8 Alternatives Analysis

SoCalGas considered alternatives when developing its proposed plan. These alternatives were dismissed in favor of the proposed plan as discussed below. Anything less than the baseline activities was not considered to be a viable alternative because the Company wants to build upon its successes and avoid taking a step backward when it comes to the safety of employees, contractors, customers, or the public.

8.1 *Alternative 1 – Increasing the Frequency of Refresher Training*

As seen in the sections above, training is a significant mitigation activity for this risk. Therefore, SoCalGas considered increasing the frequency of refresher training as an alternative to the proposed plan. For example, SoCalGas could review specific policies and procedures with employees more often than once per year. Providing more frequent training could engrain the subject matter further into the participants' minds.

This alternative was dismissed when compared to the proposed plan. Annual safety policy and standards reviews have been shown to be effective based on the gradual decline in SoCalGas' OSHA Recordable incident rate. Expanding the scope of training or reducing the period between policy

reviews across the board would require additional resources and increase costs, yet are not expected to yield significant benefits. The exception to this lies in the specific areas of defensive driving, wellness and fitness, where SoCalGas believes more can be implemented to help avoid injuries, particularly in the area of sprain and strain injury prevention and motor vehicle incident prevention.

8.2 *Alternative 2 – Modernizing Training Techniques*

SoCalGas considered modernizing its safety training techniques to include more videos, computer simulations, and computer-based training delivery channels. Many of the current trainings are administered using face-to-face or hands-on deliveries. Web-based channels could have benefits, such as greater accessibility and cost savings efficiencies in the long term.

At this time, SoCalGas' proposed plan is preferred to this alternative. All training is kept current pursuant to mandated regulations. When dealing with safety, enabling participants to understand and treat the subject matter with the utmost importance is key to the success of the training, particularly for drivers' training and other proposed enhancements to training in this Report. Such an emphasis may be more difficult to achieve through web-based delivery. Nonetheless, SoCalGas continues to consider new techniques and process improvements. Further, SoCalGas currently believes that the cost of large scale modernization of safety training would not provide added risk reduction.

8.3 *Alternative 3 – Updating to Technologically Advanced Fleet*

SoCalGas considered replacing its current vehicle fleet with vehicles equipped with the latest safety technology (vehicle guidance, blind spot assist, attention assist, etc.) but instead opted for risk-reduction alternatives that involve behavior modification and reinforcement. SoCalGas believes this approach may be more effective in influencing safety culture than engineering approaches that address a single risk factor at a time.