SOCALGAS
RAMP REPORT

2025 Risk Assessment Mitigation Phase

(Chapter RAMP-1)
Overview

May 15, 2025

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CHAPTER RAMP-1: OVERVIEW

I. INTRODUCTION

Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company's (SDG&E) (individually, Company, and collectively, Companies) Chapter RAMP-1 provides an overview of their 2025 Risk Assessment Mitigation Phase (RAMP) Reports (or Report), submitted pursuant to the California Public Utilities Commission's (CPUC or Commission) Risk-Based Decision-Making Framework (RDF).[1] The instant RAMP proceedings are the first phase of each Company's next General Rate Case (GRC), Test Year (TY) 2028. "The purpose of the RAMP is 'to examine the utility's assessment of its key risks and its proposed programs for mitigating those risks.'"[2] Consistent with this purpose, the 2025 RAMP Reports focus on each of SoCalGas's and SDG&E's key safety risks and the current and proposed activities to help mitigate those risks.

SoCalGas and SDG&E are the first utilities to implement the Commission's Phase 3 Decision into their RAMP filings, and the Reports reflect the Companies' initial implementation of the methodologies adopted in the Phase 2 and Phase 3 Decisions. The RAMP Reports also reflect lessons learned from the Companies' 2021 RAMP Reports and further improvement of the RAMP process. In addition, the Companies considered the comments and suggestions by intervenors[3] and reviewed the recent RAMP filings of Pacific Gas and Electric Company (PG&E) and Southern California Edison Company (SCE).[4]

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1 The RDF Framework refers to modifications to the Commission's Rate Case Plan, as set forth in decisions adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceedings (S-MAP), and R.20-07-013 (the Risk OIR), including decisions (D.) 14-12-025, D.16-08-018, D.18-12-014, D.20-01-002, D.21-11-009, D.22-10-002, D.22-12-027 (Phase 2 Decision), and D.24-05-064 (Phase 3 Decision).

2 D.14-12-025 at 31 (citation omitted).

3 Comments considered include those made by intervenors in the Companies' prior RAMP and GRC cycle, as well as comments received during the Companies' December 17, 2024 pre-filing workshop for the 2025 RAMP.

4 The RDF requirements have continued to evolve since the filing of SCE's and PG&E's respective RAMP Reports, meaning that SCE and PG&E were not subject to some of the requirements that apply to SoCalGas's and SDG&E's 2025 RAMP Reports.

Chapter RAMP-1 provides the following:

- An executive summary of the organization of SoCalGas's and SDG&E's RAMP Reports, by chapter;
- A summary of modifications to the RDF since the Companies' 2021 RAMP filing and how the Companies have met these requirements;
- A description of improvements and lessons learned since the Companies' 2021 RAMP filing; and
- An overview of SoCalGas's and SDG&E's Environmental and Social Justice (ESJ) Pilot Studies, attached as Appendix 4 to each Report.

II. EXECUTIVE SUMMARY

The RAMP Reports comprise two volumes and five appendices, beginning with the following volume of joint and individual introductory chapters that lay the foundation of this filing and explain the methodologies used throughout:[5]

Table 1: SoCalGas/SDG&E Introductory Chapters (Volume 1)

Chapter RAMP-1: Overview (Joint SoCalGas/SDG&E)
Chapter RAMP-2: Enterprise Risk Management Framework (Joint SoCalGas/SDG&E)
Chapter RAMP-3: Risk Quantification Framework (Joint SoCalGas/SDG&E)
Chapter RAMP-4: Safety Culture (Joint SoCalGas/SDG&E)
Chapter RAMP-5: Climate Change Adaptation (Individual, SoCalGas or SDG&E)

The Volume 1 Chapters are organized as follows:

- **Chapter RAMP-1 (Joint)** provides an overview of the requirements for SoCalGas's and SDG&E's RAMP Reports, how the Companies have met the requirements, and changes and updates since the Companies' 2021 RAMP Reports. Chapter RAMP-1 also provides an overview of the organization of each Volume 1 Introductory Chapter and each Volume 2 Risk Chapter, and lessons learned by SoCalGas and SDG&E in developing the RAMP Reports.
- **Chapter RAMP-2 (Joint)** presents SoCalGas's and SDG&E's risk philosophy and objectives, their Enterprise Risk Management (ERM) Framework, explains

[5] Volume 1, Chapters RAMP-1, RAMP-2, RAMP-3, and RAMP-4 are jointly sponsored by SoCalGas and SDG&E; Chapter RAMP-5 is company specific.

the selection of RAMP risks, and discusses continuous improvement and changes to the Enterprise Risk Registry since 2022.

- **Chapter RAMP-3 (Joint)** explains the quantitative methodology used for establishing SoCalGas's and SDG&E's Cost-Benefit Ratio (CBR) calculations and tranching methodology.
- **Chapter RAMP-4 (Joint)** discusses SoCalGas's and SDG&E's safety cultures, executive and board involvement in safety, and compensation policies to incentivize a strong commitment to safety.
- **Chapter RAMP-5** discusses SoCalGas's and SDG&E's approaches to managing risk associated with Climate Change.

SoCalGas's RAMP Report presents seven risk chapters (six of which are specific to SoCalGas), SDG&E's RAMP Report presents eight risk chapters (seven of which are specific to SDG&E), and each Company's RAMP Report contains one joint risk chapter (Cybersecurity).[6] Each Company's risk chapters are presented in the respective RAMP Report as identified below. Each identified RAMP risk is discussed in detail in the respective individual risk chapters in Volume 2 and is presented in compliance with the directives in the RDF, as discussed below and in Volume 1, Chapters RAMP-2 and RAMP-3.

Table 2: RAMP Risk Chapters (Volume 2)

SoCalGas RAMP Risk Chapters	
Chapter	**Subject**
SCG-Risk-1	Excavation Damage
SCG-Risk-2	High Pressure Gas System
SCG-Risk-3	Medium Pressure Gas System
SCG-Risk-4	Underground Gas Storage
SCG-Risk-5	Employee Safety
SCG-Risk-6	Contractor Safety
SCG-Risk-8/SDG&E-Risk-8	Cybersecurity

[6] Chapter RAMP-2: Enterprise Risk Management Framework describes the process for selecting these risks for inclusion in the RAMP Report.

SDG&E RAMP Risk Chapters	
Chapter	**Subject**
SDG&E-Risk-1	Excavation Damage
SDG&E-Risk-2	High Pressure Gas System
SDG&E-Risk-3	Medium Pressure Gas System
SDG&E-Risk-4	Wildfire and PSPS
SDG&E-Risk-5	Electric Infrastructure Integrity
SDG&E-Risk-6	Employee Safety
SDG&E-Risk-7	Contractor Safety
SCG-Risk-8/SDG&E-Risk-8	Cybersecurity

The following appendices to the 2025 RAMP Reports provide supplemental information to aid in understanding the Reports.

- **Appendix 1: Glossary of Terms**
- **Appendix 2: 2025 RAMP Roadmap** provides a listing of RAMP requirements and where they have been addressed in the Reports.
- **Appendix 3: SoCalGas and SDG&E's Alternative Tranching White Paper** describing their Homogeneous Tranching Method (HTM), served November 1, 2024.[7]
- **Appendix 4: Environmental and Social Justice (ESJ) Pilot Study Results** provided in accordance with D.22-12-027 (Phase 2 Decision).
- **Appendix 5: Ranking of Mitigations by Cost Benefit Ratios (CBR)** provided in accordance with D.24-05-064 (Phase 3 Decision), RDF Row 26.

III. PROCEDURAL HISTORY AND REQUIREMENTS

On November 14, 2013, the Commission opened Rulemaking (R.) 13-11-006, *Order Instituting Rulemaking to Develop a Risk-Based Decision-Making Framework to Evaluate Safety and Reliability Improvements and Revise the Rate Case Plan for Energy Utilities*. The purpose of that Rulemaking was to incorporate a risk-based decision-making framework into the Rate

7 SoCalGas and SDG&E's development of a tranching methodology and service of the White Paper was done in accordance with the guidance provided in the Phase 3 Decision. *See, e.g.,* D.24-05-064 at 26-28.

Case Plan (RCP) for the energy utilities' GRCs, in which utilities request funding to operate and maintain their systems, including for safety-related activities. Further, the California Legislature enacted Public Utilities Code (Pub. Util. Code) Section 963, which states that "[i]t is the policy of the state that the commission and each gas corporation place [the] safety of the public and gas corporation employees as the top priority."[8] In 2014, the California Legislature amended the Pub. Util. Code, adding Section 750, which directed the Commission to "develop formal procedures to consider safety in a rate case application by an electrical corporation or gas corporation."[9]

As a result of these directives, in D.14-12-025, the Commission adopted a risk-based decision-making framework into the Rate Case Plan for the energy utilities' GRCs. Further, it established two new proceedings to address risk assessment procedures, the S-MAP and RAMP. These proceedings inform the subsequent GRC applications.

On May 1, 2015, as ordered in D.14-12-025, SDG&E, SoCalGas, PG&E, and SCE filed S-MAP Applications (A.) 15-05-002, A.15-05-003, A.15-05-004, and A.15-05-005, which were consolidated on June 19, 2015, as A.15-05-002 and Related Matters. Phase One of that proceeding explored the models the utilities proposed in these applications to identify and manage risks.

On August 18, 2016, the Commission issued D.16-08-018 (the Phase 1 Interim S-MAP decision), which adjudicated the consolidated S-MAP applications, determined the format of future RAMP submissions, and directed the utilities to develop a more uniform approach to risk management in Phase 2 of that proceeding. On May 2, 2018, SoCalGas, SDG&E, PG&E, SCE, and other settling parties filed a Joint Motion for Approval of a Settlement Agreement in A.15-05-002 (cons.). The Commission adopted the S-MAP Settlement Agreement with modifications in D.18-12-014 (the Settlement Decision).

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8 Pub. Util. Code § 963(b)(3).

9 Pub. Util. Code § 750.

The 2025 RAMP Reports are the Companies' fourth RAMP submissions, following the 2016, 2019, and 2021 RAMP Reports.[10] SoCalGas's and SDG&E's last RAMP Reports were submitted on May 15, 2021, and were the first to present safety risks in the manner required by the Settlement Decision. Since the Companies filed their 2021 RAMP Applications and Reports, the Commission has issued four separate decisions in Rulemaking (R.) 20-07-013 (the Risk OIR) – D.21-11-009, D.22-10-002, D.22-12-027 (Phase 2 Decision), and D.24-05-064 (Phase 3 Decision) – which substantially modify the CPUC's Risk-Based Decision-Making Framework (RDF), including the adoption of new regulations governing RAMP submissions. PG&E was the first utility to submit a RAMP Report under D.21-11-009, D.22-10-002, and the Phase 2 Decision, and PG&E's 2024 RAMP Report and the feedback it has received have informed SoCalGas and SDG&E in preparing their 2025 RAMP Reports. SoCalGas and SDG&E are the first utilities to submit a RAMP Report under the new requirements adopted in the Phase 3 Decision.

IV. RECENT MODIFICATIONS TO RDF

This section enumerates and highlights several recent modifications to the RDF that the Commission has adopted since the Companies' 2021 RAMP filings and indicates how and where they are addressed.

A. Modifications Adopted in D.21-11-009

D.21-11-009 approved changes to the RDF that created new RAMP filing requirements, such as: requiring RAMP analysis for all mitigations, including controls,[11] requiring utilities to treat PSPS as risk events within the RDF framework (not just as a mitigation),[12] changing RAMP

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[10] After the filing of the Companies' 2019 RAMP reports, which were intended to inform their respective TY 2022 GRCs, the Commission issued D.20-01-002, which modified the GRC cycles of the large energy utilities, eliminating the Companies' TY 2022 GRCs. The Commission issued D.20-09-004, which closed the 2019 RAMP proceeding and clarified that the Companies' respective 2019 RAMP Reports would not be integrated into each Company's next GRC application.

[11] D.21-11-009 at 17. In D.21-11-009, the Commission required utilities to perform a risk-spend efficiency (RSE) calculation for each mitigation. This was superseded by D.22-12-017, which replaced the RDF's previous RSE requirement with a requirement to perform a specified cost-benefit analysis, as more fully discussed in Chapter RAMP-3. *See* D.22-12-017 at 24-30.

[12] D.21-11-009 at 28-30.

baselines to begin at the start of the new GRC cycle,[13] and adopting a revised S-MAP Lexicon.[14] D.21-11-009 also established a requirement to include foundational program costs in a utility's RAMP, defined as "initiatives that support or enable two or more mitigation programs or two or more risks but do not directly reduce the consequences or the likelihood of risk events."[15] Information on where these requirements are addressed is provided in Appendix 2.

B. Modifications Adopted in D.22-10-002

D.22-10-002 approved new RAMP filing requirements, including calling for utilities to provide graphics of historical progress in their RAMP reports that illustrate what safety work has been accomplished and what work remains to be done (including information over the two preceding RAMP cycles), as well as various cost mapping and reporting requirements.[16] SoCalGas and SDG&E have included these graphics in each risk chapter.

C. Modifications Adopted in the Phase 2 Decision

On December 15, 2022, the Commission superseded the Settlement Decision by approving the Phase 2 Decision. The Phase 2 Decision adopted a Cost-Benefit Approach (CBA) that requires utilities to report on risk in monetized terms (*i.e.*, dollars) for purposes of creating "utility risk and Mitigation Benefit calculations that are more useful during review and consideration of RAMP and GRC filings,"[17] along with numerous other modifications, as summarized below.

1. Cost-Benefit Approach (CBA)

The focus of the Phase 2 Decision is the "replace[ment of] the 'Multi-Attribute Value Function' adopted in D.18-12-014 with a Cost-Benefit Approach that includes standardized dollar valuations of Safety, Electric Reliability and Gas Reliability Consequences from Risk Events."[18]

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13 *Id.* at 136 (Conclusion of Law (COL) 7).

14 *Id.* at 145 (OP 10).

15 *Id.* at 19 (Examples of foundational programs or activities may include "software and computer hardware resources, situational awareness initiatives such as weather modeling, and vehicles used by employees.").

16 D.22-10-002 at 28.

17 D.22-12-027 at 26.

18 *Id.* at 2.

Risk consequences in the 2021 RAMP reports were calculated via the Multi-Attribute Value Function (MAVF) methodology, which governed risk estimation through application of weights and ranges for the Safety, Reliability, and Financial consequence attributes in accordance with the Settlement Decision.[19] As noted above, the Phase 2 Decision supersedes the MAVF, along with its components of attribute ranges and weights, with a Cost-Benefit Approach that requires consequence attributes to be expressed in dollars (referred to as "monetization"). The Phase 2 Decision further provided guidance as to the dollar equivalencies to be applied for non-financial consequence attributes, as discussed below.

SoCalGas and SDG&E are implementing the CBA for the first time in this 2025 RAMP Report. Chapter RAMP-3 describes the quantitative mechanics the Companies applied to do so.

a. Monetization of Consequences – Attribute Dollar Equivalencies (RDF Row 6)

In monetizing all consequence attributes, the Phase 2 Decision provides the following guidance for valuing those attributes in dollars:

- **Safety Consequence Attribute**. Fatalities are to be valued on the basis of the Department of Transportation's (DOT) Value of Statistical Life (VSL); further, injuries of varying degrees are to be valued by attribution of the VSL according to the DOT's Maximum Abbreviated Injury Scale (MAIS).[20] As described in Chapter RAMP-3, and in accordance with D. 22-12-027 and D. 24-05-064, RDF Row 6, SoCalGas and SDG&E used the DOT VSL, adjusted as appropriate to reflect current dollars and their respective service territories. The Companies have also used an MAIS structure for injuries, based on data availability.[21]
- **Electric Reliability Consequence Attribute**. Electric outages are to be valued on the basis of the Lawrence Berkeley National Laboratory (LBNL) Interruption Cost Estimate (ICE) Calculator, which calculates a dollar value per Customer Minute of Interruption (CMI) based on inputs that include the duration and customer mix affected by the outage. SDG&E has used the CMI metric for

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19 D.18-12-014.

20 D.22-12-027 at 63 (OP 2) (with a provision for justifying the use of an alternative VSL if applicable).

21 D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

Electric Reliability consequences and adopted the ICE calculator as the means of estimating those consequences, adapted to reflect its respective service territories, as described in Chapter RAMP-3.

- **Gas Reliability Consequence Attribute**. Gas outages are to be valued on the basis of the "implied" gas reliability dollar equivalency derived from the IOUs' previous RAMP filings' MAVF weights and ranges. SoCalGas and SDG&E have used this approach, applied to gas meters curtailed, as described in Chapter RAMP-3.

b. Risk Spend Efficiencies (RSE) replaced by Cost-Benefit Ratios (CBRs) (RDF Row 25)

SoCalGas's and SDG&E's 2021 RAMP Reports reported RSEs for mitigations. The Phase 2 Decision eliminated RSEs and required IOUs to report CBRs for mitigations.[22] SoCalGas and SDG&E have presented CBRs for all mitigations and, as discussed in Chapter RAMP-3, have included in this RAMP filing the numerous required permutations of CBRs.

The Commission also stated in the Phase 2 Decision that "we do not intend that the Cost-Benefit Ratios produced using this method must serve as the sole determinants of IOU proposals or Commission decisions on risk Mitigations,"[23] and further that "mitigation Cost-Benefit Ratio rankings need not be the only consideration in the utility's selection of Mitigations."[24] Accordingly, and consistent with SoCalGas's and SDG&E's multi-factor decision-making framework as referenced further in Chapter RAMP-2, SoCalGas and SDG&E have included, for certain risks and mitigations, a supplemental analysis of the pre- and post-mitigation estimated tail risk, described more fully in Chapter RAMP-3.

c. Use of Expected Value for Consequences in Calculating CBRs (RDF Row 24)

The Phase 2 Decision requires the expected value of consequences to be applied in the calculation of CBRs.[25] The CBRs presented by SoCalGas and SDG&E in their respective RAMP Reports reflect expected value, scaled as appropriate in accordance with Row 7 of the

[22] D.22-12-027, RDF Row 25.

[23] D.22-12-027 at 26.

[24] *Id.* at 59 (Finding of Fact (FOF) 7); *id.*, RDF Row 26.

[25] *Id.*, RDF Row 24.

RDF (as discussed in Section D.2, *infra*). For information on how SDG&E addresses tail risk in its wildfire risk modeling, refer to Chapter SDG&E-Risk-4 Wildfire and PSPS.

2. Environmental and Social Justice (ESJ) Pilot Study

The Phase 2 Decision also directed the IOUs to develop and submit an ESJ Pilot Study along with their RAMP Reports, as described and summarized in Section VII. SoCalGas's and SDG&E's ESJ Pilot Studies are attached as Appendix 4 to their respective RAMP Reports.

D. Modifications Adopted in the Phase 3 Decision

On May 30, 2024, the Commission adopted significant additional changes to the RDF RAMP requirements by adopting the Phase 3 Decision. New provisions in the Phase 3 Decision include: requiring that utilities present CBRs for each general rate case post-test year and continue to use and test Transparency Pilot Guidelines in conjunction with RAMP; identifying as a "best practice" a methodology for determining tranches and a process for using an alternative methodology for determining tranches; identifying as a "best practice" the use of truncated power law distribution for modeling wildfire tail risk and a process for using other tail risk modeling approaches; in addition to numerous other technical requirements that will be described more fully within these Reports. The Phase 3 Decision modifications to the RDF are briefly summarized below.

1. Tranching (RDF Row 14)

The Phase 3 Decision modified Row 14 of the RDF to provide more specific guidance regarding the determination of "tranches" or subsegments of RAMP Risks, with the objective of "ensur[ing] the IOUs strategically reduce the most destructive and catastrophic risks that face Californians today and each successive year, so that the IOUs are always addressing the highest relative risks first."[26] This RAMP Report reflects a marked increase in the number, granularity, and specificity of tranches compared to the Companies' 2021 RAMP filings, in compliance with the guidance provided by the Commission in the Phase 3 Decision and RDF Row 14. SoCalGas's and SDG&E's HTM methodology for determining tranches is described in their

[26] D.24-05-064 at 28.

Alternative Tranching White Paper, served November 1, 2024[27] and attached hereto as Appendix 3.

A comparison of the number of tranches included in this RAMP Report relative to the 2021 RAMP filings is shown in the table below:

Table 3: RAMP Tranches Comparison

Company	RAMP Risk[28]	2021 Tranches	2025 Tranches
SoCalGas	Excavation Damage	1	49
SoCalGas	High Pressure Gas System	2	32
SoCalGas	Medium Pressure Gas System	1	67
SoCalGas	Underground Gas Storage	1	12
SoCalGas	Employee Safety	1	6
SoCalGas	Contractor Safety	1	5
SDG&E	Excavation Damage	1	32
SDG&E	High Pressure Gas System	2	23
SDG&E	Medium Pressure Gas System	1	47
SDG&E	Wildfire & PSPS	3	64
SDG&E	Electric Infrastructure Integrity	5	69
SDG&E	Employee Safety	1	7
SDG&E	Contractor Safety	1	5
SoCalGas/SDG&E	Cybersecurity	1	4

2. Risk Scaling (RDF Row 7)

The Phase 3 Decision modified RDF Row 7 to provide more guidance on the application of risk scaling (or "risk attitude"), clarifying the appropriateness of convexly non-linear risk scaling (*i.e.*, "risk averse"), while concavely non-linear risk scaling (*i.e.*, "risk seeking") is not appropriate. The Phase 3 Decision also clarified that, in the event an IOU uses tail risk in the determination of CBRs, it is required to also present the tail-risk derived CBRs unscaled.[29] SoCalGas's and SDG&E's CBRs are presented on the basis of expected value CoRE, adjusted

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27 SoCalGas's and SDG&E's development of a tranching methodology and service of the White Paper was done in accordance with the guidance provided in the Phase 3 Decision. *See, e.g.,* D.22-12-027 at 27, 31, 32-33 at Row 14.

28 Changes made between the 2021 RAMP and this RAMP to the name and/or scope of risks is discussed in Chapter RAMP-2.

29 D.24-05-064 at 98.

by application of a convexly non-linear scaling function. A detailed description of the methodology SoCalGas and SDG&E applied to risk scaling is contained in Chapter RAMP-3. Risk scaling is applied consistently across all RAMP risks and the scaling factors are based on multiple, independent, and peer-reviewed studies of societal risk aversion.

A summary of the unscaled ("risk neutral") and scaled ("risk averse") pre-mitigated risk for each of the RAMP Risks in this filing is shown below:

Table 4: Scaled and Unscaled RAMP Risks
(Direct, in 2024 $millions)

Company	RAMP Risk	Unscaled Risk Value	Scaled Risk Value
SoCalGas	Excavation Damage	35.31	69.29
SoCalGas	High Pressure Gas System	44.85	183.98
SoCalGas	Medium Pressure Gas System	113.34	115.90
SoCalGas	Underground Gas Storage	13.33	56.08
SoCalGas	Employee Safety	23.61	26.01
SoCalGas	Contractor Safety	12.73	13.86
SDG&E	Excavation Damage	3.85	6.83
SDG&E	High Pressure Gas System	3.58	15.11
SDG&E	Medium Pressure Gas System	8.67	8.97
SDG&E	Wildfire and PSPS	476.41	3,020.61
SDG&E	Electric Infrastructure Integrity	398.05	398.05
SDG&E	Employee Safety	10.90	11.16
SDG&E	Contractor Safety	14.56	14.56
SoCalGas/SDG&E	Cybersecurity	163.36	1,904.22

3. Forecasting Period Extended to 2031

Pursuant to the Phase 3 Decision, all control and mitigation programs must include CBRs in each of the GRC post-test years (PTY), as well as an aggregate CBR for the entire PTY period and the entire GRC cycle, by tranche. SoCalGas and SDG&E's next GRC cycle will have a test year of 2028 and post-test years of 2029, 2030, and 2031. Consistent with the Phase 3 Decision, the Companies have provided CBRs for the PTY period for all control and mitigation programs, as well as aggregate CBRs. Because CBRs depend on reporting risks in monetized terms (*i.e.*, dollars), SoCalGas and SDG&E estimated costs for the activities presented in RAMP over a seven-year forward-looking period (2025-2031).

The Commission has recognized that there is an "attendant widening of 'forecast error'"[30] as forecasts are required further into the future. While SoCalGas and SDG&E provide forecasts through 2031 in these RAMP Reports, updated costs and forecasts will be presented in SoCalGas's and SDG&E's respective GRC applications.

4. Discount Rates (RDF Row 25)

The Phase 3 Decision modified RDF Row 25 to require that CBRs be calculated three ways, each using a different discount factor scenario. These scenarios include the Weighted Average Cost of Capital (WACC) discount rate for all CoRE attributes and costs, the Societal discount rate for all CoRE attributes and costs, and a hybrid scenario, where the Safety and Reliability CoRE attributes are discounted using a Hybrid rate, while the Financial CoRE attribute and the costs are discounted using the WACC rate.[31]

Table 5 shows the three discount rates for SoCalGas and SDG&E, respectively:

Table 5: Discount Factors Applied to the 2025 RAMP

	SoCalGas	**SDG&E**
Weighted Average Cost of Capital (WACC)[32]	7.49%	7.45%
Social Discount Rate	2%	2%
Hybrid rate calculated as defined in Phase 3[33]	6.1%	6.1%

SoCalGas and SDG&E have provided the requisite three CBRs in accordance with the modified RDF Row 25 requirement for each mitigation in this Report. The applicability of the discounted CBRs in the Companies' decision-making is discussed for each risk in the risk chapters. In those chapters, the Companies also discuss alternative discount rate scenarios presented, as appropriate, if better reflective of the Companies' risk-informed decision-making.

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30 D.20-01-002 at 36.

31 D.24-05-064 at 102-105.

32 Sempra, *2024 Annual Report – Powering Potential* (March 2025) at F-59, *available at:* https://investor.sempra.com/static-files/42894eb7-9d54-409c-982d-c8fd4465538d.

33 D.24-05-064 at 103.

V. CONTINUOUS IMPROVEMENT AND LESSONS LEARNED

In addition to implementing the changes required in recent Risk OIR decisions (D.21-11-009, D.22-10-002, the Phase 2 Decision, and the Phase 3 Decision), the 2025 RAMP Reports also reflect improvements and lessons learned from SoCalGas's and SDG&E's 2021 RAMP Reports. SoCalGas and SDG&E have considered comments and suggestions received by intervenors[34] to further improve upon and enhance their RAMP Reports. Examples of such improvements are provided below.

A. Removal of Stakeholder Satisfaction Attribute

The consequences considered in the former MAVF included stakeholder satisfaction to capture the consequential impacts of a risk event on five key stakeholders: customers, employees, public, government, and regulators. In accordance with feedback received from SPD and intervenors on the 2021 RAMP filings, the quantification of such consequences has been removed.[35]

B. Cross-Functional Factors

In the 2021 RAMP Reports, SoCalGas and SDG&E presented cross-functional factor (CFF) volumes, which provided additional information regarding safety-related initiatives that impacted the enterprise or were associated with more than one RAMP risk. In this RAMP, SoCalGas and SDG&E opted not to present a CFF volume (in part due to SPD criticism of the approach),[36] but instead focus on key safety risks pursuant to Commission decisions.

C. Climate Change Adaptation

SoCalGas and SDG&E recognize that climate change is driving an increased need for energy resilience in California. SoCalGas's and SDG&E's respective adaptation, assessment, and commitment to meet the challenges posed by climate change is discussed in Chapter RAMP-

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34 Comments considered include those made by intervenors in the Companies prior RAMP and GRC cycle, as well as comments received during the Companies' pre-filing workshop for the 2025 RAMP.

35 *See* A.21-05-011/-014 (cons.), SPD Staff Evaluation Report on SDG&E's and SoCalGas's RAMP Application Reports (SPD Report on the 2021 RAMP) at 205 (November 5, 2021) ("The new Stakeholder Satisfaction attribute should be removed from the MAVF until the identified shortcomings have been addressed.").

36 *See, e.g.,* A.21-05-011/-014 (cons.), SPD Report on the 2021 RAMP at 205 ("Cross-Functional Factor chapters do not quantify the expected benefits of mitigation programs.").

5.[37] That chapter describes: Climate Hazards as required by the Phase 3 Decision;[38] key results from SoCalGas's and SDG&E's respective Climate Adaptation Vulnerability Assessments (CAVA); how the effects of climate change can potentially be addressed through adaptive actions; and how these actions may impact certain RAMP risks.

D. Cost Information and Striving for Consistency

To develop their 2025 RAMP presentation, SoCalGas and SDG&E built a module within their General Rate Case Integrated Database (GRID) that is similar to the system used for producing GRC workpapers and tables. SoCalGas and SDG&E designed the GRID database for the specific purpose of meeting the data requirements of the Rate Case Plan and to help efficiently manage the data and data outputs. The development and consistent presentation of the GRC forecasts and workpapers is heavily dependent on the use of this GRID application.[39]

For the TY 2028 GRC cycle, the Commission requires that the Companies must "explicitly map costs and comments between the RAMP and GRC filings. The cost mapping must identify expenses as either capital or operating expenses."[40] Thus, for the first time in the 2025 RAMP Reports, SoCalGas and SDG&E are using GRID to systematically map historical costs to the appropriate control or mitigation. The use of GRID to develop SoCalGas's and SDG&E's RAMP Reports is intended to support consistent mapping of costs between the 2025 RAMP and the 2028 GRC, whenever feasible. Using GRID for RAMP reporting also reduces the manual input of data, so that costs can be accurately mapped and integrated to build a reliable and consistent framework for the GRC.

E. Summary of Workshop Input

While developing their RAMP Reports, SoCalGas and SDG&E met with stakeholders and held a virtual public workshop on December 17, 2024, to provide interested parties an overview of the anticipated RAMP Reports, including the list of risks under consideration for inclusion in the RAMP, and to gather feedback from stakeholders. The list of RAMP risks was

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37 SoCalGas's and SDG&E's 2021 RAMP Reports presented CFF volumes addressing energy system resilience and climate change adaptation.

38 D.24-05-064 at 124 (OP 3(b)).

39 SoCalGas and SDG&E first used GRID for the TY 2012 GRC and subsequently used GRID in the TY 2016, TY 2019, and TY 2024 GRCs.

40 D.22-10-002 at Appendix A, A-1.

subject to discussion and party feedback and helped SoCalGas and SDG&E finalize the list of risks included in their Reports. Most notable of the feedback was the suggestion that although it was not in the top 40% of SoCalGas's Enterprise Risk Registry (ERR) risks,[41] the Underground Storage risk is of interest to stakeholders and is therefore included in the final list. The workshop also included discussion of SoCalGas and SDG&E's HTM tranching methodology, which was described in a whitepaper served on November 1, 2024.[42] SoCalGas and SDG&E provided a comparison of the Phase 3 Decision's tranching methodology with HTM, which generated a very robust discussion; however, no party expressed a preference for one methodology over the other.

VI. RISK CHAPTER ORGANIZATION

In each individual risk chapter, the Companies describe the existing controls and new and/or incremental planned mitigations for each risk, presenting at least two alternative mitigation plans for each risk. SoCalGas and SDG&E present the following sections in each risk chapter:

1. Introduction – This section includes an overview of the risk definition and scope.
2. Risk Assessment – In accordance with the RDF, this section describes the risk score, risk bow tie (*i.e.*, possible drivers/triggers, and potential consequences of each identified risk), as well as the process for tranching assets into similar groups of assets. This section also includes tables summarizing the costs, units, and CBRs for mitigations included in the risk and control mitigation plan.
3. 2024 – 2031 Control and Mitigation Plan – This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for each risk and reflects any changes to the portfolio expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031).
4. Alternative Mitigations – This section presents at least two alternative mitigation plans considered as part of the risk assessment process.
5. Historical Graphics[43] – This section illustrates safety work accomplishments and safety risk mitigation progress over the two immediately preceding RAMP cycles.

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41 As determined by D.24-05-064, RDF Row 9.

42 The White Paper was served at least 45 days prior to the workshop, as directed by the Commission in D.24-05-064. SoCalGas and SDG&E's alternative tranching methodology is further discussed in Chapter RAMP-3.

43 D.22-10-002, Appendix C at C3.

VII. ENVIRONMENTAL AND SOCIAL JUSTICE PILOT STUDY OVERVIEW

As directed in the Phase 2 Decision, SoCalGas and SDG&E have each developed an ESJ Pilot Study. In Appendix 4 of each RAMP Report, SoCalGas and SDG&E present their respective ESJ Pilot Study addressing the following seven action items from the Phase 2 Decision.[44]

- Action Item 1: Consider equity in the evaluation of consequences and risk mitigation within the Risk-Based Decision-Making Framework, using the most current version of CalEnviroScreen to better understand how risks may disproportionately impact some communities more than others;
- Action Item 2: Consider investments in clean energy resources in the RDF, as possible means to improve safety and reliability and mitigate risks in Disadvantaged and Vulnerable Communities (DVC);
- Action Item 3: Consider mitigations that improve local air quality and public health in the RDF, including supporting data collection efforts associated with Assembly Bill 617 regarding community air protection program;
- Action Item 4: Evaluate how the selection of proposed mitigations in the RDF may impact climate resiliency in DVCs;
- Action Item 5: Evaluate if estimated impacts of wildfire smoke included in the RDF disproportionately impact DVCs;[45]
- Action Item 6: Estimate the extent to which risk mitigation investments included in the RDF impact and benefit DVCs independently and in relation to non-DVCs in the IOU service territory; and
- Action Item #7: Enhance outreach and public participation opportunities for DVCs to meaningfully participate in risk mitigation and climate adaptation activities consistent with D.20-08-046.

The goal of the ESJ Pilot Study was to evaluate the impact of selected risks and mitigation activities on DVCs and how that compares to non-DVC areas. This study examined disparities in safety, reliability, and climate resilience between DVCs and non-DVCs, including

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[44] D.22-12-027 at 65-67 (OP 5).

[45] This action item does not apply to SoCalGas, as a natural gas utility.

the effects of the evaluated mitigation efforts. For Action Items 1, 4 and 6, SoCalGas elected to utilize the data available for its Medium Pressure Gas System and Excavation Damage risks, overlaying it on the CalEnviroScreen 4.0 at the census tract level to better understand these impacts. Similarly, SDG&E focused on the Wildfire and PSPS risk and Electric Infrastructure Integrity risk.

VIII. CONCLUSION

In summary, the RAMP Reports provide information regarding how SoCalGas and SDG&E think about, plan for, and mitigate identified key safety risks, and present these key safety risks in compliance with the directives in the RDF. The RAMP Reports will inform the safety-related funding requests that the Companies will include in their respective TY 2028 GRC applications, currently anticipated to be filed in May 2026.

2025 Risk Assessment Mitigation Phase

(Chapter RAMP-2)

Enterprise Risk Management Framework

(Joint SoCalGas/SDG&E)

May 15, 2025

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CHAPTER RAMP-2: ENTERPRISE RISK MANAGEMENT FRAMEWORK

I. INTRODUCTION

SoCalGas and SDG&E's risk-based decision-making is guided foremost by an unwavering commitment to delivering safe and reliable energy to customers at a reasonable cost.[1] This includes the prevention of catastrophic, loss-of-life events, protracted service interruptions, and the associated financial losses to customers and the public that may stem from such events. SoCalGas and SDG&E's ERM frameworks, including ERM governance, processes, data, and tools, are designed to advance those objectives. These objectives and practices are also consistent with the CPUC's requirements in the Risk-Based Decision-Making Framework (RDF) to prioritize safety, consistent with California Public Utility Code section 451 requirements. SoCalGas and SDG&E further recognize that the risk landscape is increasingly dynamic and evolving. This demands that risk assessments and mitigation strategies remain nimble and adaptable.

This chapter provides an overview of SoCalGas and SDG&E's approach to risk management, ERM frameworks, and ongoing advancements to align risk, asset, and investment management over this and future GRC cycles. Consistent with the requirements of the RDF,[2] this chapter also identifies changes to the Enterprise Risk Registry (ERR) from the previous 2021 RAMP Report and the Test Year (TY) 2024 GRC filing.

II. SOCALGAS AND SDG&E'S RISK MANAGEMENT PHILOSOPHY AND OBJECTIVES

SoCalGas and SDG&E's risk management decision-making incorporates the selection of cost-effective means of reducing: (i) the occurrence and/or consequences of risk events (including catastrophic events), (ii) prioritizing investments that address the highest relative risks,[3] (iii) maintaining compliance with applicable laws and regulations (such as PHMSA's gas pipeline Integrity Management Program requirements, as well as from the Occupational Safety and Health Administration (OSHA), the North American Electric Reliability Corporation's Critical Infrastructure Protection (NERC CIP), the Federal Energy Regulatory Commission

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1 *See* ISO 31000 at 2.

2 D.24-05-064, RDF Row 8.

3 D.24-05-064 at 29.

(FERC), the California Independent System Operator (CA-ISO), the Environmental Protection Agency (EPA), and the Department of Transportation (DOT)), and (iv) other factors.

The Commission's RDF has evolved significantly since the 2021 RAMP, as discussed in Chapter RAMP-1. This includes voluminous data analyses required to comply with new RDF guidelines, including numerous required permutations of Cost-Benefit Ratios (CBRs).[4] As described more fully in Chapter RAMP-3: Risk Quantification Framework, the Companies have included, for certain risks and mitigations, a supplemental analysis of the pre- and post-mitigation estimated tail risk to align with SoCalGas and SDG&E's continued pursuit to reduce the likelihood of catastrophic events. SoCalGas and SDG&E recognize the importance of using increasingly quantitative models to inform risk and mitigation analysis, but also believe it is important to place these analyses in the broader context of prudent utility management, which reviews and weighs a number of factors beyond the three quantified under the RDF—safety, reliability, and financial— when making determinations.[5]

III. ENTERPRISE RISK MANAGEMENT FRAMEWORK

SoCalGas's and SDG&E's ERM frameworks are modeled after ISO 31000 and designed to identify, assess, respond to, and report on key enterprise risks. These frameworks consist of an ERM governance structure to define the ERM-related roles and responsibilities of employees at various levels up to SoCalGas's and SDG&E's respective Boards of Directors, in addition to risk processes and tools. SoCalGas's and SDG&E's respective risk management teams work closely with senior leadership, management, and employees to proactively identify threats and opportunities, align risk exposure to organizational priorities, drive risk-informed business decisions and resource allocation, and monitor identified risks and mitigation plans to foster continuous improvement. This comprehensive approach to enterprise risk management supports and informs the Commission's RDF.

SoCalGas and SDG&E each follow a process, by which SoCalGas and SDG&E identify, manage, and mitigate enterprise risks while aiming to provide consistent, transparent, and

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4 CBRs state the relative cost-effectiveness of mitigations on the basis of the Expected Value of risk reduction, however CBRs alone do not provide insight as to the reduction of catastrophic risk events, nor do they provide insight as to whether mitigations are substitutes of other mitigations addressing the same risk allowing them to be compared directly.

5 Examples of additional factors taken into consideration include, but are not limited to, environmental, community, and operational impacts.

repeatable results.[6] This process aligns with the evaluation method adopted by the Commission in 2016 "as a common yardstick for evaluating maturity, robustness, and thoroughness of utility Risk Assessment and Mitigation models and risk management frameworks."[7] Given that risks are dynamic, SoCalGas and SDG&E perform their ERM processes annually, resulting in a refreshed ERR each year that evaluates the identified enterprise-level risks and considers evolving risk conditions and emerging risks.

IV. CONTINUOUS IMPROVEMENT OF RISK MANAGEMENT PRACTICES

As discussed in Chapter RAMP-4: Safety Culture, SoCalGas and SDG&E both implement comprehensive Safety Management Systems (SMS) to continually enhance the safety of their operations, strengthen safety culture, and improve overall safety performance. Continuous improvement is a foundational value of both the SMS and ERM frameworks. To continuously identify improvement opportunities, SoCalGas and SDG&E leadership, risk owners, risk managers, and the risk management teams monitor dynamic risk conditions and risk management developments in the industry, consider feedback and input from internal and external subject matter experts and stakeholders, and evaluate the effectiveness of the Companies' overall risk management frameworks and the effectiveness of risk management plans and activities.

SoCalGas and SDG&E both continue to expand the use of metrics to inform risk-based decision-making, including asset performance and other risk metrics that inform and demonstrate progress related to planned investments. The Commission in D.19-04-020 and D.21-11-009 approved and mandated annual reporting of safety performance metrics, which began in March 2020 and is ongoing.

Further, both SoCalGas and SDG&E utilize Copperleaf Portfolio, an enterprise-wide risk-informed investment decision-support system that integrates safety, risk, and asset management data to support strategic and risk-informed capital investment decisions. SoCalGas and SDG&E aim to enhance the Copperleaf system and expand it to include multi-year scenario analyses. This will support long-term sustainability and safety by aligning risks with asset and

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6 The six-step process was discussed in SoCalGas's and SDG&E's Risk Policy testimonies served in the Companies' last GRC. *See* 2024 GRC, Direct Testimony of SoCalGas witness Deana M. Ng (Exhibit (Ex.) SCG-03: Chapter 1) and 2024 GRC, Direct Testimony of SDG&E witness Michael M. Schneider (Ex. SDG&E-03: Chapter 1).

7 D.16-08-018 at 195 (Ordering Paragraph (OP) 4).

capital investment management, and integrating SMS activities, wildfire risk (SDG&E), and emergency management mitigation actions.

For the 2025 RAMP, SoCalGas and SDG&E have also made significant advancements in their data science capabilities through the adoption of Python, MathWorks MATLAB, and Microsoft Structured Query Language (MS SQL) databases to perform detailed risk assessments. These tools enhance their modeling, simulation, and Quantitative Risk Assessment (QRA) capabilities enabling potentially greater accuracy. Python and MATLAB provide robust computational power and flexibility for complex analyses, while MS SQL databases promote efficient data management and retrieval. This integrated approach improves the reliability of risk models, streamlines workflows, and enhances scalability.

SoCalGas and SDG&E also communicate regularly with risk management representatives at Pacific Gas and Electric Company, Southern California Edison Company, and industry consortia groups such as the Edison Electric Institute and the American Gas Association to discuss and share best practices, address trends and emerging issues, and to improve risk management practices.

V. SELECTION OF RAMP RISKS

As discussed above, SoCalGas's and SDG&E's ERM processes result in an updated ERR each year. For this Report, using the updated Risk Quantification Framework described in Chapter RAMP-3: Risk Quantification Framework, SoCalGas and SDG&E scored each of the 2024 ERR risks utilizing the safety attribute only and sorted the risks in descending order by the monetized safety risk score. For the top 40% of ERR risks with a monetized safety risk score greater than zero, SoCalGas and SDG&E then calculated a risk score using all attributes in the RDF (*i.e.*, in addition to the safety attribute). The Companies reviewed the outputs of this process and developed a preliminary list of RAMP risks, based on the initial monetized safety risk scores and other discretionary enterprise risks that are determined to be top priorities. This list was presented at a pre-filing workshop[8] held on December 17, 2024, as discussed in Chapter RAMP-1: Overview. After careful consideration and based on the input received from the

8 D.24-05-064, RDF Row 12.

Commission's Safety Policy Division (SPD) and other interested parties, the RAMP risk list was finalized as presented with the addition of Underground Gas Storage Risk (SoCalGas only).[9]

A. Evolution of Risks between the ERR and RAMP

The RDF OIR Phase 3 Decision requires that RAMP Reports highlight changes to the ERR from previous RAMP or GRC filings.[10] Pursuant to this requirement, Tables 1 and 2 provide comparisons of the risks in this 2025 RAMP Report with those that were presented in SoCalGas's and SDG&E's respective 2021 RAMP Reports and their 2024 ERRs and include changes made to the scope and naming conventions.

Table 1: Comparison of SoCalGas's 2025 RAMP Risks and 2024 ERR to the 2021 RAMP Risks

2025 RAMP Risks	2024 ERR	2021 RAMP Risks
Excavation Damage	Excavation Damage	Excavation Damage (Dig-In) on the Gas System
High Pressure Gas System	High Pressure Gas System	Incident Related to the High-Pressure System (Excluding Dig-In)
Medium Pressure Gas System	Medium Pressure Gas System	Incident Related to the Medium Pressure System (Excluding Dig-In)
Underground Gas Storage	Underground Gas Storage	Incident Related to the Storage System (Excluding Dig-in)
Employee Safety	Employee Safety	Incident Involving an Employee
Contractor Safety	Contractor Safety	Incident Involving a Contractor
Cybersecurity	Cybersecurity	Cybersecurity
	Asset Records Management	
	Beyond the Meter	
	Energy Resiliency – Climate Change	
	Energy Resiliency – Energy Transition	
	Energy Supply	
	Physical Security	
	Seismic Activity	
	Technology Recovery & Resiliency	

9 SDG&E does not have any underground gas storage facilities within its service territory.

10 D.24-05-064, RDF Row 8.

The following describes the changes, if any, in scope related to SoCalGas's 2025 RAMP risks as listed in Table 1 above. If not identified below, the risk definition has either remained unchanged, such as the Cybersecurity risk, or the risk has not had a material scope change, even where the name of the risk may have changed, such as the Contractor Safety risk.

- **High Pressure Gas System:** The name of this risk was changed in the 2024 ERR and 2025 RAMP. The risk scope was also refined in the 2025 RAMP to reflect the inclusion of aboveground storage assets and their respective controls.
- **Medium Pressure Gas System**: The name and scope of this risk have changed from the 2021 RAMP to the 2024 ERR and 2025 RAMP. In the 2021 RAMP this risk included risks associated with medium pressure infrastructure both before the meter and after the meter. For the 2024 ERR and the 2025 RAMP, SoCalGas assessed these risks separately as Medium Pressure Gas System (defined as up to the meter) and Beyond the Meter (defined as after the meter), respectively. Beyond the Meter as a standalone risk, did not meet the 40% safety assessment threshold to merit being included in the 2025 RAMP.
- **Underground Gas Storage**: The name of this risk has changed from the 2021 RAMP to the 2024 ERR and 2025 RAMP. The scope was also refined to reflect that this risk solely addresses underground storage assets and their respective controls.

Table 2: Comparison of SDG&E's 2021 RAMP Risks and 2024 ERR to the 2025 RAMP Risks

2025 RAMP Risks	2024 ERR	2021 RAMP Risks
Excavation Damage	Excavation Damage	Excavation Damage (Dig-In) on the Gas System
High-Pressure Gas System	Incident Related to the High-Pressure Gas System (Excluding Dig-In)	Incident Related to the High-Pressure System (Excluding Dig-In)
Medium-Pressure Gas System	Incident Related to the Medium-Pressure Gas System (Excluding Dig-In)	Incident Related to the Medium Pressure System (Excluding Dig-In)
Wildfires and Public Safety Power Shutoff (PSPS)	Wildfires involving SDG&E Equipment (including Third Party Pole Attachments)	Wildfires Involving SDG&E Equipment (including Third Party Pole Attachments)
Electric Infrastructure Integrity	Electric Infrastructure Integrity	Electric Infrastructure Integrity

2025 RAMP Risks	2024 ERR	2021 RAMP Risks
	Customer & Public Safety – Contact with Electric Equipment	Customer & Public Safety – Contact with Electric Equipment
Employee Safety	Employee Safety	Incident Involving an Employee
	Motor Vehicle Incident	
	Workplace Violence	
Contractor Safety	Contractor Safety	Incident Involving a Contractor
Cybersecurity	Cybersecurity	Cybersecurity
	Aviation Incident	
	Capacity Restrictions or Disruptions to the Natural Gas Transmission System	
	Consumer Privacy	
	Contracted Supplier Risk	
	Customer & Public Safety – After Meter Gas Incident	
	Electric Grid Failure and Restoration Blackout/Failure to Black Start)	
	Environmental Compliance	
	Inability to Recover Technology and Applications	
	Insufficient Supply to the Natural Gas Transmission System	
	Lack of IT Resiliency	
	Massive Smart Meter Outage	
	Physical Security of Critical Electric Infrastructure	

The following details the changes, if any, in scope related to SDG&E's 2025 RAMP risks as listed in Table 1 above. If not identified below, the risk has either remained unchanged, such as the Cybersecurity risk, or the risk has not had a scope change, even where the name of the risk may have changed, such as the Contractor Safety risk.

- **<u>Medium-Pressure Gas System</u>:** The name of this risk has changed in the 2025 RAMP. In the 2021 RAMP this risk was a consolidation of two ERR risks:

(a) Incident Related to the Gas Distribution System (Excluding Dig-In), and (b) Customer & Public Safety – After Meter Gas Incident. For the 2025 RAMP, SDG&E chose not to consolidate these risks. The Customer & Public Safety – After Meter Gas Incident is a standalone ERR risk, as noted in the above table, and it did not meet the 40% safety assessment threshold to merit being included in the 2025 RAMP.

- **<u>Wildfire and Public Safety Power Shutoff (PSPS)</u>:** The name and scope of this risk have changed from the 2021 RAMP**.** The term "Public Safety Power Shutoff (PSPS)" has been added to reflect the identification and assessment of PSPS as a risk[11] in addition to being a wildfire mitigation implemented by SDG&E during fire weather conditions. The specific details regarding the scope of PSPS are included in the Wildfire and PSPS chapter.
- **<u>Electric Infrastructure Integrity</u>**: The scope of this risk has changed from the 2021 RAMP to the 2025 RAMP to include the Customer & Public Safety – Contact with Electric Equipment risk. In the 2021 RAMP, Customer & Public Safety – Contact with Electric Equipment was presented as a separate risk chapter.
- **<u>Employee Safety</u>:** The name of this risk has changed from the 2021 RAMP to the 2025 RAMP. In addition, the scope of this risk has been expanded to include the Motor Vehicle Incident ERR risk as well as the Workplace Violence ERR risk. The Motor Vehicle Incident risk is a new addition to the ERR since the 2021 ERR. It was considered a Driver/Trigger in the 2021 RAMP.

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[11] D.21-11-009 at 142 (OP 1(h)).

2025 Risk Assessment Mitigation Phase

(Chapter RAMP-3)

Risk Quantification Framework

May 15, 2025

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CHAPTER RAMP-3: RISK QUANTIFICATION FRAMEWORK

I. INTRODUCTION

SoCalGas and SDG&E's risk quantification framework described in this chapter is designed to comply with the Commission's Risk-Based Decision-Making Framework (RDF). Chapter RAMP-1: Overview describes the procedural history of the RDF, including four decisions issued since the Companies filed their 2021 RAMP Applications and Reports – D.21-11-009, D.22-10-002, D.22-12-027 (Phase 2 Decision), and D.24-05-064 (Phase 3 Decision) – which substantially modified the RDF and adopted new regulations governing RAMP submissions.[1] The Companies' 2021 RAMP Reports implemented a Multi-Attribute Value Function (MAVF) methodology set forth in D.18-12-014. The Phase 2 Decision superseded D.18-12-014 and replaced the MAVF methodology with a Cost-Benefit Approach (CBA), which was further modified in the Phase 3 Decision and is implemented in the Companies' 2025 RAMP Reports.

SoCalGas and SDG&E's risk quantification framework accounts for applicable laws related to public safety and reliability, while building upon such requirements consistent with SoCalGas's and SDG&E's dedication to continuous improvement. The RDF has substantially increased in complexity since the Companies filed their 2021 RAMP Reports, and SoCalGas and SDG&E have evolved their data management and analytical capabilities to meet these expanded requirements.

Chapter RAMP-3 describes the components, methods, and sequencing of the quantitative framework adopted by SoCalGas and SDG&E in accordance with the following steps of the RDF:

- Step 1A: Building a Cost-Benefit Approach;
- Step 1B: Identifying Risks for the Enterprise Risk Register;
- Step 2A: Risk Assessment and Risk Ranking in Preparation for RAMP;
- Step 2B: Selecting Enterprise Risks for RAMP; and
- Step 3: Mitigation Analysis for Risks in RAMP.

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[1] Chapter RAMP-1: Overview more fully describes the procedural history of the RDF Framework, as established in Decision (D.) 14-12-025, D.16-08-018, D.18-12-014, D.20-01-002, D.21-11-009, D.22-10-002, D.22-12-027, and D.24-05-064.

The above process was used for each risk in the 2025 RAMP Reports and serves as the outline for this chapter.

The RDF incorporates various prescriptive approaches to risk and mitigation quantification, including multiple permutations of Cost-Benefit Ratios (CBRs).[2] In adopting a CBA, the Commission acknowledged that CBRs are not intended to "serve as the sole determinants of [utility] proposals or Commission decisions on risk Mitigations."[3] Instead, the Commission retained language from prior decisions explaining that a utility is not bound to select a mitigation strategy based solely on the CBRs produced under the CBA:

> In the RAMP and GRC, the utility will clearly and transparently explain its rationale for selecting Mitigations for each risk and for its selection of its overall portfolio of Mitigations. […] Mitigation selection can be influenced by other factors including, but not limited to, funding, labor resources, technology, planning and construction lead time, compliance requirements, Risk Tolerance thresholds, operational and execution considerations, and modeling limitations and/or uncertainties affecting the analysis. In the GRC, the utility will explain whether and how any such factors affected the utility's Mitigation selections.[4]

Addressing each risk thus requires a thoughtful, proactive approach that extends beyond standard quantification methods that merely consider the expected outcome of a risk event.

During preparation of the 2025 RAMP Reports, certain issues have been under consideration in Phase 4 of the Commission's Risk OIR.[5] For example, risk tolerance, which is the level of residual risk one is willing to accept, is currently under consideration in Phase 4. Accordingly, the Companies have not incorporated risk tolerance in their 2025 RAMP Reports but reserve the right to incorporate risk tolerance in future proceedings.

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2 *See, e.g.,* D.24-05-064 at Appendix A. For example, Row 25 of the RDF provides a highly specified process for calculating CBRs, including the requirement to provide three specified discount rate scenarios. *Id.* at A-15. Rows 14 and 16 of the RDF extend the CBR requirement to provide such calculations at the tranche level. *Id.* at A-13, A-14. Row 26 of the RDF requires a presentation of CBR calculations for each GRC post-test year. *Id.* at A-17.

3 D.22-12-027 at 26.

4 *Id.* at 26-27; *see also, id.* at 56 (Finding of Fact (FOF) 11) (*citing* RDF Row 26).

5 *See* R.20-07-013 (the Risk OIR), Assigned Commissioner's Phase 4 Scoping Memo and Ruling (September 13, 2024) at 2-3.

II. STEP 1A: BUILDING A COST BENEFIT APPROACH

A. CoRE Attributes

Rows 2 through 6 of the RDF's "Step 1A – Building a Cost-Benefit Approach," shown in Table 1 below, describe the determination of attributes for the quantitative framework.[6]

Table 1: Rows 2-7 of the RDF

#	RDF Element Name	Element Description & Requirements
2	Cost-Benefit Approach Principle 1 – Attribute Hierarchy	Attributes are evaluated together as a hierarchy, such that the primary Attributes are typically labels or categories and the sub-Attributes are observable and measurable.
3	Cost-Benefit Approach Principle 2 – Measured Observations	Each sub-Attribute has Levels expressed in Natural Units that are observable during ordinary operations and as a Consequence of the occurrence of a Risk Event.
4	Cost-Benefit Approach Principle 3 – Comparison	Use a measurable proxy for an Attribute that is logically necessary but not directly measurable. This principle only applies when a necessary Attribute is not directly measurable. For example, a measure of the number of complaints about service received can be used as a proxy for customer satisfaction.
5	Cost-Benefit Approach Principle 4 – Risk Assessment	When Attribute Levels that result from the occurrence of a Risk Event are uncertain, assess the uncertainty in the Attribute Levels by using expected value or percentiles, or by specifying well-defined probability distributions, from which expected values and tail values can be determined. Monte Carlo simulations or other similar simulations (including calibrated subject expertise modeling), among other tools, may be used to satisfy this principle.
6	Cost-Benefit Approach Principle 5 – Risk Assessment	Apply a monetized value to the Levels of each of the Attributes using a standard set of parameters or formulas, from other government agencies or industry sources, as determined by the Phase II Decision Adopting Modifications to the Risk-Based Decision-Making Framework Adopted in D.18-12-014 and Directing Environmental and Social Justice Pilots in Rulemaking (R.) 20-07-013. A utility may deviate from the agreed upon standard set

6 While *Step 1A – Building a Cost Benefit Approach* of Appendix A has further elements, only the most pertinent elements are shown here.

#	RDF Element Name	Element Description & Requirements
		of parameters or formulas by submitting a detailed explanation as to why the use of a different value would be more appropriate. The use of a different set of parameters or formulas to determine the Monetized Levels of Attributes requires an analysis comparing the results of its "equivalent or better" set of parameters or formulas against the results of the agreed upon standard set of parameters or formulas.

SoCalGas and SDG&E comply with these elements by assessing the Consequence of Risk Event (CoRE) attributes shown in Table 2.

Table 2: CoRE Attributes by Company

Attribute	SDG&E	SCG
Safety	✔	✔
Electric Reliability	✔	
Gas Reliability	✔	✔
Financial	✔	✔

The attributes and their respective sub-attributes and monetized values are summarized in Table 3, and their determination is explained in the subsequent sections. While these attributes and sub-attributes serve as the general approach to consequence valuation, consequence modeling for particular risks is augmented to include risk-specific modeling consequences. This augmentation is further described below in Section VI.C.2: Consequence Modeling for Certain Risks.

Table 3: CoRE Attributes and Monetized Values (Direct, in 2024 $)

Attributes	Sub-Attributes	Monetized Value[7]
Safety	Fatality	$16.2 million per fatality
Electric Reliability (SDG&E Only)	Customer Minute Interrupted[8]	$3.76 per CMI
Gas Reliability	Gas Meter Outage	$3,868.79 per gas meter experiencing outage
Financial	US Dollar	$1

B. Valuing the CoRE Safety Attribute

The CoRE Safety Attribute estimates human injuries and fatalities resulting from a risk event. In determining the CoRE values – both Pre-Mitigation CoRE in accordance with RDF Row 18 (which, in turn, feeds into Pre-Mitigation Risk Value per RDF Row 19), and Post-Mitigation CoRE in accordance with RDF Row 21 (which, in turn, feeds into Post-Mitigation Monetized Risk Value per RDF Row 22) – are determined for each risk in this RAMP filing for which Safety is relevant. The Safety CoRE estimates the potential for a risk event to result in human injuries or fatalities. In turn, a mitigation's benefits for the Safety CoRE reflect the degree to which the mitigation is estimated to reduce the magnitude of those injuries or fatalities.

In accordance with D.24-05-064, RDF Row 6 guidance for monetized levels of attributes, SoCalGas and SDG&E use a California-adjusted VSL (VSL-CA) of $16.2 million for calculating the Safety Attribute CoRE. This value is derived by replicating the Department of Transportation's (DOT) methodology[9] as applied beginning from the 2012 DOT VSL of $9.1 million and extrapolating that methodology to 2024, with adjustments for California.

7 Monetized values were developed using the latest available data; through year-end 2024.

8 Customer Minute of Interruption, a standard measure for electric outages.

9 DOT, *Departmental Guidance – Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses* (March 2021), *available at:* https://www.transportation.gov/sites/dot.gov/files/2021-03/DOT%20VSL%20Guidance%20-%202021%20Update.pdf.

Methodology

The DOT VSL of $9.1 million from 2012 is scaled to the current period, consistent with the DOT's methodology, using the following formula:

$$VSL_t = VSL_0 * \left(\frac{P_t}{P_0}\right) * \left(\frac{I_t}{I_o}\right)^{\varepsilon}$$

where:

- 0 = Original Base Year
- t = Current Base Year
- P0 = Price Index in original base year
- P_t = Price Index in Year t
- I_0 = Real Incomes in original base year
- I_t = Real Incomes in Year t
- Ɛ = Income Elasticity of VSL

The National VSL is then adjusted for California using:

$$VSL_{CA} = VSL_{USA} * \left(\frac{P_{t,CA}}{P_t}\right) * \left(\frac{I_{t,CA}}{I_t}\right)^{\varepsilon}$$

where:

- $P_{t,CA}$ = Price Index for California in Year t
- $I_{t,CA}$ = Real Incomes in California in Year t

Data Sources

- National VSL: Department of Transportation[10]
- Inflation: Bureau of Labor Statistics (CPI-U)[11]
- California CPI: Department of Industrial Relations[12]
- Earnings: Bureau of Labor Statistics[13]

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10 DOT, *Departmental Guidance on Valuation of a Statistical Life in Economic Analysis*, *available at* https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis.

11 U.S. Bureau of Labor Statistics, *Table 1. Consumer Price Index for all Urban Consumers (CPI-U) U. S. city average, by expenditure category* (March 2025), *available at:* https://www.bls.gov/news.release/cpi.t01.htm.

12 State of California – Department of Industrial Relations, *California Consumer Price Index (1955-2025)*, *available at:* https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF.

13 U.S. Bureau of Labor Statistics, *Labor Force Statistics from the Current Population Survey - Earnings - Current Population Survey (CPS)*, *available at:* https://www.bls.gov/cps/earnings.htm.

Assumptions

Elasticity is assumed to be 1. The base VSL of $9.1 million is used for all calculations after 2012.

Table 4: VSL Values Over Time

Year	National VSL (million $)	CA VSL (million $)
2024	*13.7*[14]	16.2
2023	13.2	15.2
2022	12.5	15.0
2021	11.8	14.4
2020	11.6	13.9
2019	10.9	12.6
2018	10.5	12.0
2017	10.2	11.6
2016	9.9	11.1
2015	9.6	10.6
2014	9.4	10.2
2013	9.2	10.1
2012	9.1	10.1

The Phase 2 Decision requires, "depending on the availability of data," for the IOUs to apply "(1) a serious injury as 0.25 of a fatality, or (2) the injury severity level using DOT estimates for the value of injury prevention as indicated [in the following table]:"[15] Safety incidents resulting in non-fatal injuries are quantified using a fraction of the VSL.

Table 5: DOT Fractional VSLs – Corresponding with Injury Severity

Injury Severity	Fraction of VSL
Minor	0.003
Moderate	0.047
Serious	0.105
Severe	0.266
Critical	0.593
Unsurvivable	1.000

[14] Preliminary estimate.

[15] D.22-12-027 at 63-64 (Ordering Paragraph (OP) 2.).

SoCalGas and SDG&E model a serious injury as 0.25 of a fatality for asset-based risks and the workplace violence components of Employee Safety and Contractor Safety Risks. For Employee Safety and Contractor Safety Risks, where more data is available, a more granular approach is used. Prior to the issuance of the Phase 2 Decision, SoCalGas and SDG&E did not track "injury severity" data in a manner consistent with all DOT categories shown in Table 5. Therefore, SoCalGas and SDG&E cannot currently accommodate all six levels of the DOT MAIS injury severity shown in Table 5. Instead, SoCalGas and SDG&E have applied the Federal Aviation Administration's (FAA) Abbreviated Injury Scale (AIS).[16] Although the FAA AIS also includes six categories, the middle four are grouped into a "serious injury" category as a composite of the categorizations, which better aligns with SoCalGas's and SDG&E's available safety incident data. Accordingly, and as derived from the VSL-CA value of $16.2 million per fatality, serious injuries are valued at $4.10 million ($16.2 million × 0.253) and minor injuries are valued at $0.049 million ($16.2 million × 0.003).

The resulting SoCalGas and SDG&E safety sub-attribute values and monetized values are shown in Table 6 and are applied in calculating the annualized pre-mitigated risk and mitigation benefits relating to Safety Attribute CoRE.

Table 6: Safety Sub-Attributes, Values and Monetized Value (Direct, in 2024 $millions)

Safety Sub-Attributes		Relative Value	Monetized Value[17]
Fatality		1.000	16.2
Serious Injury		0.253	4.10
Minor Injury		0.003	0.049

16 The FAA's AIS categorizations of injuries are: minor, moderate, serious, severe, critical and fatal. *See* FAA, *Economic Values for FAA Investment and Regulatory Decisions, A Guide: 2024 Update – Section 2: Treatment of the Values of Life and Injury in Economic Analysis* (2024), *available at:* https://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/econ-value-section-2-tx-values.pdf.

17 Monetized values were developed using the latest available data; through year-end 2024.

In the 2021 RAMP, SDG&E included Acres Burned as a sub-attribute to account for the detrimental environmental impacts of wildfire smoke.[18] During the transition to the Cost Benefit Approach, this sub-attribute was eliminated from the Safety Attribute due to several challenges, including the difficulty of accurately identifying and quantifying the potential number of SDG&E customers impacted by smoke related to utility-caused wildfires and assessing the extent of the effects on both customers and the environment. The complexity arises from several factors, including but not limited to the variability in wildfire behavior, identifying and quantifying the type of material burned, the duration of the fire, the diverse locations and existing characteristics of the customers impacted, and the difficulty in predicting long-term environmental impacts. While the removal of the Acres Burned sub-attribute may lead to an underestimation of wildfire risk in SDG&E's service territory, this change is intended to streamline the wildfire risk quantification process and improve the accuracy of SDG&E's assessments to provide a more transparent wildfire risk evaluation.

As a utility, SDG&E lacks the information necessary to adequately quantify and measure the health or overall environmental impacts of utility-related wildfire smoke. SDG&E is open to collaborating with Safety Policy Division, Energy Safety, and academia, to assess whether the potential risks of utility-related wildfire smoke on air quality and the environment can be isolated and whether this should be incorporated into future cost-benefit calculations. SDG&E's core wildfire mitigation efforts remain aimed at reducing the risk of ignition, or the incidence of ignition evolving into a catastrophic wildfire; thus, SDG&E's wildfire mitigation efforts have the simultaneous effect of reducing the impacts of wildfire smoke.

C. Valuing the CoRE Electric Reliability Attribute

The CoRE Electric Reliability Attribute estimates electric outages resulting from a risk event. In determining the CoRE values – both Pre Mitigation CoRE in accordance with RDF Row 18 (which, in turn, feeds into Pre Mitigation Risk Value per RDF Row 19), and Post Mitigation CoRE in accordance with RDF Row 21 (which, in turn feeds into Post Mitigation Monetized Risk Value per RDF Row 22) – are identified for each SDG&E Risk in this RAMP filing for which Electric Reliability is relevant. The CoRE Electric Reliability estimates the potential for a risk event to result in outages. In turn, a mitigation's benefits with respect to the

[18] *See* SoCalGas and SDG&E 2021 RAMP Report, Chapter RAMP-C at RAMP-C-5 (Table 2: Risk Quantification Framework and Safety Index).

Electric Reliability CoRE reflects the degree to which the mitigation is estimated to reduce the magnitude of those outages.

In accordance with the RDF's requirements on valuing the Electric Reliability attribute,[19] SDG&E captures electric reliability in terms of customers experiencing electric outages. In the 2021 RAMP, SDG&E quantified electric reliability value in terms of two sub-attributes: outage duration (*i.e.*, SAIDI) and outage frequency (*i.e.*, SAIFI).[20] Consistent with changes to the RDF, SDG&E has modified its Electric Reliability Attribute CoRE in the 2025 RAMP to be valued by Customer Minutes of Interruption (CMI), in alignment with PG&E, SCE, and the LBNL's ICE version 1.0.

CMI is monetized using the LBNL ICE Version 1.0,[21] calibrated with SDG&E-specific customer demographics, historical billing and load information, regional economic measures, and utility historical reliability metrics as of year-end 2023, based on data availability. The table below outlines CMI and cost per event values per sector,[22] using system-wide averages.

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[19] Decision D.22-12-027 at 64, OP 2(b) requires the following:

(b) Each IOU shall use the most current version of the Lawrence Berkeley National Laboratory (LBNL) Interruption Cost Estimate (ICE) Calculator to determine a standard dollar valuation of electric reliability risk for the Reliability Attribute included in Appendix A.

i. If applicable, each IOU shall justify its choice of an alternative model by providing an analysis comparing the results of its preferred alternative model to the results using the ICE Calculator.

ii. Each IOU shall participate in the customer survey process needed to incorporate California data into the ICE 2.0 model.

iii. Each IOU is authorized to submit a Tier 1 advice letter establishing a memorandum account to track the costs of participating in ICE 2.0 Calculator development for costs up to $600,000, plus an additional 15 percent for potential incremental costs, and to seek recovery of these costs at a later date.

[20] SAIDI = System Average Interruption Duration Index; SAIFI = System Average Interruption Frequency Index.

[21] At the time of SDG&E's 2025 RAMP filing, ICE 1.0 was the latest known and available LBNL model. Within a reasonable timeframe and as needed, SDG&E will update its approach accordingly after the slated successor tool, ICE 2.0, becomes available.

[22] C&I: Commercial and Industrial customers.

Table 7: SDG&E Monetized CMI
(Direct, in 2024 $ millions)

Sector	No. of Customers	Cost Per Event	Total CMI in 2023 (000s)	Cost Per Average kW (2024 $s)	Cost Per Unserved kWh	Total Cost of Sustained Interruptions (2024 $millions)	$/CMI
Medium and Large C&I	26,421	20,560.5	1,649	464.9	227.7	310.7	188.38
Small C&I	135,253	909.3	9,003	808.7	396.1	70.3	7.81
Residential	1,355,077	5.6	94,283	12.4	6.1	4.3	0.05
All Customers	1,516,751	444.2	104,935	349.5	171.2	385.4	$3.67

The standardized $ per CMI value is determined by dividing the Total Cost of Sustained Interruptions by the Total CMI in 2023 and then applying a 2.5% inflation rate for 2024. The resulting SDG&E Electric Reliability Attribute value produced by the LBNL ICE Version 1.0 is $3.76 per CMI, which is applied uniformly to all customer types in CoRE modeling.

D. Valuing the CoRE Gas Reliability Attribute

The CoRE Gas Reliability Attribute estimates gas outages resulting from a risk event. In determining the CoRE values – both Pre-Mitigation CoRE in accordance with RDF Row 18 (which, in turn, feeds into Pre-Mitigation Risk Value per RDF Row 19), and Post-Mitigation CoRE in accordance with RDF Row 21 (which, in turn feeds into Post-Mitigation Monetized Risk Value per RDF Row 22) – are used for each risk in this RAMP filing for which Gas Reliability is relevant. The Gas Reliability CoRE estimates the potential for a risk event to result in gas meter outages. In turn, a mitigation's benefits with respect to the Gas Reliability Attribute CoRE reflect the degree to which the mitigation is estimated to reduce the magnitude of those gas meter outages.

In accordance with the RDF's Row 6 guidance on valuing the Gas Reliability Attribute,[23] SoCalGas and SDG&E have adopted the implied monetary value of a gas meter experiencing an outage based on their respective 2021 MAVF figures. In calculating MAVF for the 2021 RAMP filings, the Meters Out sub-attribute of Gas Reliability had a scale of 0 to 100,000 or 0 to 50,000 gas meters experiencing outage, for SoCalGas and SDG&E, respectively. The number of meter outages was one of two Gas Reliability sub-attributes and was given a weight of 50% within the Reliability attribute of the MAVF for SoCalGas and 25% for SDG&E. This sub-attribute was equivalent to the Financial attribute MAVF in SoCalGas and SDG&E's 2021 RAMP filings, which had a scale of 0 to $500 million and represented 17%[24] of the overall MAVF value.[25] Using that equivalency, one gas meter experiencing an outage equates to $3,868.79 in 2024 dollars, accounting for inflation from 2021, for both Companies.[26] In the transition to the CBA, the Companies determined it was not feasible to develop a methodology for calculating a Gas Curtailment sub-attribute in the time available and only utilize meter outages as a single attribute to measure gas reliability CoRE. This decision was due to lack of data to quantify curtailment volumes as distinct impacts from meter outages during a risk event. Because gas curtailment is an important component in measuring how customers are impacted during a risk event, SoCalGas and SDG&E continue to evaluate how this sub-attribute can be accurately incorporated into the CBA in the future.

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[23] D.22-12-027 at 64-65, OP 2(c) requires the following:

(c) Each IOU shall apply a dollar value for gas reliability based on the implied value from their most recent Multi-Attribute Value Function Risk Score calculation presented in their most recent RAMP or shall justify its choice of an alternative model by providing an analysis comparing the results of its preferred alternative model to the results using the implied values. If using the implied value from its most recent RAMP: […].

ii. For SDG&E and SoCalGas, use the 2021 RAMP filings.

[24] SoCalGas and SDG&E revised the 2021 RAMP MAVF to remove the Stakeholder Satisfaction attribute in the GRC filing, per SPD's guidance in their evaluation report. As a result of removing this attribute, the weight to the financial attribute increased from 15% shown in the 2021 RAMP report to 17% in the GRC filing.

[25] *See* SoCalGas and SDG&E 2021 RAMP Report, Chapter RAMP-C at RAMP-C-6 (Table 3: Risk Quantification Framework Reliability Index for SDG&E).

[26] 1 meter experiencing outage = ($500 million / 50,000 meters out) * (23% Reliability Weighting / 17% Financial Weighting) * (1 reliability attribute / 4 reliability attributes).

As part of gas reliability quantification, SoCalGas and SDG&E's CBA currently does not quantify the value of the gas system as an integral component of California's interconnected energy system and the many functions it provides as the reliability backstop for the electric grid and broader energy system for the State as well as the region. For instance, a considerable share of the CAISO generation fleet consists of gas-fired power plants which are expected to be called upon in the foreseeable future.[27] Therefore, electric sector reliability is dependent on gas infrastructure and electric sector reliability risks can be mitigated through leveraging gas infrastructure. As the recent North American Electric Reliability Corporation (NERC) 2024 Reliability Report (NERC 2024 Reliability Report) highlights, the important role of gas pipelines to meet electric demand during peak hours complements the intermittent nature of renewable energy resources.[28] According to the Department of Energy, the grid's need for reliable dispatchable power will continue to grow as the percentage of renewables eclipses traditional fossil-fuel energy sources and projected electricity demand requires greater reliability to serve significant new demand from non-traditional users, such as increased mobility sector electrification, data centers, and generative artificial intelligence energy demands potentially reaching up to 9% of total US electricity generation by 2030.[29]

SoCalGas and SDG&E continue to explore refining the quantification of gas reliability and will consider revisions in future filings given the significant spectrum of value the gas system provides to support the State's interconnected energy system. These include as a just-in-time and seasonal reliability resource with the ability to meet increased peak daily and hourly

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27 *See* CAISO Summer Market Performance Report (September 2024) at 22, *available at* summer-market-performance-report-september-2024.pdf; *see also* California Energy Commission (CEC), *2023 Integrated Energy Policy Report* (February 2024) at 11 (Table ES-1), 27 (Table 3), *available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=254463*.

28 NERC, *2024 Long-Term Reliability Assessment,* (December 2024), *available at:* https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf. ("Natural-gas-fired generators are a vital [bulk power system] BPS resource. They provide [essential reliability services] ERSs by ramping up and down to balance a more variable resource mix and are a dispatchable electricity supply for winter and times when wind and solar resources are less capable of serving demand. Natural gas pipeline capacity additions over the past seven years are trending downward, and some areas could experience insufficient pipeline capacity for electric generation during peak periods.").

29 Department of Energy, *Artificial Intelligence – Powering AI*, *available at:* https://www.energy.gov/topics/artificial-intelligence.

peak ramping electric sector needs which supports renewable integration and changing demand patterns.

E. Valuing the CoRE Financial Attribute

The CoRE Financial Attribute estimates both Pre-Mitigation CoRE in accordance with RDF Row 18 (which, in turn, feeds into Pre-Mitigation Risk Value per RDF Row 19), and Post-Mitigation CoRE in accordance with RDF Row 21 (which, in turn feeds into a Post-Mitigation Monetized Risk Value per RDF Row 22) to estimate the financial impacts resulting from a risk event. The Financial CoRE estimates the magnitude of financial impact that could result from a risk event. In turn, any mitigation that has a benefit with respect to the Financial CoRE reflects the degree to which the mitigation is estimated to reduce the magnitude of those financial consequences. Unlike the other CoRE valuations, the Financial CoRE attribute is inherently dollar-denominated and no conversion is necessary.[30]

In accordance with the RDF's guidance on valuing the Financial Attribute, financial risk is captured in a similar fashion to the 2021 RAMP filings. The Financial Attribute has no sub-attributes or index and is measured in dollars. Like the other attributes, the Financial Attribute is used to estimate aspects of the impact from risk events. Unlike the other attributes, however, different types of costs are measured in the attribute. The two general types of costs measured include: societal damage (including physical damage, lost wages, relocation costs, etc.) and utility service restoration and repair costs (labor, materials). The Financial Attribute focuses on impact to the public and does not include any impacts related to shareholder financial interests.

The quantitative approach used by SoCalGas and SDG&E primarily utilizes historical events as a guide for possible future impacts. Precision for the Financial Attribute is difficult to achieve, however, as risk events are rarely reported with a single summation of all financial impacts. Depending on the risk event, differing approaches were therefore used to estimate the financial impacts. For example, for pipeline risks, Pipeline and Hazardous Materials Safety Administration (PHMSA) data was used in combination with internal data; however, the financial values provided by PHMSA do not necessarily include all societal financial impacts. For electrical outages, subject-matter expert estimates were used for the cost of repairs. Additional information can be found in the individual risk chapters and Attachment B.

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30 Except for time value of money considerations that apply to all aspects of monetized benefits, as discussed *infra* Section VI.E (which addresses discounting).

III. STEP 1B: IDENTIFYING RISKS FOR THE ENTERPRISE RISK REGISTER

Row 8 of the RDF's "Step 1B – Identifying Risks for the Enterprise Risk Register" describes the method for identifying risks to be assessed by the quantitative framework.

Table 8: Row 8 of the RDF

#	RDF Element Name	Element Description & Requirements
8	Risk Identification and Definition	Utilities' risks are defined in their respective Enterprise Risk Registers. The Enterprise Risk Register is the starting point for identifying the risks that will be included in the RAMP. The process for determining these risks will be described in the RAMP. The RAMP will consider risks using the same risk definitions as in the ERR. Each RAMP filing will highlight any changes to the ERR from the previous RAMP or GRC filings.

The starting point for determining if a risk is to be included in the RAMP filing is to review the risks contained in SoCalGas's and SDG&E's respective 2024 enterprise risk registers (ERRs). Each applicable enterprise risk is then assessed in accordance with RDF Step 2A, as described in the next section, to determine if it is to be included in the RAMP filing.

IV. STEP 2A: RISK ASSESSMENT AND RISK RANKING IN PREPARATION FOR RAMP

Rows 9-11 of the RDF's "Step 2A – Risk Assessment and Risk Ranking in Preparation for RAMP" describe the method for initial assessment and risk ranking of risks via the quantitative framework.

Table 9: Rows 9-11 of the RDF

#	RDF Element Name	Element Description & Requirements
9	Risk Assessment	Using the Cost-Benefit Approach developed in accordance with Step 1A, for each Risk included in the Enterprise Risk Register, the utility will compute a monetized Safety Risk Value using only the Safety Attribute. The utility will sort its ERR Risks in descending order by the monetized Safety Risk Value. For the top 40% of ERR risks with a Safety Risk Value greater than zero dollars, the utility will compute a monetized Risk Value using at least the Safety, Reliability and Financial Attributes to determine the output for Step 2A. The output of Step 2A, along with the input from stakeholders described in Row 12 below, will be used to decide which risks will be addressed in the RAMP.

#	RDF Element Name	Element Description & Requirements
		The Risk Assessment in preparation for RAMP will follow the steps in Rows 10 and 11.
10	Identification of Potential Consequences of Risk Event	The identified potential Consequences of a Risk Event should reflect the unique characteristics of the utility. For each enterprise risk, the utility will use actual results, available and appropriate data (*e.g*., Pipeline and Hazardous Materials Safety Administration data), and/or Subject Matter Experts (SMEs) to identify potential Consequences of the Risk Event, consistent with the Cost-Benefit Approach developed in Step 1A. The utility should use utility specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. Similarly, if data reflecting past results are used, that data must be supplemented by SME judgment that takes into account the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission.
11	Identification of the Frequency of the Risk Event	The identified Frequency of a Risk Event should reflect the unique characteristics of the utility. For each enterprise risk, the utility will use actual results and/or SME input to determine the annual Frequency of the Risk Event. The utility should use utility specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. In addition, if data reflecting past results are used, that data must be supplemented by SME judgment that takes into account the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission. The utility will take into account all known relevant Drivers when specifying the Frequency of a Risk Event. Drivers should reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset. For example, where applicable, Drivers may include: the presence of corrosion, vegetation, dig-ins, earthquakes, windstorms or the location of a pipe in an area with a higher likelihood of dig-ins.

Starting with their respective 2024 ERR risks, pursuant to RDF Row 9, SoCalGas and SDG&E computed a monetized Safety Risk Value using only the Safety Attribute. The pre-mitigated Safety Risk Value (SRV) for each risk is estimated as the product of the Risk's Likelihood of a Risk Event (LoRE) and Expected Value[31] of the risk's (unscaled) Safety Consequence of a Risk Event (CoRE). The Companies then sorted these ERR risks in descending order by the monetized SRVs. Applying a 2023 VSL[32] of $15.2 million, the Companies used estimated LoREs and unscaled safety CoRE estimates for the safety calculation. For the top 40% of risks that had SRV's greater than $0, SoCalGas and SDG&E computed the risk values for Reliability and Financial Attributes to determine the total monetized risk values for the preliminary RAMP Risks.

At their discretion, the Companies elected to present an additional risk, Cybersecurity, which did not meet the RDF's 40% threshold. For SDG&E, Employee Safety-related risks, including Motor Vehicle Incident and Workplace Violence, were consolidated in a single RAMP risk. Similarly, Electric Infrastructure Integrity was consolidated with Customer & Public Safety – Contact with Electric Equipment, and SDG&E selected Medium Pressure Gas as an additional RAMP Risk.

In accordance with the RDF, and as described in detail in the sections that follow, the analysis performed produces CBRs for all selected RAMP risks for the GRC cycle (2028 through 2031) on the basis of the residual risk as of the "baseline" year (2028, the start of the GRC period), after taking into account all risk reduction benefits from all mitigation activities projected to have been performed by the start of 2028.[33] Please refer to Chapter 2 for additional information regarding the Companies' selection of RAMP risks.

V. STEP 2B: SELECTING ENTERPRISE RISKS FOR RAMP

Row 12 of the RDF's "Step 2B – Selecting Enterprise Risks for RAMP" describes the method for selecting risks for RAMP.

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[31] "Expected Value" is the probability-weighted sum of all possible risk outcomes.

[32] At the time the Safety Risk Assessment was performed and presented during the December 17, 2024 pre-filing risk selection workshop, the 2023 VSL value was the best available information.

[33] *See* "Baseline Risk" in RDF Lexicon.

Table 10: Row 12 of the RDF

#	RDF Element Name	Element Description & Requirements
12	Risk Selection Process for RAMP	Using the analysis performed in Step 2A, the utility will preliminarily select risks to be included in the RAMP. The utility will host a publicly noticed workshop, to be appropriately communicated to interested parties and at a minimum, should include the CPUC's Safety Policy Division (SPD), to gather input from SPD, other interested CPUC staff, and interested parties to inform the determination of the final list of risks to be included in the RAMP. At least 14 days in advance of the workshop, the utility will provide to SPD and interested parties at least the following information: (1) its preliminary list of RAMP risks; and (2) the monetized Safety Risk Value for each risk in the ERR and the monetized Risk Value for the top ERR risks identified through the process in Row 9. The utility will make its best effort to timely respond to reasonable requests for additional information prior to the workshop. Based on input received from SPD, other interested CPUC staff, and interested parties, the utility will make its determination of the final list of risks to be addressed in its RAMP. The rationale for taking or disregarding input during the workshop will be addressed in the utility's RAMP.

SoCalGas and SDG&E's selected RAMP risks were presented informally to the CPUC's Safety Policy Division (SPD) for review on October 14, 2024, and formally to SPD and interested parties during the December 17, 2024 RAMP pre-filing risk selection public workshop. Following the workshop, based on feedback provided by stakeholders, SoCalGas elected to present Underground Storage as an additional RAMP risk.

VI. STEP 3: MITIGATION ANALYSIS FOR RAMP RISKS

Rows 13-25 of the RDF's "Step 3 – Mitigation Analysis for Risks in RAMP" describes the method for analyzing risks per the quantitative framework.

Table 11: Rows 13-25 of the RDF

#	RDF Element Name	Element Description & Requirements
13	Calculation of Risk	For purposes of the Step 3 analysis, pre- and post-mitigation risk will be calculated by multiplying the Likelihood of a Risk Event (LoRE) by the Consequences of a Risk Event (CoRE). The CoRE is the sum of each of the Risk-Adjusted Attribute Values using the utility's full Cost-Benefit Approach.
14	Definition of Risk Events and Tranches	Detailed pre- and post-mitigation analysis of Mitigations will be performed for each risk selected for inclusion in the RAMP. The utility will endeavor to identify all asset groups or systems subject to the risk and each Risk Event associated with the risk. For example, if Steps 2A and 2B identify wildfires associated with utility facilities as a RAMP Risk Event, the utility will identify all Drivers that could cause a wildfire and each group of assets or systems that could be associated with the wildfire risk, such as overhead wires and transformers. For each Risk Event, the utility will subdivide the group of assets, or the system associated with the risk into Tranches. Risk reductions from Mitigations and Risk Spend Efficiencies will be determined at the Tranche level, which gives a more granular view of how Mitigations will reduce Risk. The determination of Tranches will be based on how the risks and assets are managed by each utility, data availability and model maturity, and strive to achieve as deep a level of granularity as reasonably possible. The rationale for the determination of Tranches, or for a utility's judgment that no Tranches are appropriate for a given Risk Event, will be presented in the utility's RAMP submission. For the purposes of the risk analysis, each element (*i.e.*, asset or system) contained in the identified Tranche would be considered to have homogeneous risk profiles (*i.e.*, considered to have the same LoRE and CoRE).
15	Bow Tie	For each risk included in the RAMP, the utility will include a Bow Tie illustration. For each Mitigation presented in the RAMP, the utility will identify which element(s) of its associated Bow Tie the Mitigation addresses.
16	Expressing Effects of a Mitigation	The effects of a Mitigation on a Tranche will be expressed as a change to the Tranche-specific pre-mitigation values for LoRE and/or CoRE. The utility will provide the pre- and post-mitigation values for LoRE and CoRE determined in

#	RDF Element Name	Element Description & Requirements
		accordance with this Step 3 for all Mitigations subject to this Step 3 analysis.
17	Determination of PreMitigation LoRE by Tranche	The pre-mitigation LoRE is the probability that a given Risk Event will occur with respect to a single element of a specified Tranche over a specified period of time (typically a year) in the planning period, before a future Mitigation is in place.
18	Determination of PreMitigation CoRE	The pre-mitigation CoRE is the sum of each of the pre-mitigation Risk Adjusted Attribute Values using the utility's full Cost-Benefit Approach. The CoRE is calculated using the full Cost-Benefit Approach tool constructed consistent with Step 1A above.
19	Measurement of PreMitigation Risk Value	The monetized pre-mitigation risk value will be calculated as the product of the pre-mitigation LoRE and the pre-mitigation CoRE for each Tranche subject to the identified Risk Event.
20	Determination of PostMitigation LoRE	The post-mitigation LoRE calculation will be conducted at the same level of granularity as the pre-mitigation risk analysis within Step 3. The calculated value is the probability of occurrence of a Risk Event after the future Mitigation is in place.
21	Determination of PostMitigation CoRE	The post-mitigation CoRE calculation will be conducted at the same level of granularity as the pre-mitigation risk analysis. The post-mitigation CoRE is the sum of each of the post-mitigation Risk-Adjusted Attribute Values using the utility's full Cost-Benefit Approach.
22	Measurement of PostMitigation Monetized Risk Value	The monetized post-mitigation risk value will be calculated as the product of the post-mitigation LoRE and post-mitigation CoRE for each Tranche subject to the identified Risk Event.
23	Measurement of Risk Reduction Provided by a Mitigation	The risk reduction provided by a risk mitigation will be measured as the difference between the values of the monetized pre-mitigation risk value and the monetized post-mitigation risk value.
24	Use of Expected Value for CoRE; Supplemental Calculations	The utility will use expected value for the Cost-Benefit Approach-based measurements and calculations of CoRE in Rows 13, 18, 19, 21, 22, and 23. If a utility chooses to present Alternative Analysis of monetized pre- and post-

#	RDF Element Name	Element Description & Requirements
		mitigation CoRE using a computation in addition to the expected value of the Cost-Benefit Approach, such as tail value, it does so without prejudice to the right of parties to the RAMP or GRC to challenge such Alternative Analysis.
25	Cost-Benefit Ratios Calculation	The Cost-Benefit Ratio calculation should be calculated by dividing the dollar value of Mitigation Benefit by the Mitigation cost estimate. The values in the numerator and denominator should be present values to ensure the use of comparable measurements of Benefits and costs. The Benefits should reflect the full set of Benefits that are the results of the incurred costs. For capital programs, the costs in the denominator should include incremental expenses made necessary by the capital investment.

F. Estimating LoRE and CoRE

For each RAMP risk, the RDF directs utilities to assess each mitigation's prospective benefits (monetized, over the mitigation's life, and discounted to present value in accordance with RDF requirements) in relation to the mitigation's cost (likewise discounted to present value). In this section, SoCalGas and SDG&E present their methodology for estimating mitigation benefits in accordance with RDF guidance.

The RDF defines mitigation benefits as the difference between the Pre-Mitigation Risk Value (per RDF Row 19) and the Post-Mitigation Monetized Risk Value (per Row 22). SoCalGas and SDG&E note, however, that Pre-Mitigation Risk Values are time specific. That is, the underlying Pre-Mitigation LoRE and/or Pre-Mitigation CoRE can change over time, owing to the presence or removal of existing mitigations, as well as ongoing system deterioration and inflation. For example, in meeting the requirement to provide CBRs for each GRC Post-Test Year (per RDF Row 26), the Pre-Mitigation Risk Value for a RAMP risk for 2029 may be different than for 2030. As such, in SoCalGas and SDG&E's modeling, the Pre-Mitigation Risk Value is not a singular, unchanging value.

Further to this point, there are certain mitigations that have the effect of "preserving" the risk profile (*i.e.*, maintaining the Pre-Mitigation Risk Value over time). That is, absent the presence of such mitigations (which are typically ongoing mitigations or controls), the Pre-

Mitigation Risk Value would be greater, all other things being held constant. The modeling of such effect, referred to as "preservation," is discussed in detail in Section VI.D.3 below.

To distinguish between the computed Pre-Mitigation Risk Value for a RAMP risk for which "preservation" mitigations remain in place (and new mitigations have yet to be considered), and the Pre-Mitigation Risk Value absent ongoing "preservation" mitigations, in the methodology presented in this chapter, SoCalGas and SDG&E refer to the former value as the "Risk Value" while reserving the term Pre-Mitigation Risk Value for the final calculations of CBRs. For the final calculations of CBRs for the Test Year 2028 and each of the Post-Test Years 2029, 2030, and 2031, the benefit is the difference between the Pre-Mitigation Risk Value and the Post-Mitigation Risk Value specific to the year for which the CBRs are calculated.

Calculating a Risk Value for each RAMP risk involves estimating the LoRE and the three attributes comprising the CoRE before applying any mitigations and continuing current risk-treatment activities. The LoRE is calculated by multiplying the annual probability of a risk event per unit of exposure (*e.g.*, per mile of pipe) by the total number of units. This method allows for the calculation of LoRE at both the tranche and system levels.

When the probability of a risk event is multiplied by the number of units, the resulting value is a rate or frequency and hence can exceed 1, especially at the system level. Thus, the LoRE is a frequency or rate, indicating the number of times the risk event is expected to occur per year. This behavior is expected, as risk is additive, but probabilities are not.

The CoRE is estimated by modeling the range of possible outcomes resulting from a risk event. For each CoRE attribute (Safety, Reliability, and Financial), possible outcomes[34] are modeled independently. Each CoRE attribute is then scaled in accordance with Row 7 of the RDF; and, as described in the next section, the expected value (EV) of the scaled distribution of outcomes for that attribute represents the attribute's CoRE value. As shown in Equation 3.1, the expected values of the three CoRE attributes—Safety, Reliability, and Financial—are summed to comprise the total CoRE expected value.

$$\mathrm{EV}\left(\mathrm{CoRE}^{\mathrm{Total}}\right) = \mathrm{EV}\left(\mathrm{CoRE}^{\mathrm{safety}}\right) + \mathrm{EV}\left(\mathrm{CoRE}^{\mathrm{reliability}}\right) + \mathrm{EV}\left(\mathrm{CoRE}^{\mathrm{financial}}\right) \qquad 3.1$$

[34] Outcomes are derived from: (i) direct observations, (ii) random sampling from known or constructed distributions fit to observations, or (iii) Monte Carlo simulations on failure consequence models (*e.g.*, safety CoRE modeling of high-pressure gas).

Table 12: Row 7 of the RDF

7	Cost-Benefit Approach Principle 6 – Risk-Adjusted Attribute Levels	Apply a Risk Scaling Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Attribute Levels. The Risk Scaling Function is an adjustment made in the risk model due to different magnitudes of Outcomes, which can capture aversion or indifference towards those Outcomes. The Risk Scaling Function can be linear or convexly non-linear. For example, the Risk Scaling Function is linear to express indifference if avoiding a given change in the Monetized Attribute Level does not depend on the Attribute Level. Alternatively, the Risk Scaling Function is convexly non-linear to express aversion if a change in the Attribute level results in an increasing rate of change in the Risk-Adjusted Monetized Attribute Level as the Level of the Attribute increases. When completing Rows 5 and 24 in the RDF, if a utility chooses to address tail risk using the power law or other statistical approach and chooses to present Risk-Adjusted Attribute Levels by relying on a convex scaling function, then it must supplement its analysis by also presenting Risk-Adjusted Attribute Levels by relying on a linear scaling function.

G. Risk-Averse Scaling of CoRE

An additional consideration in developing the CoRE expected value is the application of societal risk-averse scaling to the CoRE outcomes. Row 7 of the RDF provides for convex non-linear (risk-averse) risk scaling, which SoCalGas and SDG&E applied to risk-scale CoRE estimates for all RAMP Risks. This approach recognizes that an increasing aversion to progressively larger CoRE outcomes aligns with societal preferences.[35]

For certain asset-based risks such as High Pressure Gas and Wildfire & PSPS, Monte Carlo simulation is used to produce a scaled CoRE distribution for each attribute by applying a convex risk-averse scaling function, described in the following section, at the trial (event) level. The scaled expected value of the CoRE is equivalent to the expected value of the scaled distribution, estimated by computing the average outcome from all the scaled trials. The scaled

[35] *See*, *e.g.*, UCLA School of Engineering and Applied Sciences, *The Use of Risk Aversion in Risk Acceptance Criteria?* (June 1980), *available at:* https://www.osti.gov/servlets/purl/5230500.

expected value is calculated at the attribute level, and then all the attributes are summed (as shown in Equation 3.1) to determine the total scaled expected value CoRE.

1. Risk-Averse Scaling Function

One commonly-used convex risk-averse scaling function is the Power Law function,[36] as shown in Equation 3.6, where the risk aversion factor, $\alpha > 1$, is determined from the relationship between the number of fatalities (N) and the frequency (f) of those events across a wide range of occurrences (such relationship is termed an "f – N curve").

The Power Law function can be derived from the regression line of an $f - N$ curve with a negative slope of $-\alpha$, as shown in the Gas Research Institute (GRI)[37] study. In the GRI study's Figure 3.8, the log-fatalities (N) of events are plotted against the log-likelihoods (p) of those events. The Power Law equation, Equation 3.6, is derived from the regression line in Equations 3.2-3.5.

$$\log_{10} p = -\alpha \cdot \log_{10} N + C \tag{3.2}$$

$$\Rightarrow 10^{\log_{10} p} = 10^{\log_{10} N^{-\alpha}} 10^{C} \tag{3.3}$$

$$\Rightarrow p = k\, N^{-\alpha} \tag{3.4}$$

$$\Rightarrow p N^{\alpha} = k \tag{3.5}$$

$$f(N) = N^{\alpha} \tag{3.6}$$

Equation 3.5 shows the concept of risk neutral versus risk-averse well. Note that when $\alpha = 1$, the product of the likelihood and its corresponding fatalities are always constant (*i.e.*, "risk neutral"). This implies that rare catastrophic events are treated the same as more frequent, less catastrophic events, which is the concept of risk neutrality. Hence, in the case of societal risk-aversion, α is greater than 1, leading to increased scaling of consequences as the severity of catastrophic events rises.

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36 The power law function describes a relationship where a relative change in one variable results in a proportional relative change in another variable, raised to a constant exponent. For risk-averse scaling, the constant exponent term is $\alpha > 1$. Note that this should not be confused with the power law or other statistical methods used to address tail risk, which specifically refers to the Probability Density Function of the Pareto distribution with a negative exponent.

37 Journal of Pressure Vessel Technology, Transactions of the ASME, *Target Reliability Levels for Design and Assessment of Onshore Natural Gas Pipelines* (December 2009), *available at*: https://www.researchgate.net/publication/245365044_Target_Reliability_Levels_for_Design_and_Assessment_of_Onshore_Natural_Gas_Pipelines.

To determine an appropriate value for α, SoCalGas and SDG&E conducted an analysis based on independent and peer-reviewed empirical studies that quantify risk aversion in similar industries. These studies provide a suitable proxy for societal risk aversion with respect to SoCalGas's and SDG&E's operations. Specifically, two studies of $f - N$ and $F - N$ curves, commonly used to estimate risk aversion in infrastructure-intensive industries with potential for catastrophic injury or fatality events, were utilized. SoCalGas and SDG&E leveraged studies from the Department of Energy (DOE)[38] and the GRI to identify the risk scaling factor. The DOE and GRI studies determined implied risk aversion coefficients of 1.34 for natural catastrophic events and 1.6 for North American pipeline standards, respectively. SoCalGas and SDG&E adopted the average of these two implied factors, resulting in a risk scaling factor α of 1.47.[39] A PHMSA study[40] on risk tolerance across various industries globally focused on $F - N$ curves and lines with slopes of $-\alpha$ for risk tolerance. As demonstrated in the GRI study, this can be translated to a risk-averse function (Equation 3.6). The PHMSA study found slopes of -1, -1.5, and -2, corresponding to α values of 1, 1.5, and 2, respectively. This indicates that the value of 1.47 is consistent with other risk-aversion practices across industries and around the world.

2. Implied Thresholds and the Application of the Scaling Function

Since fatalities in the $f - N$ and $F - N$ curves start at 1, the scaling function in Equation 3.6 is defined for $N \geq 1$. In SoCalGas and SDG&E's Fractional VSL framework (described in Section II B. above), equivalence of fatalities are represented as fractions (*e.g.*, 0.25 for serious injuries). Therefore, for purpose of the RAMP Reports, SoCalGas and SDG&E define the risk-averse scaling function in Equation 3.7, to be applicable for all values of equivalent fatalities:

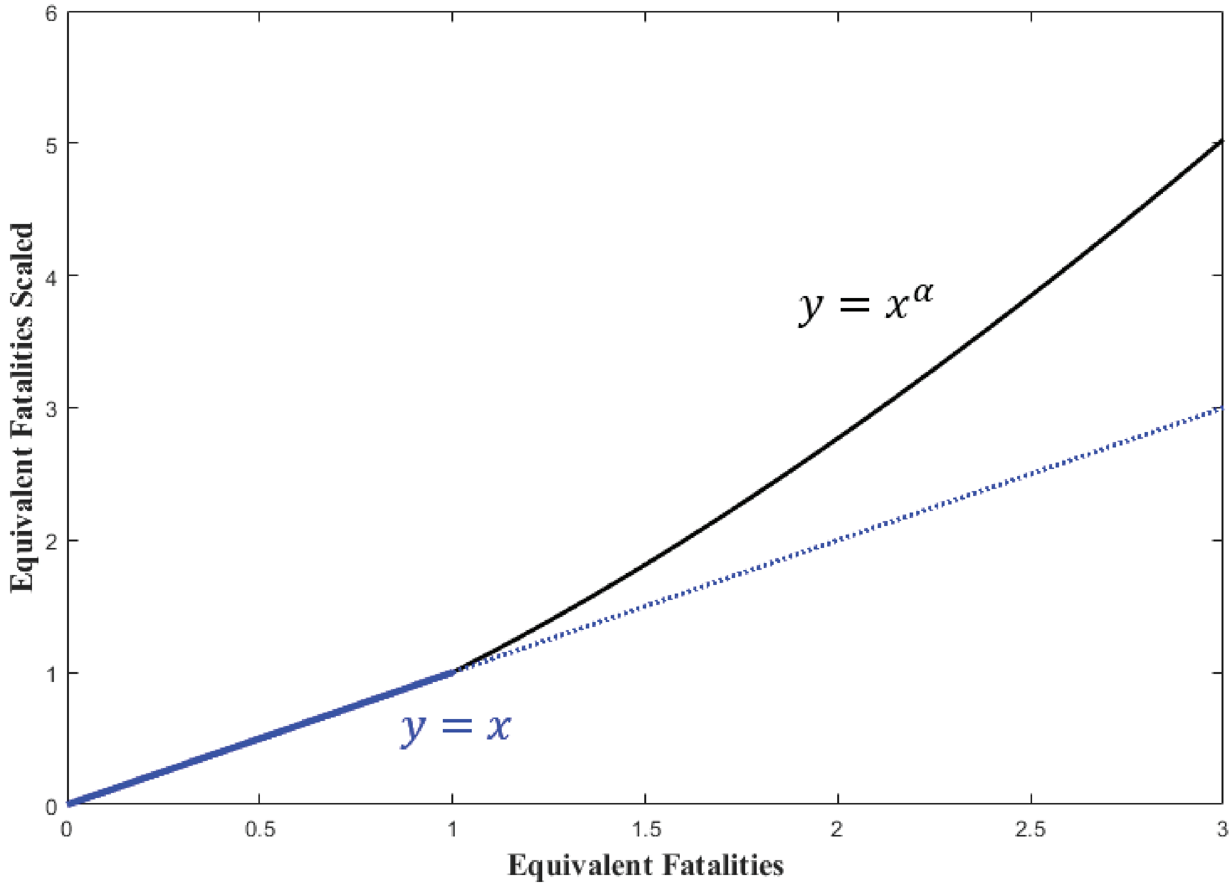
$$f(x) = \begin{cases} x & 0 \leq x < 1 \\ x^{\alpha} & x \geq 1 \end{cases} \qquad 3.7$$

[38] UCLA School of Engineering and Applied Sciences, *The Use of Risk Aversion in Risk Acceptance Criteria?* (June 1980), *available at:* https://www.osti.gov/servlets/purl/5230500.

[39] This is consistent with PHMSA and other global and local risk aversion practices (*i.e.*, 1.0-2.0 range).

[40] PHMSA, *Final Report on Paper Study on Risk Tolerance* (June 30, 2016), *available at:* https://primis.phmsa.dot.gov/matrix/FilGet.rdm?fil=10733.

Figure 1: Risk-Averse Scaling Function Equation 3.7



This produces an implied transition from linear scaling to convex scaling at one equivalent fatality. This transition threshold is applied consistently for all CoRE attributes.[41] The monetized scaling function for any attribute will be the composition of Equations 3.7, 3.8 and its inverse 3.9, as seen in Equation 3.10:

$$g(x) = \frac{x}{VSL} \tag{3.8}$$

$$g^{-1}(x) = VSL \cdot x \tag{3.9}$$

$$s(x) = g^{-1} \circ f \circ g(x) = g^{-1}\left(f\left(g(x)\right)\right) \tag{3.10}$$

Note that any monetized CoRE will first transform into equivalent fatalities using Equation 3.8, then be scaled by Equation 3.7, and finally be transformed back to monetized scaled CoRE.

41 Note that the implied transition point of one equivalent fatality is not indicative of a risk tolerance threshold for either company and is presented here solely for purposes of risk-averse scaling for SoCalGas's and SDG&E's 2025 RAMP presentations, which are submitted in compliance with the Commission's RDF.

Consistent with the Commission's shift to monetization in the Phase 2 Decision, SoCalGas and SDG&E's adoption of Equation 3.10 produces a consistent implied threshold for Safety, Reliability, and Financial attributes. Specifically, the Companies apply the risk scaling factor on a trial-by-trial basis to each CoRE attribute, starting at the monetized equivalent of the VSL dollar value for one fatality. This process is applied to each attribute using Monte Carlo sampling from the CoRE distribution. The expected value of the resulting scaled CoRE distribution represents the scaled CoRE for each attribute, and using Equation 3.1, SoCalGas and SDG&E derive the total scaled CoRE. Table 13 below illustrates the application of both the implied threshold and the step-by-step application of Equations 3.8, 3.7, and 3.9, culminating in Equation 3.10.

Table 13: Illustrative Risk Aversion Function Applied to CoRE Distribution for each Attribute through the VSL

Simulation	**Unscaled CoRE** ($) x	**Unscaled CoRE** (Fatality-equivalent) $y = g(x) = \frac{x}{VSL}$	**Scaled CoRE** (Fatality-equivalent) $z = f(y) = \begin{cases} y & y < 1 \\ y^{1.47} & y \geq 1 \end{cases}$	**Scaled CoRE** ($) $w = g^{-1}(z) = z \cdot VSL$
Trial 1	$200,000	0.012	0.012	$200,000
Trial 2	$12,000,000	0.741	0.741	$12,000,000
Trial 3	$50,000	0.003	0.003	$50,000
Trial 4	$27,000,000	1.667	2.119	$34,326,749
Trial 5	$100,000	0.006	0.006	$100,000
Trial 6	$55,000,000	3.395	6.030	$97,692,471
Trial 7	$250,000	0.015	0.015	$250,000
Trial 8	$1,200,000	0.074	0.074	$1,200,000
Trial 9	$8,000,000	0.494	0.494	$8,000,000
Trial 10	$25,000	0.002	0.002	$25,000

Expected Value ($) =	$10,382,500			$15,384,422
If LoRE = 0.1, then Risk ($) =	$103,825			$153,844

VSL: $16.2M ($2024)

H. Deriving Risk Values

Consistent with the RDF, the Risk Value is the product of LoRE and the scaled expected value of CoRE (denoted hereinafter as CoRE):

$$\text{Risk Value} = \text{LoRE} \times \text{CoRE} \qquad 3.11$$

1. Data Sources Used in Estimating Risk Values

SoCalGas and SDG&E applied the RDF's analytical requirements by leveraging internal and external historical data, external research, simulations, and subject matter expertise (SME) to assess the range of potential risk event impacts to inform the CoRE attributes. Probabilistic distributions of consequence outcomes are developed where sufficient data exists. The data for such analyses are derived from internal historical records, external sources, or SME estimates, as needed.

The distribution for each consequence outcome is determined based on the properties of the consequence and the available data. The expected values of consequences, as well as other relevant values (*i.e.*, tail outcome values), are derived from the probabilistic range of outcomes presented in the distributions. A non-exhaustive list of potential distributions used, sometimes in combination, for 2025 RAMP calculations includes:

- Lognormal
- Poisson
- Bernoulli
- Generalized Pareto Distribution
- Truncated Pareto
- Capped discrete Pareto
- Truncated Normal
- Uniform
- Kernal Density Estimation
- Beta
- PERT

Data to assess risk and mitigation value comes from various sources, such as internal data at SoCalGas and SDG&E, publicly available data, external research, and historical utility datasets. A non-exhaustive list of examples includes the following:

A. Electric outage data – SAIDIDAT [2014-23]
B. Circuit customer count [2014-23]
C. PHMSA Reportable Incident and Annual Data
D. Damage Information Reporting Tool (DIRT) data
E. Other SoCalGas and SDG&E Internal Data
F. Other Industry Reports, Studies, Papers
G. Field-Based Safety Management System (SMS) data [2016-24]

H. CPUC-reportable fire incident data[42]

Table 14: Sample Data Sources Used in Estimating Risk Value

RAMP Risk	Data Source(s)
HP Gas	C, E, F
MP Gas	C, E, F
Excavation Damage	C, D, E, F
Gas Storage	C, E, F
Employee Safety	F, G
Contractor Safety	F, G
EII	A, B, E, F
Cybersecurity	F, G
Wildfire	A, B, E, F, H (*see* section 2.i)

2. Consequence Modeling for Certain Risks

Special consequence modeling is administered for certain risks, as described below, which supersedes the analyses described above.

i. Consequence Modeling for Wildfire Risk

The unique nature of Wildfire Risk has garnered specialized methodologies, as described in the section below. The prevalence and complexity of wildfire risk has garnered heightened attention and analyses from SDG&E, as exemplified in the Wildfire Mitigation Plan (WMP) filings and prior RAMP reports. Consequence modeling for wildfire risk include modeling for the risk itself as well as Public Safety Power Shutoff (PSPS) and Protective Equipment and Device Settings (PEDS) considerations. Each are described below, and additional details can be found in SDG&E's 2026-2028 WMP.[43]

Wildfire consequence estimations are derived from Technosylva's FireSight™ simulations (also known as WFA-E WRRM). These simulations assess fire behavior at each asset location under historical worst-case fire weather conditions. Currently, SDG&E evaluates fire behavior scenarios for 125 days, spanning from 2013 to 2021, which represent the worst fire

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42 CPUC, *Wildfire and Wildfire Safety*, *available at:* https://www.cpuc.ca.gov/industries-and-topics/wildfires.

43 State of California – Office of Energy Infrastructure and Safety, *2026-28 Base Wildfire Mitigation Plans (WMP)*, *available at:* https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/wildfire-mitigation-plans/2026-28-base-wildfire-mitigation-plans/.

weather days in its service area. These days are selected and reviewed by experts from the Meteorology, Fire Science, Engineering, and Risk Analytics groups to properly account for the most critical fire weather conditions in SDG&E's service territory and promote accurate risk assessments. SDG&E subject matter experts are collaborating with the Technosylva team to reevaluate and expand the selection of these critical fire weather days to include the latest fire weather events that occurred in California from November 2024 to January 2025, including the Palisades and Eaton fires.

Technosylva's advanced and proprietary wildfire modeling incorporates weather variables, detailed fuel layers, and a 24-hour unsuppressed fire spread model to estimate potential ignition size (acres burned) and impact (buildings destroyed), both at and around asset locations within SDG&E's service territory.

Table 15: Attributes for Wildfire Consequence

Risk Attribute	Wildfire Consequence
Safety	Equivalent Safety Serious Injuries and Fatalities are calculated based on Technosylva estimates of structures destroyed. Assumption: To estimate the total number of equivalent fatalities per structure destroyed a 0.00617 factor is assumed. This factor is estimated based on an internal analysis conducted on the CALFIRE dataset.
Reliability	Subject matter expert assumption to estimate Customer Minutes Interrupted (CMI) values based on estimates of outage duration and assumed restoration duration. These CMI estimates are subsequently monetized using the $/CMI value provided in this chapter. Assumption: Restoration time is 24h
Financial	Subject matter expert conservative assumption to translate buildings destroyed and acres impacted estimated by Technosylva simulations to financial dollars. Assumptions: - Suppression and restoration cost: $2,350/acres burned[44] - Structure Destroyed cost: $1,000,000/structure destroyed[45]

[44] SME assumption based on a review of CALFIRE suppression costs incurred from 2000 to 2023. Data for 2024 and 2025, which should include the devastating fires in Los Angeles, is not included as suppression costs for these incidents are not available as of February 2025.

[45] SME assumption based on a review of publicly available data on the median listing home price in San Diego County as of February 2025.

To calculate the potential impacts of PSPS de-energizations, the duration of de-energization by feeder segment and the number of downstream customers affected by de-energization on each feeder segment are considered. These values are used to determine natural unit values for the three consequence components.

Table 16: Attributes for PSPS Consequence

Risk Attribute	PSPS Consequence
Safety	Subject matter expert conservative assumption to estimate the potential number of Serious Injuries and Fatalities created by a PSPS de-energization event. Assumption: 1 fatality per 10 billion customer minutes de-energized. This assumption is estimated based on a review of historical PSPS events in California (2018-2021).[46,47,48]
Reliability	Customer Minutes Interrupted (CMI) estimates are calculated directly from the number of customers impacted at each feeder segment with varying event durations based on historical and projected PSPS event durations. Assumption: These CMI estimates are subsequently monetized using the $/CMI value provided in this chapter.
Financial	Subject matter expert conservative assumption to estimate the potential financial loss experienced by customers affected by a PSPS de-energization event. Assumption: For Residential customers a $482 cost per event is calculated using the per diem rates applicable to San Diego, CA, as of September 2024 with the assumption of accommodating four family members per customer meter. For C&I customers, a $1,446 cost per event is estimated.[49]

[46] CPUC, *Utility PSPS Reports: Post-Event, Pre-Season and Post-Season*, *available at*: https://www.cpuc.ca.gov/consumer-support/psps/utility-company-psps-reports-post-event-and-post-season.

[47] SCE, *PSPS Reports to the CPUC*, *available at:* https://www.sce.com/outage-center/outage-information/psps.

[48] PG&E, *Public Safety Power Shutoffs*, *available at:* https://www.pge.com/en/outages-and-safety/safety/community-wildfire-safety-program/public-safety-power-shutoffs.html.

[49] For FY 2025 per diem rates for San Diego, California refer to: U.S. General Services Administration (GSA), *FY 2025 per diem rates for ZIP Code. Financial values as of February 2025. A factor of three is assumed for C, available at:* https://www.gsa.gov/travel/plan-book/per-diem-rates/per-diem-rates-results?action=perdiems_report&city=San%20Diego&fiscal_year=2025&state=CA&zip=.Financial%20values%20as%20of%20February%202025.%20A%20factor%20of%20three%20is%20assumed%20for%20C&I%20customers.

To align the risk quantification requirements between this RAMP filing and WMP filings,[50] SDG&E includes risks associated with Protective Equipment Device Settings (PEDS). This PEDS model follows a similar approach to PSPS as it is modeled as a reliability outage. The following assumptions are considered to establish PEDS consequences.

Table 17: Attributes for PSPS Consequence

Risk Attribute	PEDS Consequence
Safety	The same assumption as in the PSPS consequence model is used for PEDS. Subject matter expert conservative assumption to estimate the potential number of Serious Injuries and Fatalities created by a PEDS reliability outage event. Assumption: 1 fatality per 10 billion customer minutes de-energized. This assumption is estimated based on a review of historical PSPS events in California (2018-2021).[51,52,53]
Reliability	Customer Minutes Interrupted (CMI) estimates are calculated directly from the number of customers impacted at each feeder segment, with varying event durations based on historical and projected PEDS event durations. These CMI estimates are subsequently monetized using the $/CMI value provided in of this chapter.
Financial	Subject matter expert conservative assumption to estimate the potential financial loss by a PEDS de-energization event. Assumption: Based on historical overhead line patrol costs during elevated or extreme fire weather conditions, whether conducted on foot or by helicopter, a 10% ratio of the expected reliability cost is assumed to model this impact.

[50] State of California – Office of Energy Infrastructure Safety, *Wildfire Mitigation Plans Guidelines* (February 24, 2025), *available at:* https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=58026&shareable=true.

[51] CPUC, *Utility PSPS Reports: Post-Event, Pre-Season and Post-Season*, *available at*: https://www.cpuc.ca.gov/consumer-support/psps/utility-company-psps-reports-post-event-and-post-season.

[52] SCE, *PSPS Reports to the CPUC*, *available at:* https://www.sce.com/outage-center/outage-information/psps.

[53] PG&E, *Public Safety Power Shutoffs*, *available at:* https://www.pge.com/en/outages-and-safety/safety/community-wildfire-safety-program/public-safety-power-shutoffs.html.

ii. Modeling Safety Consequences for High-Pressure, Above-Ground Gas Facilities and Storage

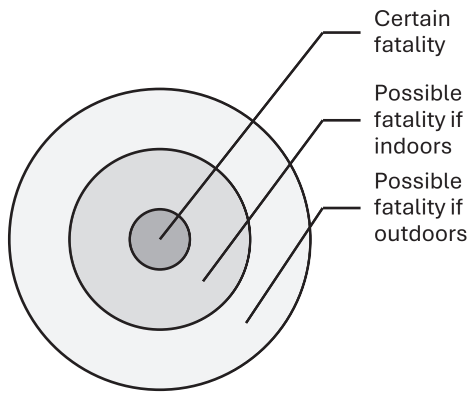
Due to the lack of historical high-pressure gas risk events resulting in fatalities or serious injuries, SoCalGas and SDG&E have relied on national natural gas pipeline incident data provided by PHMSA to quantify the potential safety impacts of such events. This approach takes into account pipeline specifications, such as operating pressure and pipe diameter, as well as service territory characteristics like population density, which may differ from national data. This is done using mathematics and physical principles, based on an equation provided in the Gas Research Institute (GRI),[54] which is based on the same physical model as the Potential Impact Radius (PIR) model used for natural gas pipelines in the U.S. Code of Federal Regulations (49 CFR § 192). The general form of the equation is the following:

$$N = p_i \cdot a_h \cdot \rho \cdot \tau \qquad 3.12$$

where p_i is the probability of ignition, a_h is the size of the hazard area, ρ is the population density, and τ is the probability of an occupant being present at the time of the incident. The probability of ignition p_i is calculated as a function of pipe diameter and a_h is assumed to be a circle with radius r_i, within which the heat intensity exceeds a certain threshold that results in certain fatality or possible fatality depending on the threshold. The study depicts the hazard area and potential safety consequences in Figure 2 below:

[54] Journal of Pressure Vessel Technology, Transactions of the ASME, *Target Reliability Levels for Design and Assessment of Onshore Natural Gas Pipelines* (December 2009), *available at*: https://www.researchgate.net/publication/245365044_Target_Reliability_Levels_for_Design_and_Assessment_of_Onshore_Natural_Gas_Pipelines.

Figure 2: Hazard Areas



For the outcome rupture, Nessim et al. (2009) shows Equation 3.12 can be expanded to:

$$N = p_i \cdot \rho \cdot \tau \cdot \pi \cdot [P_{in} \cdot (0.25 \cdot (r_{i-0}^2 - r_{i-100}^2) + r_{i-100}^2) + P_{out} \cdot (0.5 \cdot (r_{o-0}^2 - r_{o-100}^2) + r_{o-100}^2)] \quad 3.13$$

where r_{i-0} and r_{i-100} are the radii of the hazard area when indoors, and similarly r_{o-0} and r_{o-100} describe the hazard radii for outdoor exposure. The study also makes assumptions that τ is 40%, the probability of being indoor P_{in} is 90%, and the probability of being outdoors P_{out} is 10%. Large leaks are also modeled using Equation 3.13 with different radii and a probability of ignition accounting for the differences between a rupture and a large leak.

Using these assumptions SoCalGas and SDG&E adopted the approach presented in the GRI study in Monte Carlo simulation to estimate the average number of fatalities per rupture and large leak. Since the equation only predicts fatalities, PHMSA data was used to estimate how many serious injuries would occur given a rupture or large leak. This approach using heat thresholds and hazard radii was also applied to High-Pressure facilities and Underground Storage, with different assumptions based on the type of asset.

Additionally, the Monte Carlo simulations for the Safety CoRE distributions included distributions for Class locations for transmission and Zone locations for High-Pressure distribution infrastructure. These Class/Zone distributions were constructed using internal sliding miles data and the latest available California and US census data.

This comprehensive approach enhances the modeling of the safety consequences of high-pressure risk events, taking into account specific pipeline and service territory characteristics.

iii. Safety Consequence Modeling for Medium-Pressure Gas Risk including Excavation

Consequence modeling for Medium Pressure risk involves assessing the probability that a leak results in a serious incident (a serious injury or fatality or SIF), the expected number of SIFs, and the proportion of those SIFs that are fatalities versus serious injuries. Equation 3.13 discussed above applies only to high-pressure assets and cannot be used to estimate safety consequences for the medium pressure system, as safety incidents associated with the Medium Pressure Gas Risk typically occur due to gas migration and accumulation into a structure.

Where possible, internal data was leveraged, such as the probability of a serious incident, which is an output of the Companies' Integrity Management Quantitative Risk Analytics (QRA) model. Where internal data was unavailable, national PHMSA incident data was used. The total number of SIFs expected per incident and the proportion of those SIFs expected to be fatalities were determined using PHMSA data. For risk-averse scaling, probability distributions calibrated to PHMSA data were used to perform Monte Carlo simulations.

SoCalGas and SDG&E recognize potential drawbacks to using national data, such as varying levels of population density nationwide that may not reflect the service territory population density and thus may not entirely reflect potential safety outcomes. To address this, SoCalGas and SDG&E categorized the locations of the national incident data into one of four types: Business District High Population, Business District Low Population, Non-Business District High Population, and Non-Business District Low Population.

Considering business districts and population density as two different dimensions allows for different location types to be considered, which may have varying amounts of traffic. For example, an area may have low population density because it is commercial and lacks many homes. It would not be accurate, however, to assume that safety consequences are relatively low just because there are few homes, as this area may be highly populated during business hours. Using Google Maps and 2020 census data, SoCalGas and SDG&E were able to categorize the national incident data into one of these four categories, allowing the modeled safety outcomes to align more closely with the Companies' respective service territories.

This approach is intended to accurately model the safety consequences of medium pressure risk events and account for specific characteristics of the service territories.

I. Estimate Mitigation Costs and Benefits

1. Estimating Mitigation Costs

Control and mitigation costs are derived from business unit forecasts of expected unit installations and related capital and O&M costs from 2028-2031. Costs are further broken down by labor and units (*e.g.*, number of poles) required to implement the associated mitigation. Forecasts are informed by historical units and costs of controls, where relevant data is available.

2. Estimating Mitigation and Control Benefits

Mitigations and controls either reduce or maintain risk. When risk is reduced, the LoRE or CoRE may be decreased, resulting in a potential baseline shift in the Risk Value for future years. For activities that maintain risk that otherwise would increase owing to ongoing infrastructure deterioration or exogenous factors such as climate effects, SoCalGas and SDG&E consider an alternative scenario where the activity does not exist, allowing the Companies to quantify the benefit of the activity. In this scenario, the Risk Value would be higher without the activity, and thus the LoRE or CoRE would be higher. This concept of "prevention" versus "preservation" will be discussed in the following section.

Estimating mitigation benefits depends on the availability and quality of data. In an effort to use the most reliable information, SoCalGas and SDG&E developed a data prioritization framework. This framework prioritizes: 1) internal data sources to assess mitigation effectiveness, including pre- and post-implementation reports, integrity management analysis, failure rates (*e.g.*, leak rates), incident rates, and maintenance data. When internal data is insufficient, SoCalGas and SDG&E incorporate 2) external industry sources, such as reports from the DOE, PHMSA incident data, vendor documentation, and academic research. For emerging technologies with limited empirical data, the Companies adopt a 3) qualitative approach, leveraging SME (Subject Matter Expert) insights to estimate potential benefits.

3. Calculating Benefits Through Prevention, Preservation, and Containment

The risk reduction or risk maintenance attributable to a mitigation or control – which constitutes the "benefits" for CBR purposes – is the estimated difference between the Pre-Mitigated and Post-Mitigated Risk Value resulting from application of the mitigation or the scenario of the absence of an ongoing activity. Calculating the risk reduction or risk maintenance entails modeling whether and how the mitigation or control impacts LoRE, one or more CoRE attributes, or some combination.

For this RAMP filing, SoCalGas and SDG&E modeled risk reduction or risk maintenance according to three categories of how mitigations or controls interact with risk, as described below. For simplicity, scope[55] is not considered in Equations 3.14−3.17; scope calculations are introduced in the next section.

Prevention: This involves reducing the LoRE without affecting the CoRE. Examples include replacing pipelines and undergrounding powerlines. Equation 3.14 shows the risk reduction as the difference between the Pre-Mitigated Risk and the Post-Mitigated Risk:

$$\text{Risk Reduction} = (\text{LoRE} \times \text{CoRE}) - (\alpha \times \text{LoRE} \times \text{CoRE}) \qquad 3.14$$

where $0 \leq \alpha \leq 1$.[56] Here the effectiveness of the mitigation is represented by α, where $(1 - \alpha)$ is the effectiveness of the mitigation. For example, for a mitigation that is 95% effective, we use $\alpha = 0.05$.

Preservation: This involves maintaining the current level of risk. Examples include routine maintenance, corrosion control, vegetation management, inspections, and safety training mitigations. Equation 3.15 shows the risk reduction as the difference between the Pre-Mitigated Risk and the Post-Mitigated Risk:

$$\text{Risk Reduction} = (\rho \times \text{LoRE} \times \text{CoRE}) - (\text{LoRE} \times \text{CoRE}) \qquad 3.15$$

where $\rho \geq 1$. Here the effectiveness of an ongoing mitigation or control is represented by ρ, where $\frac{\rho-1}{\rho}$ is the effectiveness of the mitigation or control. For example, if an ongoing mitigation or control is 50% effective, we use $\rho = 2$. Another way to estimate ρ is to determine how many more failures would be expected in absence of the ongoing activity.

Containment: This involves reducing the severity of outcomes (CoRE) without affecting the LoRE. Examples include emergency response plans, fire suppression systems, automated valves, and personal protective equipment (PPE) mitigations. Equations 3.16 and 3.17 represent this for new mitigations or controls, and ongoing mitigations or controls, respectively:

$$\text{Risk Reduction} = (\text{LoRE} \times \text{CoRE}) - (\text{LoRE} \times \gamma \times \text{CoRE}) \qquad 3.16$$

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55 Scope is the proportion of risk that could be addressed by mitigation.

56 Here, alpha is used as the parameter of LoRE reduction; in the section describing the approach to risk scaling, alpha is used to denote the scaling coefficient.

$$\text{Risk Reduction} = (\text{LoRE} \times \kappa \times \text{CoRE}) - (\text{LoRE} \times \text{CoRE}) \qquad 3.17$$

where $0 < \gamma \leq 1$ and $\kappa \geq 1$. Similar to α and ρ, γ and κ represent the effectiveness of a new mitigation or control, or an ongoing activity, through $(\gamma - 1)$ and $\frac{\kappa-1}{\kappa}$, respectively.

4. Mitigation Scope, Future Values, and Shifting the Baseline

When applying one of the parameters α, ρ, γ or κ, from prevention, preservation, or containment, to a LoRE or CoRE, it should only be applied to the portion that the mitigation or control covers. For example, if focusing on 100 miles of medium pressure mains, one must first consider the LoRE or CoRE specific to medium pressure mains and then apply the parameter to the proportion that corresponds to the 100 miles.

Certain models with high granularity allow for precise targeting of the portion addressed by the control or mitigation, while others require estimating the percentage, and some require both approaches. Step 1 involves narrowing down the slices of risk that the mitigation or control addresses as much as possible. Step 2 involves using exposure data to determine the percentage being addressed.

To demonstrate the math, SoCalGas and SDG&E assume that the LoRE/CoRE pairs in the equations represent Step 1, and the scope parameter s (or S) is the percentage of that LoRE or CoRE being addressed by the parameters α, ρ, γ or κ.

To discuss the equations for scope calculation, one must first express all LoREs and CoREs in terms of future values. In subsection E below, an explanation for how everything is discounted back to a single point in time (base year 2024 for these RAMP Reports), using three discount scenarios, is provided. This discussion focuses on applying inflation to the CoRE attributes and Costs, and degradation to the LoRE.

SoCalGas and SDG&E start with the general equations to convert CoRE and Cost into future values from the base year t_0 (for this RAMP, 2024) to a future year $T > t_0$:

$$\text{CoRE}_T = \text{CoRE}_{t_0} \cdot (1 + r_{\text{inf}})^{(T - t_0)} \qquad 3.18$$

$$\text{Cost}_T = \text{Cost}_{t_0} \cdot (1 + r_{\text{inf}})^{(T - t_0)} \qquad 3.19$$

Here, r_{inf} represents the inflation rate.

For any degradation rate, such as corrosion, that increases LoRE, the following equation is used:

$$\text{LoRE}_T = \text{LoRE}_{t_0} \cdot \left(1 + r_{\text{deg}}\right)^{(T - t_0)} \qquad 3.20$$

where r_{deg} represents the degradation rate.

Next, for a mitigation m_0 with scope s_0 and prevention parameter α_0 in year $T-1$:

$$\mathrm{LoRE}_T = \mathrm{LoRE}_{T-1} \cdot (1 - s_0) + LoRE_{T-1} \cdot s_0 \cdot \alpha_0 \tag{3.21}$$

This equation can be rewritten as:

$$\mathrm{LoRE}_T = \mathrm{LoRE}_{T-1} \cdot (1 - s_0 \cdot (1 - \alpha_0)) \tag{3.22}$$

Similarly, for mitigation M_0 with scope S_0 and containment parameter γ_0 in year $T-1$:

$$\mathrm{CoRE}_T = \mathrm{CoRE}_{T-1} \cdot (1 - S_0 \cdot (1 - \gamma_0)) \tag{3.23}$$

For multiple mitigations $m_0, m_1, \ldots, m_n$ with scopes $s_0, s_1, \ldots, s_n$ and prevention parameters $\alpha_0, \alpha_1, \ldots, \alpha_n$ in year $T-1$, respectively:

$$\mathrm{LoRE}_T = \mathrm{LoRE}_{T-1} \cdot \prod_{i=0}^{n} \left(1 - s_i \cdot (1 - \alpha_i)\right) \tag{3.24}$$

Similarly, for multiple mitigations $M_0, M_1, \ldots, M_N$ with scopes $S_0, S_1, \ldots, S_N$ and containment parameters $\gamma_0, \gamma_1, \ldots, \gamma_N$ in year $T-1$, respectively:

$$\mathrm{CoRE}_T = \mathrm{CoRE}_{T-1} \cdot \prod_{i=0}^{N} \left(1 - S_i \cdot (1 - \gamma_i)\right) \tag{3.25}$$

Equations 3.18−3.20 and 3.23−3.25 define LoRE and CoRE in future values.

Equations 3.21−3.25 correspond to mitigations that are preventions or new containments. These equations shift the baseline, as the left-hand sides define the start of the next year as a function of the previous year. For year T, the right-hand sides also represent the post Mitigation LoREs and post Mitigation CoREs. Specifically:

$$\text{postMitigation LoRE}_T = \mathrm{LoRE}_T \cdot (1 - s \cdot (1 - \alpha)) \tag{3.26}$$

$$\text{postMitigation CoRE}_T = \mathrm{CoRE}_T \cdot (1 - s \cdot (1 - \gamma)) \tag{3.27}$$

for year T.

Prevention and containment mitigations and controls do not shift baselines, and the math is the same for determining the pre-Mitigation LoREs and pre-Mitigation CoREs, as follows:

$$\text{preMitigation LoRE}_T = \mathrm{LoRE}_T \cdot (1 - s \cdot (1 - \rho)) \tag{3.28}$$

$$\text{preMitigation CoRE}_T = \mathrm{CoRE}_T \cdot (1 - s \cdot (1 - \kappa)) \tag{3.29}$$

for year T.

These equations help determine how the effectiveness of mitigations and controls, represented by parameters α, ρ, γ and κ, impact the LoRE and CoRE over time.

J. Discounting Costs and Benefits, and Calculating the Cost-Benefit Ratio

The previous subsection describes how to convert all LoREs, CoREs, and costs into future values. The next step is to discount everything back to a single point in time (the net present value), which, for purposes of the 2025 RAMP is 2024, the last recorded year of data available at the time of this RAMP filing. Consistent with the direction provided in the RDF, this is done using three discount scenarios: Societal, Weighted Average Cost of Capital (WACC), and a Hybrid approach. The Hybrid approach discounts the Safety and Reliability CoREs using a Hybrid rate, as prescribed by the Phase 3 Decision, while the Financial CoRE and costs are discounted using the WACC.

SoCalGas and SDG&E perform this discounting either before or after calculating the risk. For any CoRE attribute in future value, the following equation is used:

$$\mathrm{PV}_{r_{\mathrm{dis}}}[\mathrm{CoRE}_T] = \frac{\mathrm{CoRE}_T}{(1 + r_{\mathrm{dis}})^{(T-t_0)}} \qquad 3.30$$

Alternatively, this can be expressed as:

$$\mathrm{PV}_{r_{\mathrm{dis}}}[\mathrm{CoRE}_T] = \mathrm{CoRE}_{t_0} \cdot \left(\frac{1 + r_{\mathrm{inf}}}{1 + r_{\mathrm{dis}}}\right)^{(T-t_0)} \qquad 3.31$$

where r_{dis} is the discount rate.

Similarly, for costs:

$$\mathrm{PV}_{r_{\mathrm{dis}}}[\mathrm{Cost}_T] = \mathrm{Cost}_{t_0} \cdot \left(\frac{1 + r_{\mathrm{inf}}}{1 + r_{\mathrm{dis}}}\right)^{(T-t_0)} \qquad 3.32$$

Note that:

$$\mathrm{PV}_{r_{\mathrm{dis}}}[\mathrm{LoRE}_T \cdot \mathrm{CoRE}_T] = \mathrm{LoRE}_T \cdot \mathrm{PV}_{r_{\mathrm{dis}}}[\mathrm{CoRE}_T] \qquad 3.33$$

for any of the CoRE attributes (Safety, Financial, or Reliability), since LoRE is not monetary. Hence, one can now define the net present value of Risk:

$$\mathrm{PV}[\ \mathrm{Risk}_T] = \mathrm{LoRE}_T \cdot \left(\mathrm{PV}_{r_{\mathrm{dis}_s}}\left[\mathrm{CoRE}_T^{\mathrm{safety}}\right] + \mathrm{PV}_{r_{\mathrm{dis}_r}}\left[\mathrm{CoRE}_T^{\mathrm{reliability}}\right] + \mathrm{PV}_{r_{\mathrm{dis}_f}}\left[\mathrm{CoRE}_T^{\mathrm{financial}}\right]\right) \qquad 3.34$$

where r_{dis_s}, r_{dis_r}, and r_{dis_f} are discount rates for the Safety CoRE, Reliability CoRE, and Financial CoRE, respectively. As mentioned, in the two discount scenarios, WACC and Societal, all discount rates apply uniformly to all attributes. In the Hybrid scenario, while the cost and Financial CoRE use WACC as the discount rate, the safety and reliability CoRE use a Hybrid discount rate, as described in the Phase 3 Decision.[57]

What follows is the net present value of the benefit of a mitigation:

$$\text{Benefit}_T = \text{PV}[\text{ PreMitigation Risk}_T] - \text{PV}[\text{ PostMitigation Risk}_T] \qquad 3.35$$

And the total benefit:

$$\text{Benefit} = \sum_{t \in \text{BY}} \text{Benefit}_t \qquad 3.36$$

where BY is all the benefit years of the mitigation.

The ratio of Equation 3.36 and Equation 3.32 define the Cost-Benefit Ratio for a mitigation or control:

$$\text{CBR} = \frac{\text{Benefit}}{\text{PV}[\text{Cost}_T]} \qquad 3.37$$

When comparing the effects of the three discount rate scenarios on the CBRs, several observations can be made. For mitigations with a one-year benefit, the WACC and Societal discount rates yield identical CBRs. This occurs because both the numerator and denominator are inflated and discounted over the same period, causing the rates to cancel each other out. In contrast, under the Hybrid scenario, the numerator and denominator are discounted differently, leading to different CBRs.

For mitigations with benefits lasting longer than one year, if the discount rate (*e.g.*, WACC) exceeds the inflation rate, the benefits are reduced more than the costs. For instance, consider a mitigation with a 68-year benefit where a pipe is replaced in 2028. The cost is discounted over 4 years, while the benefit is discounted over a period ranging from 4 to 72 years. This creates a significant difference in CBR values between the discount rate scenarios, especially between the WACC and Societal rates.

[57] D.24-05-064 at 103.

Table 18 shows the three discount rates for SoCalGas and SDG&E, respectively:

Table 18: Discount Factors Applied to the 2025 RAMP

	SoCalGas	SDG&E
Weighted Average Cost of Capital (WACC)[32]	7.49%	7.45%
Social Discount Rate	2%	2%
Hybrid rate calculated as defined in Phase 3[33]	6.1%	6.1%

K. Mitigation Strategy – Other Considerations

As stated in Chapter RAMP-2, SoCalGas and SDG&E's risk management philosophy prioritizes the prevention of catastrophic, loss-of-life events, protracted service interruptions, and the associated financial losses of such events. Row 26 of the RDF provides that a utility "is not bound to select its Mitigation strategy based solely on the Cost-Benefit Ratios produced by the Cost-Benefit Approach" and that "[m]itigation selection can be influenced by other factors." One such consideration that factors into the Companies' decision-making is the effectiveness of risk mitigations in reducing the potential for the type of catastrophic ("tail risk") outcomes described above. Providing insight into the specific question of tail risk reduction entails an analysis of pre- and post-mitigation tail risk. This section illustrates such tail risk analysis[58] as applied to certain of SDG&E's Wildfire mitigations.

For tail risk analysis, SDG&E uses the same probability distribution modeling underlying the development of the CBRs as described in the preceding sections within Step 3: Mitigation Analysis for RAMP Risks of this Chapter. In accordance with the RDF, SDG&E calculated CBRs for Strategic Undergrounding (SUG) and Combined Covered Conductor (CCC), which provide a comparison of those two mitigations on an expected value basis. In addition, SDG&E compares pre- and post-mitigation outcomes at various tail percentile values, including the 98th percentile (1 in 50 years) and the 99th percentile (1 in 100 years) to understand the potential residual tail risk remaining in the system after deploying these mitigations.

For illustrative purposes, the table below presents an evaluation of the residual risk (unmitigated) for the 98th percentile (1 in 50-year return period) for both SUG and CCC, Notwithstanding the CBRs, the post-mitigation (residual) tail risk (98th percentile outcome)

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58 The analysis presented in this section is not an application of tail risk-based CBRs in accordance Row 24 of the RDF, but a separate consideration in accordance with Row 26 of the RDF.

resulting from CCC is very large and, arguably, "intolerable."[59] Accordingly, and given SDG&E's aim of effectively and cost-efficiently reducing the risk of catastrophic outcomes, SDG&E's decision process would consider whether supplemental mitigation would be required with CCC to further reduce the P98 residual risk over the lifetime of the assets.

Table 19: Residual Tail Risk Comparison

Feeder Segment	Mitigation	Pre-Mitigation Risk at P98 [k$]	Post-Mitigation Risk at P98 [k$]	Risk Reduction at P98 [%]
235-899R	SUG	$ 4,667.33	$ 175.48	96.24%
235-899R	CCC	$ 4,667.33	$ 3,111.56	33.33%
222-1990R	SUG	$ 1,102.51	$ 445.56	59.59%
222-1990R	CCC	$ 1,102.51	$ 891.12	19.17%

L. Tranching

1. SoCalGas and SDG&E's 2025 RAMP Tranching Methodology

RAMP Risks are characterized by variation in the level of risk within the Risk, meaning that certain segments are riskier than others, particularly with asset-based risks. Within the RDF, "tranching" is the method by which a risk is partitioned in accordance with the variation in the risk profiles – that is, variation in the risk scores across the Risk – and "tranches" are the partitions resulting from tranching. One of the CPUC's stated goals of the RDF tranching requirement is to provide more granular tranches to inform the Commission of the riskiest portions of the Companies' infrastructure.[60] Calculating CBRs at the tranche level generally follows the process described above in Step 3 of this Chapter (Mitigation Analysis for RAMP Risks). To produce the requisite tranche-level view of a risk, the process first entails application of a method for partitioning the risk into tranches. Further, the tranches should adhere to the guidance of RDF Row 14 in terms of being sufficiently granular and exhibiting homogeneous risk profiles within each tranche. The Phase 3 Decision adopts a Row 14 tranche granularity approach (referred to as the Phase 3 Tranching Approach (PTTA)) and requires utilities "to use this approach to determine tranches in most cases,"[61] while allowing for flexibility, as follows:

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59 "Intolerable" is used indicatively here; SDG&E is not asserting a risk tolerance.

60 D 24-05-064 at 28.

61 *Id.* at 26.

The best practice for determining the homogeneity of risk profiles in reporting Tranches is the use of quintiles of LoRE and quintiles of CoRE, resulting in 25 reporting tranches. The utility can and should submit more granular data in workbooks included with RAMP and GRC filings if it is available, but that more granular data shall be aggregated into at least 25 reporting tranches with homogeneous risk profiles. If the assets or system associated with a given risk are less than 25 in number, the utility may use an alternative means of determining homogeneity of risk profiles, including quartiles or other smaller divisions of LoRE and CoRE, but this alternative means must be described in detail in the RAMP filing.

If a utility desires to use an alternative determination of Tranches not reflecting 25 homogenous risk profiles based on LoRE and CoRE, or they wish to use a percentile ranking approach that would result in more than 25 reporting Tranches, the utility must submit a White Paper describing their preferred method for determining Tranches and relevant workpapers to SPD no later than 45 days before their first pre-RAMP workshop and must serve the White Paper to the service list of R.20-07-013 or a successor proceeding as well as the service list of the utility's most recent RAMP application proceeding no later than 45 days before their first pre-RAMP workshop. Staff and Parties may provide input on the IOU's White Paper within the 21 days from the submittal. The utility must also include the White Paper in its RAMP filing, clearly indicating any changes to the previously served version. An IOU may submit this White Paper without prejudice to the right of parties to the RAMP or GRC to challenge such alternative determination of tranches.[62]

The PTTA tranching methodology has not yet been applied or implemented in a RAMP application. Indeed, SoCalGas and SDG&E are the first utilities to test the PTTA approach in their RAMP Reports, which is especially important within the context of assessing and presenting infrastructure risk. This testing process identified inconsistencies between the stated objectives of the PTTA and the methodology itself, as SoCalGas and SDG&E explain in their Alternative Tranching White Paper (White Paper), which was served November 1, 2024, in accordance with the process set forth in Row 14, and is attached to this RAMP Report as Appendix 3.

The White Paper explains that testing of the PTTA revealed the following issues:

- Inconsistencies between the Phase 3 Decision's objective to develop tranches with "homogeneity of risk profiles" and the PTTA's guidance to produce twenty-five tranches reflective of each possible pairing of LoRE and CoRE quintiles. Specifically, many of the resultant tranches from application of the PTTA included a heterogeneous – not homogeneous – mix of risk events, in contrast

62 D.24-05-064 at 33 (describing changes to the RDF Row 14).

with CPUC objectives.[63]

- Inconsistencies between the Phase 3 Decision's objective to identify "the riskiest portions of [a utility's] infrastructure and/or management system …" and the PTTA's potential to mix unlike risk profiles in a way that does not best represent the differences in risk profiles of the assets within the risk.[64]
- Inconsistencies between the Phase 3 Decision's goal of informing the Commission on the riskiest portions of the Companies' infrastructure and the PTTA's potential to minimize the presence of risk with respect to specific assets, due to the blending of different risk profiles within a tranche.[65]

Given these results, the White Paper explains that SoCalGas and SDG&E developed and applied a methodology referred to as the Homogeneous Tranche Method (HTM). The HTM is designed to achieve the stated objectives of the PTTA process (*i.e.*, by introducing an algorithm that addresses unwanted PTTA results observed in the testing), while adhering closely to the Row 14 PTTA process. Specifically, the algorithm produces homogeneity within each tranche, meaning the elements within the tranche are of substantially the same risk profile, within the same risk quantile, and arranged into similar LoRE/CoRE regions. In turn, each tranche provides a delineation as to the tranche's asset class within the Risk (*e.g.*, medium pressure underground assets), the relative level of risk (*e.g.*, the top 20%), and the LoRE/CoRE profile (*e.g.*, lower LoRE/upper CoRE). The HTM aligns with and advances the Commission's objective to identify the "riskiest portions of [a utility's] infrastructure and/or management system," consistent with the Phase 3 Decision's stated objectives.

A full explanation of the HTM is provided in the White Paper. The schematic in Figure 3 below provides a step-by-step illustration of the HTM. A similar schematic, specific to each risk, is also provided as an attachment to each Volume II risk chapter. In the graphic, the starting point is the set of risk incidents with their associated likelihood (LoRE) and consequence (CoRE) pairings. In the example below, the numerous causes of faults on SDG&E's electrical system (EII Risk) is the set of "LoRE/CoRE pairs" from which the tranches are derived. Next, the LoRE/CoRE pairs are aligned to Classes (Step 1). Classes for asset-based risks such as EII are generally asset subcategories (in the case of EII, substations, overhead infrastructure and

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63 White Paper at 8.

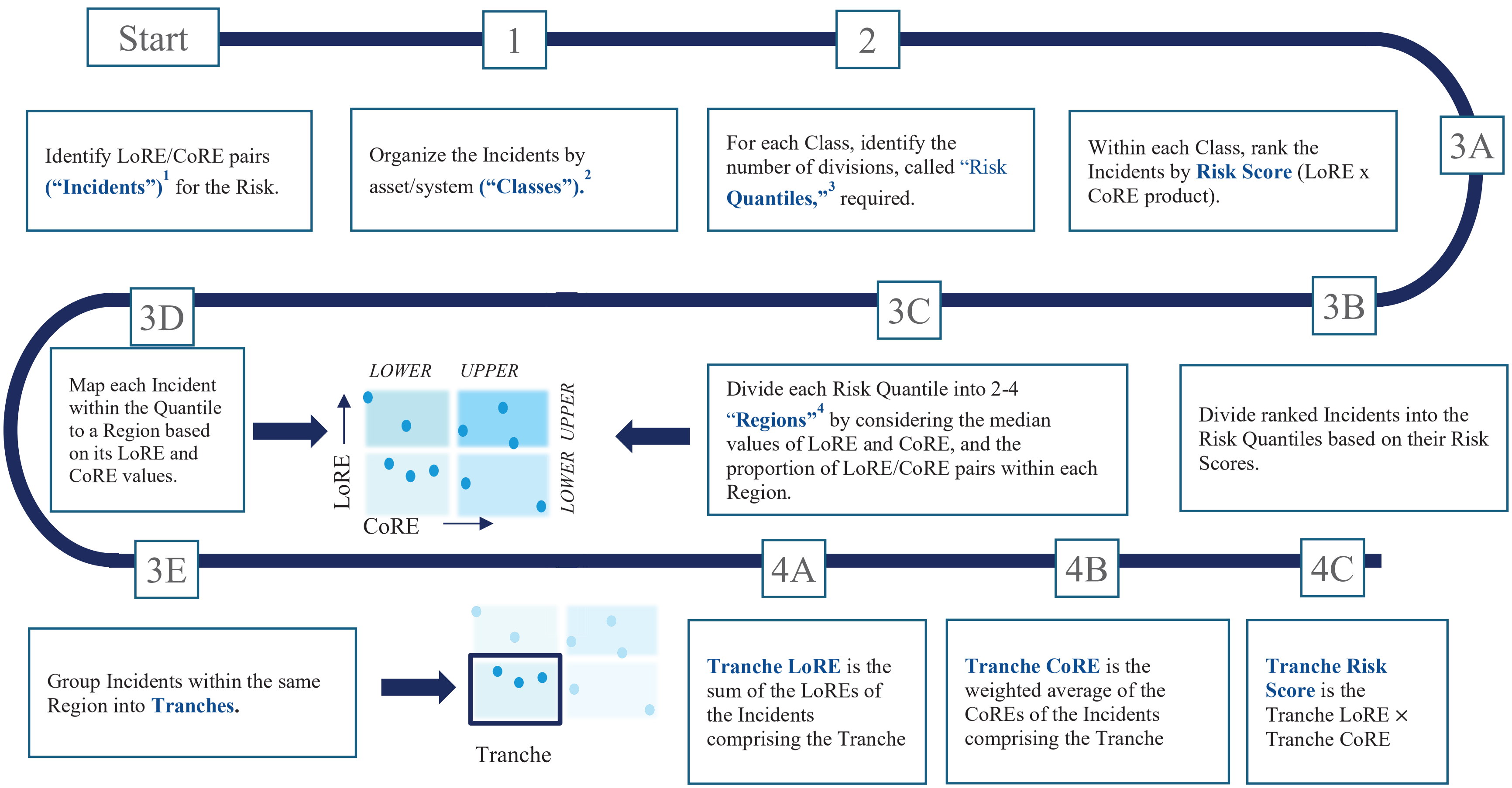
64 *Id.*

65 *Id.*

underground infrastructure). The classes provide the first "cut" of increased granularity. The next step (Step 2) is to determine how many divisions of incidents within each Class are needed to yield tranches that are homogeneous. Without this step, tranches for Classes with many incidents would be too broad (*i.e.*, too wide a range of LoRE/CoRE pairs within a tranche) and not achieve the RDF's goal of homogeneity within tranches. Accordingly, the number of "risk quantiles" is determined to facilitate homogeneity. In this way, Step 2 provides a second "cut" of increased granularity by dividing class LoRE/CoRE pairs into meaningful divisions *(e.g.*, "risk quartiles" if four divisions are determined, "risk quintiles" if five, and so forth).

As shown in Steps 3A through 3E of the graphic, the LoRE/CoRE pairs within each Class are organized highest to lowest (3A), the quantile lines "drawn" (3B), and the LoRE/CoRE pairs within each Class-quantile are mapped to the two to four LoRE x CoRE regions (3C). In this way, the resulting tranches (3E, in which LoRE/CoRE pairs within a region are group) are class-specific, within the same quantile of risk, and exhibit common LoRE/CoRE profiles. An example of a resulting tranche might therefore be "all of the low likelihood, high-consequence incidents in the first quartile of substation faults." As the original LoRE and CoRE attributes for each incident remain intact, the re-scoring of the tranche-level Risk Values is then determined (steps 4A through 4C).

Figure 3: Step-by-Step of the Homogeneous Tranching Method



NOTES

[1] *For example,* ***Incidents (or "Risk Incidents")*** *for Electric Infrastructure Integrity (EII) are generally fault types.*

[2] *For example,* ***Classes (or "Asset Classes")*** *for EII include Overhead Lines/Components, Underground Lines/Components, and Substations.*

[3] ***Quantiles*** *are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*

[4] *The four* ***Regions*** *are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*

2. Response to Initial SPD Feedback

As contemplated in the Phase 3 Decision, SPD Staff provided input on the Companies' White Paper following its submittal, in a letter sent on November 22, 2024 (the SPD Letter).[66] While SoCalGas and SDG&E developed the HTM in good faith to align with and improve upon the PTTA and enhance transparency, consistent with the Phase 3 Decision's goal, SPD raised concerns regarding the transparency and understandability of the HTM in its letter. SoCalGas and SDG&E appreciate SPD's feedback and have endeavored to address SPD's concerns regarding the transparency and understandability of the HTM in this RAMP presentation,[67] and provide the following context in considering the SPD Letter:

SoCalGas and SDG&E are Aligned with SPD on the Policy Objectives of Tranching. The central stated policy objective of the RDF's tranching requirement is to promote targeted and efficient use of risk mitigation dollars by "prioritizing mitigations in the highest-risk tranches."[68] Pursuit of that objective was the overarching driver of the Companies' extensive, good faith effort to develop the HTM, which was designed to produce "tranches" for which the risk between tranches is measurably different, and for which the risk within each tranche is similar ("homogeneous"). The HTM also aims to achieve data-driven results, increase the transparency and granularity of information contained in the Companies' RAMP filing, and align with and inform risk mitigation efforts compatible with the Companies' existing and prospective operating procedures.[69]

SoCalGas and SDG&E Exercised Transparency in Developing the HTM. SoCalGas and SDG&E conducted a testing analysis of the Phase 3 Decision's PTTA to understand how to model it and undertook a good faith effort to develop an empirical model with

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66 Letter from Danjel Bout, Director, Safety Policy Division, CPUC, to Kathe Hunter Córdova, GRC Program Manager, GRC Case Management – SoCalGas/SDG&E (November 22, 2024) Re: Safety Policy Division Response to the Sempra Alternative Tranching Method Whitepaper.

67 SPD Letter at 4.

68 *See* D.24-05-064 at 13; *see also id.* at 28 ("[U]sing LoRE/CoRE quintile tranches will aid the Commission and parties understand if a utility is requesting funding for mitigations in the riskiest portions of their infrastructure and/or management system.").

69 White Paper at 2.

the goal of producing tranches that adhere to the guidance contained in the PTTA.[70] The PTTA was not tested in S-MAP Phase 3, and there was no known pilot analysis the Companies could reference to understand how to model the Phase 3 Decision's PTTA guidance empirically. The Companies met with SPD staff on August 16, 2024 to discuss their intent to test the Phase 3 Decision's tranching methodology, then subsequently on September 10, 2024 and October 14, 2024, to provide status updates and share preliminary observations from that testing. SoCalGas and SDG&E's PTTA testing provided a critical foundational context for the HTM, as it was developed specifically to address the fact that the resulting PTTA tranches were not homogenous. The Companies have attempted in good faith to convey these steps in the meetings with SPD on tranching, as well as in the detailed White Paper, and remain committed to sharing information and analysis that serves the goal of achieving transparency and understandability.

Use of the HTM Aligns with the Phase 3 Decision's Desired Tranching Results. SoCalGas and SDG&E include in their 2025 RAMP filings a significantly greater number of tranches compared with their 2021 RAMP filings. The Companies' tranching results are consistent with the Phase 3 Decision's intent and represent significant progress in advancing stated policy goals related to tranching. The Companies understand from the SPD Letter and subsequent meetings with SPD staff a concern that the HTM approach's mathematical complexity may hinder its ability to support risk-based decisions. While this feedback is appreciated, to provide additional context, the HTM's complexity is a function of the intent to improve upon the PTTA results while deviating as little as possible from the Phase 3 Decision's RDF Row 14 guidance. During the December 17 Pre-RAMP Workshop, certain participants posited alternative methodologies – including TURN's recommended asset-centric approach and OEIS's suggested "clustering" – that were suggested could produce even more homogeneous and useful tranches. While constructive, those suggestions depart even further from the Phase 3 Decision's Row 14 guidance than using the HTM.[71] While SoCalGas and SDG&E are receptive to consideration of alternative, more simplified approaches proposed by Stakeholders, the

70 White Paper at 5-7.

71 Additionally, tranching alternatives suggested at the Pre-RAMP Workshop could not have been considered for use in this 2025 RAMP Report, given RDF Row 14's White Paper requirement and timing constraints.

Commission would need to express support for such approaches. In sum, SoCalGas and SDG&E are in alignment with SPD and intervenors on the important policy goals that tranches are intended to advance and submit that the development and application of the HTM has resulted in significant progress in the development and use of tranching in the Companies' 2025 RAMP filings. Constructive feedback on the mechanics of tranching is appreciated in considering future enhancements to the RDF. For purposes of their 2025 RAMP presentations, SoCalGas and SDG&E have utilized their HTM[72] and appreciate consideration of their good faith tranching presentation and results, which were designed to adhere to the RDF's Row 14 both in letter and in spirit, and to comply with the Phase 3 Decision while advancing the CPUC's stated policy goals.

VII. QUANTITATIVE WORKPAPERS

SoCalGas and SDG&E are providing workpapers to support the quantitative analysis in their RAMP Reports. The RDF Row 29 states the following:

> The methodologies used by the utility should be mathematically correct and logically sound. The mathematical structure should be transparent. All algorithms should be identified. All calculations should be repeatable by third parties using utility data and assumptions recognizing that, dependent on the models used, some variation of result may occur. This requirement is subject to practicality and feasibility constraints of sharing data and models (such as confidentiality, critical energy infrastructure data, volume of information and proprietary models). If these constraints arise, the utility will walk through the calculations in detail when requested by intervenors or the CPUC staff.

The Companies are providing quantitative workpapers that include (1) Excel-based workbooks and calculations and (2) tranche visuals in HTML format. For the workbooks and calculations, the Companies are producing these quantitative workpapers in the format for which the calculations were executed. For some RAMP risks, the quantitative modeling was performed either partially or entirely in Excel, and in these instances, Excel modeling workbooks with formulas intact are being provided. For other RAMP risks, Python and MATLAB programming languages were used to perform the quantitative risk modeling and calculations. When analytical programs are used, Excel-based workpapers are generated to present the output data. These workpapers may not include all underlying formulas. When this is the case, detailed calculation

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72 In workpapers, SoCalGas and SDG&E have also provided as points of comparison examples of tranching using the PTTA method for two risks: Underground Storage System and Wildfire and PSPS.

steps are provided for each mitigation that explain how the benefit-cost ratio is derived.

Risk quantification is further supported by additional resources and workpapers that include calculations, pseudocode, formulas, and detailed explanations, as applicable. In accordance with the RDF and Commission Rules, the Companies will walk through the calculations when requested by intervenors or the CPUC staff.

2025 Risk Assessment Mitigation Phase

(Chapter RAMP-4)
Safety Culture

May 15, 2025

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CHAPTER IV: SAFETY CULTURE

I. INTRODUCTION

This Chapter provides information regarding Southern California Gas Company's (SoCalGas) and San Diego Gas & Electric Company's (SDG&E) (collectively, the Companies) organizational structures, programs, cultures, and compensation as they relate to safety, as required by Decision (D.) 18-12-014.

Safety is foundational to both SoCalGas's and SDG&E's operations, requiring commitment from each Company's respective leaders, employees, and contractors to deliver safe and reliable energy to customers. SoCalGas and SDG&E define safety as the presence of controls for known hazards, actions to anticipate and guard against unknown hazards, and the commitment to continuously improve SoCalGas's and SDG&E's ability to recognize and mitigate hazards. Safety requires strong ongoing leadership commitment and active engagement and ownership from all employees. SoCalGas and SDG&E focus on safety through the lenses of employee safety,[1] public safety,[2] infrastructure safety,[3] and contractor safety.[4] Safety is a fundamental core value at the Companies and underpins all their actions. This commitment to safety is ingrained in the culture and exemplified by a dedicated workforce – from senior leadership to the front-line workers who safely manage and operate the systems and serve customers each day.

The Companies each describe the elements of their safety organizations, cultures, and practices in various proceedings and regulatory submissions, including the California Public Utility Commission's (Commission or CPUC) Order Instituting Investigation into SoCalGas's

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1 Safety systems and processes focused on the health and safety of employees. This includes safety policies, programs, and training.

2 Safety systems and processes focused on protection of customers and the public (*i.e.*, emergency management, environmental safety, customer data privacy, accessibility, protection of the public from harm caused by operations or assets, and the safety of vulnerable populations).

3 Safety systems and processes associated with the design, construction, operation, inspection, and maintenance of SoCalGas's and SDG&E's infrastructure.

4 Safety systems and processes focused on the safety and protection of contractors and subcontractors who provide services to support SoCalGas's and SDG&E's assets and operations.

Organizational Culture (I.19-06-014) (Safety Culture OII),[5] the Safety Culture Assessment Rulemaking proceeding (R.21-10-001),[6] SDG&E's annual Wildfire Safety Culture Assessments pursuant to Assembly Bill (AB) 1054, and annual Safety Performance Metrics Report (SPMR) submissions as required by the Commission's Safety Model Assessment Proceeding (S-MAP) Phase Two Decision, D.19-04-020. Additionally, SoCalGas and SDG&E participated in the joint Commission and Office of Energy Infrastructure Safety (OEIS) annual Public Safety Briefing in August 2024, outlining their respective safety organizations, cultures, and practices.[7] This chapter is intended to provide an overview and references the above-mentioned proceedings and regulatory submissions for additional information.

A. Safety Culture Goals & Objectives

SoCalGas and SDG&E recognize the importance of fostering and sustaining a strong culture of safety and share common objectives. Their commitment to a "safety first" mindset is demonstrated through the actions, allocation of resources, and organizational governance of the Companies. SoCalGas's and SDG&E's leadership teams actively build trust through non-punitive measures, a commitment to reducing high-risk conditions, leveraging data to identify risks, and continuously advancing as learning organizations. SoCalGas and SDG&E employees and contractors – at all levels, across all work locations and departments – are empowered and encouraged to offer safety suggestions, report near misses, identify hazards, raise safety concerns, and "stop the job" if they ever perceive unsafe actions or situations. The Companies work continuously to advance their respective safety cultures and measure the effectiveness of these initiatives.

SoCalGas and SDG&E have previously engaged in assessments to learn about and improve upon their company cultures and are collaboratively engaged in R.21-10-001 to help the Commission develop a Normative Safety Culture Framework for California's Investor-Owned Utilities. This recently adopted framework defines safety culture as "the collective set of values,

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5 I.19-06-014, Order Instituting Investigation on the Commission's Own Motion to Determine Whether Southern California Gas Company's and Sempra Energy's Organizational Culture and Governance Prioritize Safety (issued December 24, 2024).

6 R.21-10-001, Order Instituting Rulemaking to Develop Safety Culture Assessments for Electric and Natural Gas Utilities (issued October 13, 2021).

7 SoCalGas and SDG&E presentations can be accessed at: https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/safety-culture-and-governance.

principles, beliefs, norms, attitudes, behaviors, and practices that an organization's leadership, employees, and contractor personnel share with respect to risk and safety."[8]

The Normative Safety Culture Framework for California's Investor-Owned Utilities, as adopted by the Commission in D.25-01-031, includes the following traits:

- Leadership Safety Values and Actions: Leaders demonstrate a commitment to safety in their decisions and behaviors.
- Problem Identification and Resolution: Issues potentially impacting safety are systematically identified, fully evaluated, and promptly addressed and corrected commensurate with their significance.
- Personal Accountability: All individuals take personal responsibility for safety.
- Work Processes: The process of planning and controlling work activities is implemented so that safety is maintained.
- Continuous Learning: Opportunities to learn about ways to ensure safety are sought out and implemented.
- Environment for Raising Concerns: A safety-conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment, or discrimination.
- Effective Safety Communication: Communications maintain a focus on safety.
- Respectful Work Environment: Trust and respect permeate the organization.
- Questioning Attitude: Individuals avoid complacency and continuously challenge existing conditions and activities to identify discrepancies that might result in error or inappropriate action.
- Decision making: Decisions that support or affect utility safety are systematic, rigorous, and thorough.

SoCalGas and SDG&E are dedicated to delivering safe, reliable, and affordable energy; and committed to continuously improving upon and enhancing the maturity of their respective cultures and approaches to safety, including maturing and evolving as learning organizations. As part of this commitment and as further described in Sections II and III, below, SoCalGas and SDG&E are continuously reviewing, measuring and improving their respective Safety

[8] D.25-01-031 at 53 (Finding of Fact (FOF) 10).

Management Systems (SMS), consistent with American Petroleum Institute Recommended Practice 1173 (API RP 1173), and are engaged in continuous learning and improvement to enhance their organizational safety cultures.

B. Current Safety Culture Improvement Efforts

1. SoCalGas Safety Culture Improvement Plan

As part of the CPUC's Safety Culture OII, SoCalGas underwent a safety culture assessment based on the International Atomic Energy Agency's (IAEA) approach to assess leadership and culture for safety.[9] As described by Safety Policy Division, this new assessment approach for California is based upon the following methodology:[10]

- Focus on understanding the invisible aspects of culture or what's "below the surface" (Schein's Iceberg Model).
- Data by itself says little about culture (tip of iceberg).
- Based on an exploratory approach.
- Captures information to foster dialogue, reflection, and insight within the organization regarding its behavior, rather than data for a corrective action process.

This approach to safety culture learning and improvement has fostered significant reflection and growth at SoCalGas. To improve SoCalGas's understanding of the assessment results, the Company's understanding of the existing safety culture and its drivers, and of the need and opportunity to improve, SoCalGas enlisted the support of renowned external experts to engage in over 90 employee and contractor dialogue and facilitated co-creation sessions. This work resulted in a deeper and richer understanding of SoCalGas's culture, enabled the identification of the basic assumptions influencing culture, and informed how to effect positive change.

As part of this change and improvement effort, SoCalGas engaged in efforts to align its safety culture through "**Safer Together.** Advancing a culture that empowers communication, curiosity, commitment, and collaboration." Safer Together is SoCalGas's "North Star"—the

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9 This assessment methodology and framework aligns with the framework developed by the Commission in R.21-10-001.

10 *See* California Public Utilities Commission (CPUC), *Workshop: Evaluation of SoCalGas revised Safety Culture Improvement Plan* (February 3, 2025), *available at:* https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/safety-policy-division/meeting-documents/i1906014-workshop-slides-for-spd020325.pdf.

fixed point on the horizon that will keep the Company reliably oriented and on course to navigate to its safety culture aspirations. The words Safer Together express the concepts of shared interests, broad and inclusive perspectives, stakeholder collaboration, and continuous improvement.

With Safer Together representing SoCalGas's safety culture goals and objectives, on September 20, 2024, SoCalGas filed its Revised Safety Culture Improvement Plan as a portfolio of actions to move toward the goals. Figure 1 below illustrates actions SoCalGas proposed to influence positive culture change. Following the submission of the Revised Plan, SoCalGas began implementing the change and improvement efforts and has been communicating progress, challenges, and learnings through ongoing quarterly reports to the Commission.

Figure 1

2. SDG&E Safety Culture Improvement Efforts

SDG&E recognizes the importance of fostering and sustaining a strong culture of safety. The Company's commitment to a "safety first" mindset is demonstrated through its actions, allocation of resources, and organizational governance. SDG&E leadership actively builds trust through non-punitive measures, a commitment to reducing high-risk conditions, leveraging data to identify risks, and advancing as a learning organization. The Company continuously works to advance the safety culture and measure the effectiveness of initiatives. SDG&E's efforts to assess, understand, sustain, and continuously improve the culture of safety include monthly Electric and Gas Safety Subcommittee meetings to solicit safety input directly from employees closest to the risks with identified action items tracked through completion, quarterly Contractor Safety Summits to advance the safety partnership with SDG&E's contracted workforce, an annual Start Strong Safety Event, and an annual Safety Congress and award ceremony to recognize and reinforce the importance of safe behavior and a safety-first mindset. SDG&E promotes two-way communication and conducts regular surveys of the workforce to identify strengths and opportunities for improvement.

Since January 2023, SDG&E hosts an annual "Start Strong" safety event for its operational (field) employees. This event, which is a partnership between SDG&E leadership and IBEW Local 465, emphasizes the joint commitment to safety and sets clear expectations for the year. It allows the majority of SDG&E's represented workforce to hear directly from leaders on key safety messaging and resources. The event aims to foster psychological safety where all employees are empowered and feel comfortable speaking up, raising safety concerns, submitting near misses, and stopping the job whenever they are unsure how to safely perform a task. Another key objective of the event is for all attendees to understand their role with respect to safety and how their actions and decisions contribute to the safety of their colleagues, contractors and communities served by SDG&E.

SDG&E also hosts an annual Safety Congress and Safety Leadership Award Ceremony to promote a culture of safety engagement and recognition. SDG&E currently has approximately 60 Safety Committees (34 office-based, 27 field-based committees) that represent their respective work location or department. Safety Committees meet regularly to discuss safety topics and identify actionable items to promote safety across their teams. Since 2002, SDG&E has held an annual Safety Congress, which provides a platform for the Safety Committee members and other safety leaders to collaborate and share insights through networking and workshops. Each year at the Safety Congress, SDG&E recognizes outstanding safety leaders, honoring individuals and teams who exemplify the Company's safety vision. Such employee recognition helps SDG&E employees feel valued and appreciated for their contributions to safety, builds trust, and boosts morale.

SDG&E has processes, programs, and committees in place that encourage two-way communication with internal stakeholders. To foster a culture of continuous safety improvement, SDG&E promotes a psychologically safe work environment where employees at all levels can raise safety concerns and offer suggestions for improvement. SDG&E has a formalized Stop Work Authority Process outlining that all employees – regardless of title or tenure - are empowered to stop work whenever unsafe conditions are perceived. All employees are encouraged to report near misses for follow-up, assessment and hazard awareness.

Communication with external stakeholders (*e.g.*, the public, first responders, public officials) is coordinated through SDG&E's Public Awareness Plan[11] and public liaison program.[12] For significant projects and programs, a dedicated outreach and communication plan is established to gather input, including safety-related feedback, from the community and other stakeholders.

SDG&E's Contractor Safety Management program incorporates feedback from contractors on safety risks at SDG&E. Contractors receive training on the reporting policy and procedures. Contractor feedback is highly valued and essential for continuous improvement. SDG&E promotes two-way communication with its contractors to exchange safety information such as near misses, incident reporting, incident debriefs, safety best practices, and monthly newsletters. Moreover, SDG&E leadership conducts safety connection touchpoints with contractor leadership to identify proactive and preventive solutions, lessons learned, and opportunities for safety enhancement.

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11 SDG&E's Public Awareness Plan includes SDG&E's natural gas safety marketing campaign that provides outreach to various stakeholders regarding general safety and specific infrastructure projects that impact a particular area or group.

12 Additional detail on SDG&E's public liaison program is available at: www.sdge.com/safety/sdge-first-responder-liaison-activities.

C. Future Safety Culture Learning and Improvement Efforts

1. Office of Energy Infrastructure Safety AB 1504 Assessment

Since 2021, SDG&E has undergone an annual safety culture assessment, as directed by the OEIS. The OEIS assesses electrical corporations' Wildfire Mitigation Plans, safety culture, safety certifications, and executive compensation structures. Pursuant to Public Utilities (Pub. Util.) Code Section 8389(d)(4), OEIS issued its 2023 Safety Culture Assessment Report for SDG&E on March 22, 2024. The 2023 report details the assessment carried out by the National Safety Council (NSC), which assessed the safety culture of SDG&E through management self-assessment as well as workplace surveys and interviews. In both the 2022 and 2023 reports, the NSC generally concludes that SDG&E "has exhibited continued commitment to advancing its safety culture maturity."[13] SDG&E uses its annual OEIS assessment to gain cultural insights and identify opportunities for continuous improvement. Issuance of SDG&E's 2024 Safety Culture Assessment Report is currently pending.

2. Safety Culture Assessment Framework Rulemaking

In October 2021, the CPUC issued Order Instituting Rulemaking (OIR) R.21-10-001 to develop and adopt a safety culture assessment framework and identify the structure, elements, and process necessary to drive regulated investor-owned electric and natural gas utilities and gas storage operators to establish and continuously improve their organization-wide safety culture. In January 2025, the CPUC approved the *Decision Adopting a Safety Culture Framework for the Large Investor-Owned Utilities*.[14] This Decision adopts a normative framework adapted from the United States Nuclear Regulatory Commission's Safety Culture Common Language and the Institute of Nuclear Power Operations' Ten Traits of a Healthy Nuclear Safety Culture to serve as the basis of the CPUC's Safety Culture Assessment framework.[15] Per the schedule adopted in the Decision, SDG&E will undergo a comprehensive safety culture assessment in 2026 and SoCalGas will undergo a comprehensive safety culture assessment in 2029. These assessments will be used to drive deeper cultural understanding and identify opportunities for continuous improvement.

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13 *See*, OEIS, *2023 Safety Culture Assessment San Diego Gas & Electric Company Prepared by the National Safety Council Published March 2024* (March 22, 2024), Executive Summary at 3, *available at:* https://efiling.energysafety.ca.gov/eFiling/Getfile.aspx?fileid=56373&shareable=true .

14 D.25-01-031.

15 *Id.* at 22-23, and Findings of Fact 12 at 54.

II. SAFETY ORGANIZATION STRUCTURE

A. SoCalGas

SoCalGas is committed to safety as foundational to every aspect of its enterprise and central to its vision, mission, and values. Safety is a shared responsibility across the company, with several notable systems in place to align safety strategy, objectives, and goals.

First, to align actions, SoCalGas is advancing a comprehensive SMS framework that integrates safety systems and processes. This system supports continuous learning and improvement, enhancing the safe and reliable delivery of service to customers. A core part of SoCalGas's SMS and safety culture improvement efforts includes a governance structure for managing key components of SMS, with cross-functional teams for each functional area of SoCalGas's SMS. These teams will consist of leaders from departments leading and supporting the SMS. In this way, safety efforts will have cross-functional and company-wide alignment, governance, and accountability.

Second, SoCalGas embeds safety practices into its operating groups. This is done in the form of safety processes and procedures, initiatives, and policies that are driven by various employees across the Company. SoCalGas utilizes a variety of engagement initiatives to bring employees and contractors together in forums to discuss safety concerns from the perspective of those closest to the risks. These include the Executive Safety Council engagement, Employee Safety & Health Congresses, Safety Standdowns, local safety committees, safety culture surveys, the Safety (Management/Union) Leadership Team, the Contractor Safety Congress, and Stop the Job/Near Miss reporting tools. The reporting and sharing of questions, events, suggestions, and observations provides learning opportunities that help prevent incidents and foster organizational awareness and learning. SoCalGas recognizes that learning is key to improvement and incident prevention, and endeavors to identify systemic improvements with attention to culture, management systems, process conditions, and human factors. Feedback, suggestions, and recommendations with respect to safety are sought through multiple platforms and processes to gather and analyze employee safety feedback. These include:

- The Injury & Illness Prevention Program (IIPP) encourages employees to identify risks and elevate them to management.

- Employees are encouraged to report near misses,[16] stop the jobs,[17] and good catches.[18] These employee reports, as well as safety incidents incurred during the week, are posted on SoCalGas's intranet site and distributed by e-mail to be shared with employees at regularly scheduled meetings.
- Employee dialogues and executive base visits offer opportunities for in-person dialogue between frontline employees and SoCalGas executives.
- Engagement surveys and other localized and company-wide survey efforts to gather employee feedback and perceptions.
- Town Halls to share and engage on safety topics and seek input, feedback, and suggestions from employees.
- Meetings and dialogue sessions where employees and local safety committees meet with Executive Safety Council (ESC)[19] members provide important opportunities for senior leadership to hear directly from frontline employees on safety issues.
- Meeting and dialogue sessions where employees meet directly with Advisory Safety Council (ASC)[20] to ask questions and raise concerns in a confidential manner.
- Learning Teams as well as Event Learnings include frontline employees to foster broader understanding, improve work processes, and gain insights directly from those performing work to enhance safety and continuously improve.
- Annual Employee and Contractor Safety Congresses and District Safety Standdowns across the service territory.
- Meetings between the Chief Safety Officer (CSO), Union Leadership, and other safety leaders.
- SoCalGas engages with contractor stakeholders to identify continuous improvement opportunities through safety-related engagements and dialogues.

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16 A Near Miss report is when an individual identifies an incident(s) where no injury, illness or damage occurred but there was the potential for injury, illness, or damage.

17 A Stop the Job report is when someone encounters an unsafe condition or action or is uncertain on how to perform a job and stops work before endangering themselves or others.

18 A Good Catch is the report of an observation, event, or situation that has the potential to cause injury, illness, or damage, but did not occur thanks to timely intervention by an engaged employee or the presence of an effective control.

19 SoCalGas's ESC provides safety oversight and executive interactions with employees over safety matters. The ESC meets at various operating locations to engage with represented employees, supervisors, and managers associated with an operating district or a region. Employee dialogue sessions are held to provide a forum for employees to share feedback and executives to listen and learn. Issues brought up are discussed and resolved during the dialogue session or carried forward as action items for later resolution, with follow up to the employees who made the suggestion.

20 In 2020, SoCalGas established an independent Advisory Safety Council to engage the perspectives of external experts as part of SoCalGas's safety journey.

In addition to this cross-functional approach to advancing safety across the organization in an integrated and aligned way, several SoCalGas departments also advance foundational safety efforts in a more centralized fashion, including the Safety Organization, Asset Management Team, and Enterprise Risk Management Team.

1. Safety Organization

SoCalGas's safety organization is led by a dedicated Chief Safety Officer who, along with a team of directors, managers, supervisors, and subject matter experts, with centralized accountability and responsibility to advance and influence the following:

- Providing strategic guidance and establishing appropriate policies, standards, procedures, and key performance indicators, as well as technology and data analytics tools, platforms, and reporting capabilities;
- Leading incident investigations and sharing lessons learned with stakeholders to demonstrate risk reduction and improvement; and
- Collaborating with employees to provide safety and compliance support, emergency preparedness, and response support capabilities.

The Safety Organization advances safety programs (including implementation of SoCalGas's various safety policies, trainings, and programs, including: the Environmental & Safety Compliance Management Program, Industrial Hygiene programs, Incident Investigations, Contractor Safety programs, as well as Near Miss, "Stop the Job," and Jobsite Safety programs).

2. Emergency Management

Emergency Management at SoCalGas is integrated into the broader SoCalGas safety organization. The Emergency Management function coordinates safe, effective and risk-based emergency preparedness and response to safely and efficiently prepare for, respond to, and recover from an emergency or disaster. As part of the Emergency Management department, personnel focus on the following activities: 1) business resumption, 2) emergency preparedness and response operations, 3) information and technical services, and 4) operational field emergency readiness. Emergency Management also sustains quality assurance and improvement processes through strategic planning, training, simulation exercises, and a comprehensive After-Action Review and Improvement program.

3. Enterprise Risk Management

The Enterprise Risk Management department works in close collaboration with senior leadership, management, and employees to proactively identify potential threats and opportunities, assess and prioritize risks, document mitigation efforts, and monitor risk mitigation effectiveness. This collaborative approach enables the results of the risk management process to inform decision-making and resource planning across the organization.

SoCalGas's Enterprise Risk Management (ERM) Framework, modeled after the International Organization for Standardization (ISO) Standard 31000, is designed to create and protect long-term value for customers, employees, shareholders, and the communities served. The ERM Framework incorporates a formalized governance structure to integrate and align risk management practices across the enterprise and foster appropriate communication and collaboration throughout the Company. Both leadership and subject matter expert input is incorporated into the ERM Framework to drive risk-informed business decisions and resource allocations, and monitor identified and emerging risks and mitigation plans to foster continuous improvement and achieve Company objectives.

Effective risk management practices reinforce a strong and positive safety culture and are integral to SoCalGas's approach to adopting risk management structures and processes at all levels. This commitment continually advances the development of a risk-aware culture, as the ERM practices and processes are actively utilized by various operational and functional departments to identify safety risks, thereby serving as a critical component of SoCalGas's SMS. Further details regarding the Enterprise Risk Management process are provided in Volume 1, Chapter 2, Enterprise Risk Management Framework (Joint SoCalGas/SDG&E).

4. Enterprise Asset Management

SoCalGas has implemented an Enterprise Asset Management (EAM) program that consolidates, cleanses, and geospatially aligns asset data to build capabilities around asset analytics and decision making through advanced technologies, business process changes, and improved definition around roles and responsibilities. This program increases the knowledge and accountability of asset owners through a more robust and comprehensive operating model that aligns with SoCalGas's strategic objectives. EAM is intended to improve safety, integrity, transparency, and availability of asset records by integrating asset data for advanced analytics and leveraging reliable asset data for data-driven asset investment management.

B. SDG&E

Safety is a shared responsibility for everyone at SDG&E, however, SDG&E's Chief Safety Officer bears ultimate accountability for the safety of the workforce and communities it serves. SDG&E conveys a comprehensive, proactive and preventative approach to safety where all employees have a role to play and are empowered and encouraged to speak up and stop work whenever unsafe conditions are perceived. SDG&E has dedicated teams embedded in the organization whose roles revolve around management of safety and other risks. Such centralized organizational structures include:

- Safety;
- Asset Management;
- Enterprise Risk Management; and
- Emergency Management.

Dedicated safety roles also exist at the operational level, partnering with the above-listed teams to advance safety within their respective organization. Such decentralized safety roles include SDG&E's:

- Gas Safety Center;
- Electric Safety Center;
- Kearny Maintenance and Operations;
- Customer Field Operations; and
- Behavior Based Safety Observers.

1. Safety Department

SDG&E's safety department is organized under SDG&E's Chief Safety Officer.[21] SDG&E has a centralized, dedicated safety department comprising a director and managers who oversee the implementation of the Company's various safety policies, trainings, and programs, including the Environmental & Safety Compliance Management Program (ESCMP), the Behavior Based Safety Programs, Stop the Job, Close Call/Near-Miss program, Incident Investigations, Safety Culture Assessments, and Contractor Safety Programs. These programs are described within the Employee Safety Risk Chapter (SDG&E-Risk-06) and Contractor Safety Risk Chapter (SDG&E-Risk-04) of this RAMP Report.

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[21] Kevin Geraghty, Chief Operating Officer and Chief Safety Officer.

SDG&E's Executive Safety Council, led by SDG&E's Chief Safety Officer and the Director of Safety and comprising cross-functional Company officers, advances the Company's safety culture, addresses enterprise-wide safety strategy, and is the centralized governing body for all safety committees. Executive Safety Council meetings integrate employee and supervisor dialogue sessions so that employees have an opportunity to share safety experiences directly with Company leadership. Resulting follow-up action items are documented and tracked through resolution. Quarterly Executive Safety Council meetings are held at various Company locations (*e.g.*, district Construction and Operation facilities) to allow top Company leadership to engage directly with a cross-functional representation of SDG&E's frontline workers and operational support staff.

Additionally, SDG&E has numerous field and office site safety committees. These site-specific committees actively engage in safety awareness by educating, promoting a healthy lifestyle, encouraging work-life balance, and always maintaining a safe work environment. Quarterly meetings are held with committee chairpersons and co-chairpersons, where safety updates are shared, training is provided, and action planning steps are identified.

The Director of Safety also serves as the Chairperson for SDG&E's SMS governance team. The SMS governance team represents centralized authority, accountability, and responsibility to support the execution of an SMS throughout the organization, including designing, developing, implementing, and continuously improving the SMS. The SMS governance team is a cross-functional team composed of business leaders representing SDG&E's employee and contractor safety, customer and public safety, risk management, gas operations, electric operations, emergency management, and asset management organizations. The primary role of the SMS governance team is to represent their respective organizations and work together to create and maintain a comprehensive SMS that informs consistent, effective, and appropriately adapted practices across the enterprise.

2. Asset Management

In 2017, SDG&E began asset management initiatives focused on developing a strategic asset management capability for the Company that aligns with the international standard of ISO 55000. The initiatives focus on implementing the tenets of ISO 55000 across the organization to more optimally balance asset cost, asset risk (including safety), and asset performance. In collaboration with SDG&E's operating units, the teams develop, implement, and enable strategies and solutions in the areas of regulatory compliance, business technology, data management, and integrated asset management in support of the safe, clean, and reliable delivery of energy to customers.

3. Enterprise Risk Management

SDG&E's Enterprise Risk Management organization comprises a Vice President and Chief Risk Officer, Director of Risk and Compliance, two managers, and support staff. Their collective roles are dedicated to implementing the risk management process and the integration of risk-based decision-making across the Company. This includes the development of transparent, repeatable, and consistent processes that are quantitative and data-driven, facilitating an annual identification and evaluation of risk, and supporting operational areas across the Company in the assessment of their risks and development of associated risk controls and mitigations. SDG&E's Enterprise Risk Management organization oversees the development of the annual Enterprise Risk Registry process. Further details regarding the ERM process are provided in Volume 1, Chapter RAMP-2, Enterprise Risk Management Framework.

4. Emergency Management

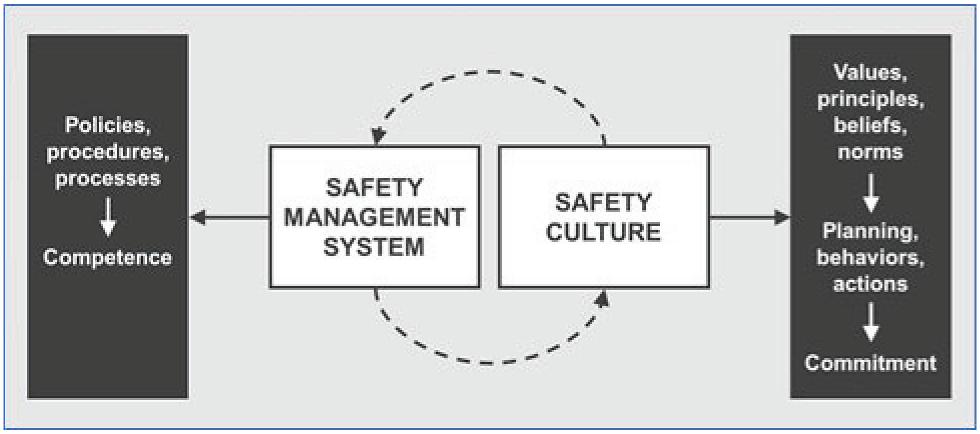
SDG&E's Emergency Management department coordinates safe, effective, and risk-based emergency preparedness to safely and efficiently prepare for, respond to, and recover from all threats and hazards. The Emergency Management Department sustains quality assurance and improvement processes through strategic planning, training, simulation exercises, and a comprehensive After-Action Review and Improvement program. SDG&E's Emergency Management department is comprised of: (1) aviation services, (2) business resumption, (3) emergency preparedness, training and response operations, (4) information and technical services, and (5) operational field emergency readiness.

SDG&E responds to gas and electric emergencies and/or short-term crises as an important part of its normal business practices and has implemented and adapted a Utility Incident Command System (UICS) into those practices based on the National Incident Management System.

Each of the above-described departments are aligned and integrated within SDG&E's Safety Management System, as further detailed below.

III. SAFETY MANAGEMENT SYSTEM

A Safety Management System (SMS) and organizational safety culture are interconnected, and their integration is key to fostering a safe and effective work environment, as depicted in the graphic below.



SoCalGas's and SDG&E's respective safety management systems connect and consolidate each Company's respective processes, to provide a risk-based approach to operations through established accountabilities, responsibilities, and continuous improvement. The intent of an SMS is to comprehensively define elements that identify and add rigor, accountabilities, and assurance to the ways risks are managed and to help prevent or mitigate the likelihood and consequences of an incident or injury. SoCalGas's and SDG&E's respective safety management systems provide the structure, processes, and tools, while their safety cultures provide the values, attitudes, and behaviors that breathe life into those tools. When integrated well, they form a synergistic relationship that drives safety excellence across the organization, providing formality and structure for integrating safety culture and management into organizational activity in a sustainable way. For example:

1. **Leadership Commitment:** SoCalGas's and SDG&E's respective safety management systems promote a structured approach to safety, and success relies on leadership commitment to safety and culture. Leaders should embody safety values and prioritize safety over competing goals, such as productivity or costs.
2. **Policies and Procedures:** SoCalGas's and SDG&E's respective safety management systems establish well-defined policies and procedures, which are designed to align with each organization's safety culture and approach to safety. These guidelines help formalize and demonstrate commitment to safety.

3. **Training and Awareness:** SoCalGas's and SDG&E's respective safety management systems include ongoing safety training programs that instill safety awareness and reinforce the values of their safety cultures among employees. This helps create shared attitudes and practices around risk reduction.
4. **Employee Participation:** Safety culture thrives when employees are engaged. SoCalGas's and SDG&E's respective safety management systems integrate tools for reporting incidents and hazards, encouraging open communication without fear of blame. This mutual trust strengthens safety culture.
5. **Continuous Improvement:** SoCalGas and SDG&E's respective safety management systems emphasize evaluations, audits, and feedback loops to refine safety practices. This aligns with their mutual commitment to always strive for improvement in safety outcomes.
6. **Shared Responsibility:** Through the SMS framework, safety is framed as a shared responsibility across all levels of the organization. This shared accountability reinforces a culture where everyone feels invested in and accountable for maintaining a safe environment.

SoCalGas and SDG&E have each established comprehensive safety management systems, consistent with American Petroleum Institute (API) Recommended Practice 1173.[22] Their common objective is to enhance the safety and integrity of operations, establish compliance with regulatory requirements, and promote a culture of continuous improvement and safety excellence. A successfully implemented SMS will highlight safety risks and provide a framework for addressing them, with the goal of improving safety performance. An SMS comprehensively defines elements that identify and add rigor, establish accountability, and provide assurance to the ways risks are managed, thereby helping to prevent or mitigate the likelihood and consequences of an unintended incident or event. Measuring and reporting safety performance and demonstrating continuous improvement, increases employee and stakeholder confidence in safe operations. This policy and centralized SMS standard with subsequent element standards sets the framework for the way the Companies manage safety.

22 SoCalGas' and SDG&E's respective Safety Management Systems each apply the ten elements and principles of API 1173. Absent an electric-industry equivalent, SDG&E adapted the ten elements of API 1173 to apply to both its electric and gas operations.

IV. COMPENSATION POLICIES RELATED TO SAFETY

Safety culture at SoCalGas and SDG&E is supported and demonstrated by using compensation metrics and key performance indicators to drive improved safety performance. As the Commission stated in D.16-06-054, "[o]ne of the leading indicators of a safety culture is whether the governance of a company utilizes any compensation, benefits or incentive to promote safety and hold employees accountable for the company's safety record."[23] Benefits programs that promote employee health and welfare also contribute to SoCalGas's and SDG&E's safety performance and cultures.

The compensation and benefits programs at SoCalGas and SDG&E are designed to focus employees on safety and continue to emphasize employee and operational safety measures in their variable pay plans, commonly referred to as the Incentive Compensation Plans (ICP).[24] ICP is a longstanding component of SoCalGas and SDG&E's total compensation strategies for their entire non-represented workforce. The ICP targets for goals within the Employee & Public Safety Operations category are the same for every non-represented employee, regardless of their role in the company. ICPs place a portion of employee compensation at risk, subject to achievement of identified performance measures, motivating employees to meet or exceed important company goals, including those related to safety.

Safety is a core value for SoCalGas and SDG&E, and this is reflected in the weighting of the safety measures in the Companies' ICP metrics. Safety measures represent the largest category of performance measures in the Companies' ICPs. The Companies have a longstanding practice of prioritizing safety measures in the design of their ICPs to drive improved safety performance, with safety measure weightings making up 80% of the non-executive ICP's company performance component for SoCalGas and 68% for SDG&E since 2020.[25] These safety-related measures broadly include factors related to contractor, public, employee, as well as

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23 D.16-06-054 at 153.

24 2024 GRC, Revised Direct Testimony of SoCalGas/SDG&E witness Deborah Robinson, (Ex. SCG-25-R/SDG&E-29-R) at 11. SoCalGas's and SDG&E's compensation packages include base pay, short-term incentive compensation (ICP), long-term incentive compensation (for key management employees only), and special recognition awards. *Id.* at 8. Executive officer compensation is excluded from rates under Public Utilities (Pub. Util.) Code 706. *See, e.g., id.* at 1, n.3.

25 2024 GRC, Ex. SCG-25-R/SDG&E-29-R (Robinson) at 5, 11-12, reflecting safety measure weightings in 2022. In 2019, the weighting was 68% at SDG&E and 70% at SoCalGas; and in 2018, it was 68% at SDG&E and 60% at SoCalGas.

electric and gas system safety, as applicable. Safety-related measures comprise a majority of their respective 2024 Executive ICPs.[26]

This strong emphasis on employee and operational safety measures in SoCalGas's and SDG&E's ICPs, in turn, bolsters their safety culture and safety performance. Providing continued alignment between the Companies' safety programs and their ICPs helps to strengthen the Companies' safety cultures and signal to employees that safety is a core value.

V. BOARD ENGAGEMENT AND OVERSIGHT OVER SAFETY PERFORMANCE

A. SoCalGas

1. Board Safety Committee

SoCalGas's Board Safety Committee advises and assists the Company's Board of Directors in the oversight of employee, contractor, public, and infrastructure safety matters. These quarterly meetings include the following oversight functions:

- Review and monitor safety culture, goals, and risks;
- Monitor safety performance metrics;
- Monitor and review significant utility safety incidents;
- Provide strategic guidance and recommendations to management on safety issues; and
- Continuous review of governance practices.

The Board Safety Committee has evolved its oversight, and promotes greater discipline, structure, and a broader view of safety. This includes an enhanced governance structure and enhanced engagement with stakeholders and experts. These continuous improvements include:

- Improve the Committee's charter and oversight function;
- Focus on leading safety indicators;

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[26] As noted in Section I.C, *supra,* OEIS assesses and approves SDG&E's executive compensation structures annually, pursuant to Pub. Util. Code Section 8389(e)(4) and (e)(6), and OEIS guidelines. Submissions and approvals are available at: https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/executive-compensation/. SoCalGas and SDG&E each also submit to the CPUC an annual Safety Performance Metrics Report (SPMR), which "[i]dentif[ies] all metrics linked to or used in any way to determine executive compensation levels and/or incentives" and "[d]escribe[s] the bias controls that the utility has in place to ensure that reporting of the metric(s) has not been gamed or skewed to support a financial incentive goal." D.19-04-020 at 63, Ordering Paragraph 6A and 6C. SPMR reports are available at:https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/wildfire-and-safety-performance/safety-performance-metrics-reports.

- Review and align safety-related goals for incentive compensation; and
- Expand opportunities to allow committee members to interact directly with non-executive employees and outside experts.

2. Advisory Safety Committee

SoCalGas established an independent Advisory Safety Council in 2020 to engage external experts and improve safety culture, complementing the SoCalGas Board Safety Committee which advises the Company's Board. SoCalGas created the Advisory Safety Council to invite new ideas and perspectives and has intentionally engaged individuals with varied experience and expertise, with a focus on public safety, potential significant events, and safety culture. SoCalGas leverages the Advisory Safety Council to learn from other industries, companies, and academia, and to create new tools and processes to engage employees in learning and improvement. Advisors engage directly with SoCalGas employees to listen, learn, and provide SoCalGas leadership insights and input.

B. SDG&E

1. Board of Directors Safety Committee

SDG&E's Board of Directors Safety Committee (Board Safety Committee) performs the following governance and oversight with respect to safety culture.

- Reviews safety culture, goals, and risks;
- Reviews incidents, measures and management strategies to prevent, mitigate or respond to safety-related incidents involving employees, contractors, customers or community members;
- Monitors current and emerging safety matters and issues raised by safety audits;
- Provides strategic guidance and recommendations to management on safety issues; and
- Continuous review of governance practices through annual review of Committee Charter.

The Board Safety Committee meets quarterly with SDG&E management and operational leaders on various safety topics. Meetings begin with a safety briefing and include a regular review of year-to-date safety performance as well as current safety and risk-related topics. The Board Safety Committee monitors safety performance using a robust set of metrics across key safety areas. The Board Safety Committee also advises and reviews Company Incentive Compensation metrics related to safety.

The Board Safety Committee chairperson engages with external partners through the SDG&E Wildfire Safety Community Advisory Council, described below. The Board Safety Committee Chair reports to the full Board of Directors on safety matters addressed by the Committee and presents to the Commission and Office of Energy Infrastructure Safety as part of SDG&E's annual public safety briefing.[27]

2. Community Wildfire Safety Advisory Council

In 2019, SDG&E established a Community Wildfire Safety Advisory Council (CWSAC) comprised of independent community members who possess extensive public safety and wildfire experience. The CWSAC meets on a quarterly basis and provides input and guidance to the SDG&E Board Safety Committee and the Company on safety matters. The CWSAC's primary function is to provide SDG&E with recommendations and insights on wildfire safety strategies, including vegetation management, infrastructure hardening, and public outreach. The CWSAC plays a crucial role in ensuring that SDG&E's wildfire safety measures are effective and aligned with the needs and concerns of the communities they serve.

VI. CONCLUSION

SoCalGas and SDG&E are committed to fostering, continuously improving upon, and maintaining robust cultures of safety. SoCalGas's and SDG&E's respective SMS programs provide the framework, processes, and tools necessary to support a safety culture that embodies the values, attitudes, and behaviors essential for these tools' effectiveness. SoCalGas and SDG&E will continue to mature as learning organizations, strive to consistently evaluate, review, and enhance their respective organizational cultures to safeguard employees, contractors, and the communities the Companies are privileged to serve.

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[27] On August 29, 2024, the Commission hosted a Public Meeting on Utility Safety Practices, during which representatives from SDG&E, SoCalGas, and Southern California Edison presented on safety matters and answered questions from Commissioners and the Director of Energy Safety.

2025 Risk Assessment Mitigation Phase

(Chapter RAMP-5)
Climate Change Adaptation

May 15, 2025

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CHAPTER V: CLIMATE CHANGE ADAPTATION

I. INTRODUCTION

As climate change and extreme weather events continue to increase, including its impacts on utility assets, operations, and services, risk frameworks will need to account for changing climate conditions in utility risk planning. The changing climate requires an energy ecosystem that is resilient to extreme weather, wildfires, and drought, while delivering safe, reliable, and affordable energy. Increased awareness of the importance of climate events amongst utilities has been growing, as these climate-driven events can have severe impacts on energy resource infrastructure. Some of the climate hazards that will have short- and long-term ramifications in the Southern California region include increased frequency in extreme temperatures, extreme weather conditions, and sea level rise. SoCalGas recognizes the need to adapt to these climate hazards to promote safety and reliability of services to its customers and mitigate the increasing risk through innovative and community-centric approaches.

Climate vulnerability refers to the susceptibility of SoCalGas's infrastructure, operations, and customer base to the change in climate hazards. This includes factors such as the exposure of utility infrastructure to these hazards and the utility's capacity to adapt to changing conditions. SoCalGas's Climate Adaptation Vulnerability Assessment (CAVA), which is being concurrently filed in Rulemaking (R.) 18-04-019, explores these factors. In contrast, climate risk refers to the consequences to human or ecological systems, that result from the vulnerability of infrastructure, operations, and customer base from climate change.[1] It is arrived at by combining the likelihood of climate events with their possible impacts to the utility and community served. Essentially, while vulnerability focuses on the inherent characteristics that render the utility and its customers susceptible to harm, risk considers both the likelihood of climate events and the potential consequences of such events. Understanding both concepts is crucial for developing and prioritizing effective strategies to promote reliable and resilient service in the face of climate change.

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[1] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2023 Synthesis Report* (March 19, 2023) at 128, *available at*: https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf ("In the context of climate change impacts, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards.").

The California Public Utilities Commission (CPUC or Commission) has two open proceedings that consider how utilities should incorporate potential climate change impacts in their risk assessment processes: the Risk-Based Decision-Making Framework (RDF) proceeding (R.20-07-013) and the Order Instituting Rulemaking (OIR) to Consider Strategies and Guidance for Climate Change Adaptation (Climate Change Adaptation OIR) (R.18-04-019). In the Climate Change Adaptation OIR proceeding, SoCalGas is directed to file the Company's first CAVA on the same day it files its 2025 Risk Assessment and Mitigation Phase (RAMP) Report. Findings from the CAVA have been used to assist in identifying the types of impacts that future climate events may have across SoCalGas's infrastructure, operations, and services. The development of the CAVA has also supported SoCalGas's ongoing foundational work that seeks to improve SoCalGas's internal capabilities to understand and analyze climate data for climate informed decision making. This information will be integrated into future investment decision making.

The purpose of this chapter is to identify how climate change has the potential to affect SoCalGas's system and how the effects can potentially be addressed through adaptive actions. As described in this chapter, climate hazards and potential adaptation actions can have significant impacts on certain RAMP risks. Rather than acting as a RAMP risk itself, climate change hazards can drive, trigger, or exacerbate multiple RAMP risks while climate change adaptation can alleviate some of the likelihood or consequences of a particular negative outcome due to a climate hazard. SoCalGas provides in this chapter an overview of its climate change adaptation culture that examines, anticipates, and mitigates potential climate change effects on its assets and operations, key results from the CAVA, and RAMP controls and mitigations that are intended to increase resilience to climate hazards.

II. CLIMATE CHANGE ADAPTATION CULTURE AT SOCALGAS

SoCalGas's inter-disciplinary and cross-departmental climate advisory group was established in 2020 and meets quarterly to act as a forum in which leaders and decision-makers from across the Company can discuss the expected impacts of climate change hazards on operations and develop unique, innovative solutions to address them. Additionally, the Climate Advisory group uses these meetings to offer climate change expertise to leaders across SoCalGas to better incorporate climate change information to maintain safe and resilient operations. In addition to coordinating internal subject matter experts to determine if there are gaps in existing data for vulnerability assessment and adaptation planning, SoCalGas actively engages in partnerships with academic and research institutions to leverage cutting-edge expertise to further advance climate resilience initiatives.

III. CLIMATE ADAPTATION VULNERABILITY ASSESSMENT

In 2018, the Commission initiated the Climate Change Adaptation OIR,[2] which defined climate change adaptation for energy utilities and promoted efforts "to address climate change adaptation issues in Commission proceedings and activities to ensure safety and reliability of utility operations."[3] Building on this effort, the Commission issued Decision (D.) 20-08-046 in September 2020 to promote the use of "best available climate science" to make informed decisions towards building resilient infrastructure and services to tackle climate change.[4] Further, the Commission acknowledged the profound and unequal burden climate change places on Disadvantaged and Vulnerable Communities (DVCs) across the state, defined DVCs within the decision, and directed robust utility engagement to empower and support these communities in building resilience. The decision provides that California investor-owned utilities (IOUs) are required to conduct a CAVA every four years, at minimum, and their analyses must reflect best available science. Additionally, the decision required IOUs to submit a Community Engagement Plan (CEP).

On August 1, 2024, the Commission issued D.24-08-005 to update climate change adaptation modeling requirements and refine the climate adaptation and vulnerability assessments. It established the Shared Socioeconomic Pathway (SSP) greenhouse gas emissions scenario 3-7.0 as the reference scenario for energy utility use in the CAVA, adopted the Global Warming Level approach as the basis of CAVA planning in lieu of the targeted years approach, and updated the timing of CAVA submittals for the next cycle, requiring the assessment be filed one year prior to each utility's RAMP application.[5] SoCalGas submitted its CEP in 2024, is submitting its first CAVA concurrently with this RAMP filing, and will submit its General Rate

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[2] R.18-04-019.

[3] D.20-08-046 at 2.

[4] *Id.*

[5] The new timing of CAVA submittals established in D.24-08-005 will apply to SoCalGas's next CAVA.

Case (GRC) Application in 2026. SoCalGas's CAVA addresses the requirements of the Climate Change Adaptation OIR and industry best practices for assessing physical climate risks.

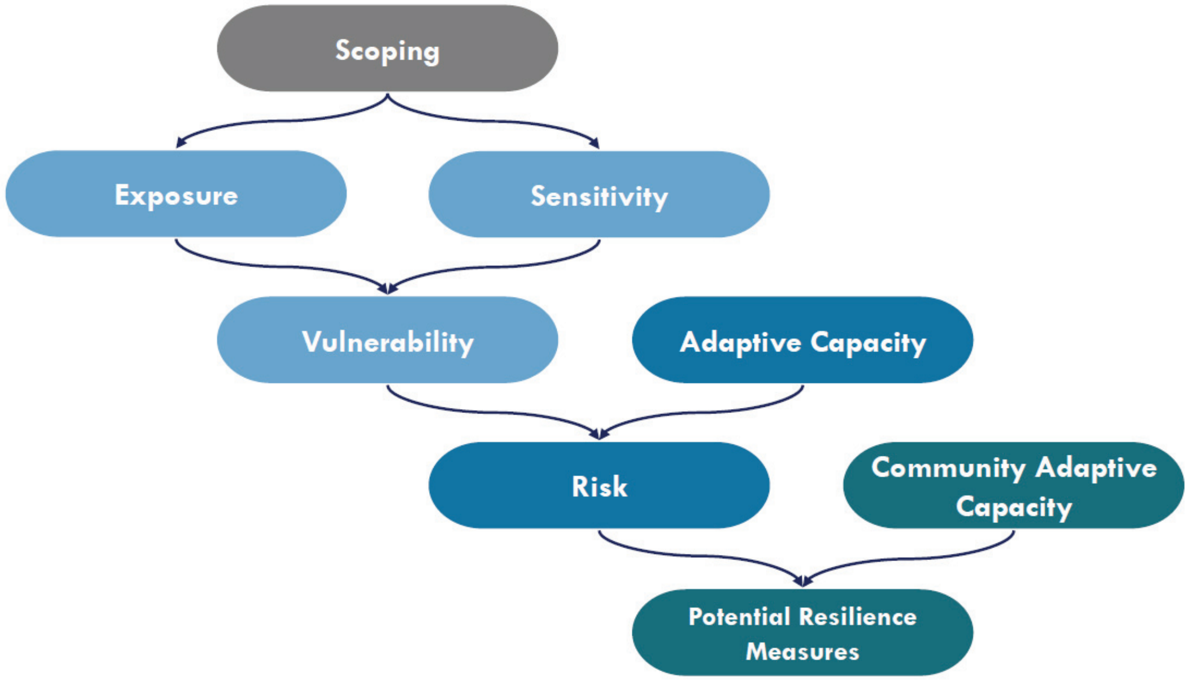
This section provides an overview of SoCalGas's concurrently filed CAVA, highlighting the methodology and key findings as they relate to the risks detailed in Volume 2. The results of CAVA serve primarily to identify assets at moderate- to high-risk due to climate hazards that could impact safe and reliable service and identify adaptation options that may be considered.

A. Methodology

The vulnerability assessment aims to identify asset and operational vulnerabilities across the SoCalGas service territory. Following the guidance of the CPUC, SoCalGas considers the 2030, 2050, and 2070 time periods in its assessment. The climate hazards of extreme heat, sea level rise, flooding/precipitation, landslide and wildfire are considered for each asset class. Subsidence has been determined to be of low consequence within the SoCalGas service territory.

In assessing vulnerabilities, the CAVA uses forward-looking climate science information applied to the gas system, and relies on a combination of climate exposure, infrastructure sensitivity, vulnerability, and adaptative capacity scores. In turn, and based on internal asset information, the assessment derives climate change risk scores that help identify the asset-hazard combinations that are considered priority vulnerabilities across SoCalGas's gas system. This approach is exemplified in the figure below.

Figure 1: CAVA Framework



The key components of the figure are defined as follows:

- Exposure: the degree to which assets or regions may experience climate hazards based on their physical locations.
- Sensitivity: the degree to which an asset's integrity or function could be adversely impacted in the event of hazard exposure.
- Vulnerability: the potential for negative outcomes on assets, operations, and services due to climate hazards.
- Adaptive Capacity: current capabilities to which an asset or operation can be adapted to mitigate climate hazards' negative outcomes based on organizational and operational maturity.
- Risk: the potential for negative outcomes for assets, operations, and services to climate hazards taking into consideration current adaptive capacity.
- Community Adaptive Capacity: current capabilities to which a community relies on to manage environmental hazards.

The Climate Change Adaptation OIR requires SoCalGas and the other California IOUs to conduct community outreach throughout the CAVA process, as well as to file a CEP one year prior to the filing of the CAVA. This stakeholder engagement includes interactions with local governments, community-based organizations, and customers, among others. This engagement is critical for ground-truthing the findings of the CAVA as well as spurring a regional approach to climate change adaptation, which is critical for the success of such endeavors. SoCalGas's outreach efforts include holding workshops, conducting interviews, convening information sessions, and performing surveys to provide opportunities for engagement and collaboration throughout the CAVA process.

B. Key Findings

Assets were categorized into the following five (5) simplified asset classes: (1) high-pressure pipelines, (2) medium-pressure pipelines, (3) facilities, (4) regulator stations, compressors, and valves, and (5) storage fields.[6] The risk classes are a combination of the 2050 asset vulnerability scores and asset adaptative capacity results. These results are intended to convey relative risk rather than absolute risk. Furthermore, the risk categories presented in the table are assigned at the asset class rather than the asset level. An asset class being designated as high risk does not imply that all assets within that asset class are high risk. The purpose is to prioritize what assets need a closer, site-specific analysis in the next CAVA phase.

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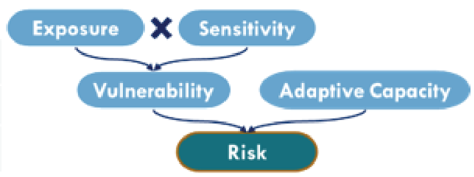
[6] In the analysis, each storage field was treated as a single asset. To be conservative, a storage field's exposure score for a particular hazard was assigned by taking the maximum exposure across the entire storage field area for that hazard, including aboveground and underground assets. This does not imply that all parts of the storage field had that level of exposure or the resulting level of vulnerability. This approach is helpful for screening purposes but likely overestimates the level of vulnerability for some assets (*i.e.*, Underground Storage Assets).

Table 1: Asset Risk Results by Asset Class and Hazard

	Coastal Erosion	Coastal Flood	Inland Flood	Landslide	Wildfire
High-Pressure Pipelines	Lower Risk	Lower Risk	Moderate Risk	Moderate Risk	Lower Risk
Medium-Pressure Pipelines	Lower Risk	Lower Risk	Lower Risk	Moderate Risk	Lower Risk
Facilities	Lower Risk	Lower Risk	Moderate Risk	Moderate Risk	Moderate Risk
Regulators, Compressors, Valves	Lower Risk	Lower Risk	Lower Risk	Moderate Risk	Moderate Risk
Storage Fields	Higher Risk	Moderate Risk	Moderate Risk	Moderate Risk	Moderate Risk

Color	Label
Red	Higher Risk
Yellow	Moderate Risk
Green	Lower Risk



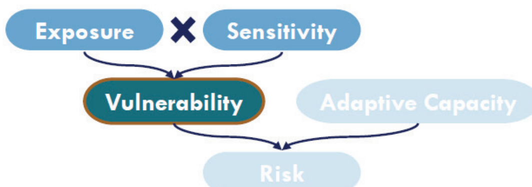
Per Asset Class:

- Storage fields were categorized as higher risk for coastal erosion (the only higher risk classification) and moderate risk for the other four hazards.
- High-pressure pipelines, including high-pressure service pipelines, were categorized as moderate risk for both inland flooding and landslides, and lower risk for the other three hazards.
- Medium-pressure pipelines, including high-pressure service pipelines, were categorized as moderate risk for landslide and lower for the other four hazards.
- Facilities were at moderate risk for inland flooding, landslide, and wildfire; and lower for the other two hazards.
- Regulator stations, compressor stations, and valves (including controllable and non-controllable) were grouped together and considered moderate risk for landslide and wildfire, and lower risk for the other three hazards.

The asset vulnerability score categories are summarized in Table 2. The categories are based on each 95th percentile asset vulnerability score for 2050 for each combination of asset class and hazard.

Table 2: Asset Vulnerability Summary for Year 2050

	Coastal Erosion	Coastal Flood	Inland Flood	Landslide	Wildfire
High-Pressure Pipelines	Very Low	Very Low	Moderate	High	Low
Medium-Pressure Pipelines	Very Low	Very Low	Low	Moderate	Low
Facilities	Very Low	Very Low	Moderate	Moderate	High
Regulators, Compressors, Valves	Very Low	Very Low	Moderate	Moderate	Moderate
Storage Fields	High	High	High	High	High



Color	Label
	High
	Moderate
	Low
	Very Low

Per Asset Class:

- Storage fields were classified as high vulnerability for all five hazard types.
- Facilities were at high vulnerability to wildfire and moderate vulnerability to both landslide and inland flooding.
- Regulator stations, compressor stations, and valves were at moderate vulnerability to inland flooding, landslide, and wildfire.
- High-pressure pipelines were at high vulnerability to landslide and moderate vulnerability to inland flooding.
- Medium-pressure pipelines were at moderate vulnerability to landslide.

Table 3 summarizes asset adaptive capacity, which was assessed qualitatively at the asset class level in a series of Subject Matter Expert (SME) workshops. The following definitions were used:

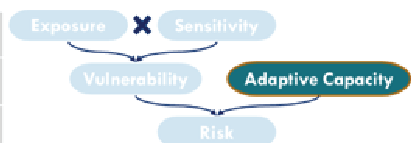
- High: "Sufficient or excellent capabilities to manage the climate hazard now and in the future" (or no exposure or very low sensitivity)
- Medium: "Some or many existing capabilities; however, there are opportunities to strengthen these"

- Low: "No or very few current capabilities"

Table 3: Asset adaptive Capacity Summary

	Coastal Erosion	Coastal Flood	Inland Flood	Landslide	Wildfire
High-Pressure Pipelines					
Medium-Pressure Pipelines					
Facilities					
Regulators, Compressors, Valves					
Storage Fields					

Color	Label
	Low Adaptive Capacity
	Moderate Adaptive Capacity
	High Adaptive Capacity



Most simplified asset classes and hazards were categorized as having moderate adaptive capacity. Exceptions included the following:

- Storage fields were considered low adaptive capacity for coastal erosion.
- Regulator stations, compressor stations, and valves were considered high adaptive capacity for coastal and inland flooding.
- Facilities were not exposed to either coastal erosion or coastal flooding, therefore, they were considered to have high adaptive capacity for those hazards.

While the CAVA is designed to inform medium to long-term planning, the focus in RAMP is on identifying asset classes with high vulnerability in the near-term within the Test Year 2028 GRC cycle. Vulnerability, however, does not equate to risk. Therefore, some of the assets identified as vulnerable in CAVA may not appear in risk chapters due to RAMP asset prioritization criteria set forth in the RDF, yet their identification remains critical for informing adaptation planning. For a detailed methodology of the framework used to determine risks included in RAMP through the CPUC's cost-benefit approach, please refer to Volume 1, Chapter RAMP-3: ERM Risk Quantification Framework. To explore further information on asset types more prone to specific climate hazards and examine how their vulnerability evolves through 2030, 2050, and 2070, please refer to Section 3 of the CAVA, titled "Vulnerability Assessment Methodology."

IV. CLIMATE CHANGE ADAPTATION IN THE RISK-BASED DECISION-MAKING FRAMEWORK

Effective climate adaptation requires the identification and evaluation of actions that can be taken to address vulnerabilities associated with climate change impacts. SoCalGas will continue to explore ways to integrate climate exposure data and vulnerability analysis into its quantitative risk models. Translating climate vulnerability into risk presents several challenges, as the translation of one concept into the other involves nonlinear relationships, interdependencies, and uncertainties. An example of climate hazard interdependencies is the risk of landslides or debris flows (flooding) following a wildfire. The decimation of ground cover leads to the potential for erosion and land movement (landslides/debris flows) during subsequent rain events.

Climate hazards do not necessarily impact every risk directly, and additional analyses are required to understand the specific pathways and interactions involved. Addressing these challenges will require ongoing research and collaboration across the industry to establish best practices for integrating climate data into risk considerations. SoCalGas is actively working to refine methodologies and conduct the critical analyses needed to create a robust approach to climate risk that captures the intricate dynamics linking hazards, system responses, and potential outcomes.

The table below summarizes the controls and mitigations listed in individual RAMP risk chapters that pertain to climate change adaptation options listed in CAVA or which increase climate resiliency. This list includes options to harden assets to climate hazards and modify SoCalGas's operational practices.

Table 4: Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

Risk Chapter	Relevant ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
High-Pressure Gas System	C010	Pipeline Monitoring Technologies	Inland Flooding and Landslides
	C013	Maximum Allowable Operating Pressure (MAOP) Reconfirmation	Inland Flooding and Landslides
	C014	Storage Field Maintenance Aboveground Facilities	Inland and Coastal Flooding, Coastal Erosion, Landslides, and Wildfires
	C016	Storage Field Maintenance Aboveground Piping	Inland and Coastal Flooding, Coastal Erosion, Landslides, and Wildfires
	C019	Storage Upgrade to Purification Equipment	Inland Flooding and Landslides
	C104	Cathodic Protection - Capital	Inland Flooding and Landslides
	C105	SCADA Operations	Inland Flooding and Landslides
	C109	Control Room Monitoring, Operation and Fatigue Management	Inland Flooding and Landslides
	C113	Leak Repair	Inland Flooding and Landslides
	C119	Engineering, Oversight and Compliance Review	Inland Flooding and Landslides
	C125	Pipeline Relocation/Replacement	Inland Flooding and Landslides
	C126	Shallow Exposure/Exposed Pipe Remediations	Inland Flooding and Landslides
	C134	Pipeline Monitoring	Inland Flooding and Landslides
	C135	Electronic Pressure Monitoring (EPM) Installations & Replacements	Inland Flooding, Landslides, and Extreme Temperatures
	C138	Right of Way	Inland Flooding, Landslides, and Wildfires
	C157	PSEP Phase 1A	Inland Flooding and Landslides
	C171	TIMP	Inland Flooding and Landslides

	C174	Service Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
	C177	Main Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
	C178	Distribution Leak Survey	Inland Flooding and Landslides
	C179	Distribution Main & Service Leak Repair	Inland Flooding and Landslides
	C185	PSEP Phase 1B	Inland Flooding and Landslides
	C186	PSEP Phase 2A	Inland Flooding and Landslides
Medium-Pressure Gas System	C120	DIMP - Distribution Riser Inspection Program (DRIP)	Inland Flooding and Landslides
	C124	Regulator Station Installation Replacement & Enhancement	Inland Flooding, Landslides, and Wildfires
	C134	Pipeline Monitoring	Inland Flooding and Landslides
	C135	EPM Installations & Replacements	Inland Flooding, Landslides, and Extreme Temperatures
	C174	Service Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
	C175	Residential Meter Protection	Inland Flooding and Landslides
	C177	Main Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
	C178	Distribution Leak Survey	Inland Flooding and Landslides
	C179	Distribution Main & Service Leak Repair	Inland Flooding and Landslides
	C182	DIMP - Distribution Risk Evaluation & Monitoring System (DREAMS)	Inland Flooding and Landslides
Underground Gas Storage	C401	Storage Integrity Management Program (SIMP)	Inland Flooding, Landslides, and Wildfires
	C402	Well Abandonment, Replacement Demo Verification, and Monitoring Practices	Inland and Coastal Flooding, Coastal Erosion, and Landslides
	C408	Storage Field Maintenance - Underground Components	Inland Flooding, Landslides, and Wildfires
Contractor Safety	C349	Contractor Safety Program	Extreme Temperatures

Employee Safety	C343	Employee Safety Strategy	Extreme Temperatures
	C345	Safety & Health - Operations	Extreme Temperatures
	C346	Safety & Health - Programs	Extreme Temperatures

SoCalGas will continue efforts to align regulatory proceedings, such as RAMP and the GRC, with efforts to address climate risks and mitigation activities. SoCalGas supports the Commission's decision in D.24-08-005 to move the timing of the CAVA filing to one year prior to the RAMP report.[7] This change will promote further integration of results and climate change adaptation options into mitigation and control programs.

[7] *See* D.24-08-005 at 83 (Ordering Paragraph 1).

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-1)

Excavation Damage

May 15, 2025

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I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for excavation damage. This chapter contains information and analysis that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (Phase 2 Decision)[2] and D.24-05-064 (Phase 3 Decision).[3] Excavation Damage is included in the 2025 RAMP Report based on a safety risk assessment, further informed by its reliability and financial consequence attributes, consistent with RDF guidance. This risk chapter describes the basis for selection of Excavation Damage, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's Excavation Damage is defined as the risk of a dig-in on the natural gas system (high or medium pressure) caused by excavation activities, which results in an uncontrolled release of gas and the potential for serious injuries, fatalities, and/or damage to the infrastructure.

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1 As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

2 D.22-12-027 is the "Phase II Decision Adopting Modifications to the Risk-Based Decision-Making Framework Adopted in Decision 18-12-014 and Directing Environmental and Social Justice Pilots" (December 21, 2022).

3 D.24-05-064 is the "Phase III Decision" (June 6, 2024).

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF reporting requirements, such as those from the CPUC's General Order (GO) 112-F and PHMSA, including but not limited to subparts of Rule 49 Code of Federal Regulations (CFR). A list of compliance requirements applicable to Excavation Damage is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as enhancing operations, alignment with sustainability goals, and improving customer service.

2. Risk Overview

SoCalGas operates and manages a natural gas system of over 101,000 miles of distribution pipe and 3,385 miles of transmission pipe within its 24,000 square mile service territory. Pipe mileage can be further segregated into general operating pressure categories of Medium Pressure (MP) which operates at or less than 60 psig,[4] and High Pressure (HP) which operates above 60 psig. The expansive SoCalGas underground piping network has the potential for dig-in related incidents. This risk highlights the consequence and likelihood of dig-in damage that causes a release of natural gas, damages property, or causes personal injury due to excavation activity.

SoCalGas has been mitigating dig-in risk to its underground gas infrastructure for decades. Dig-ins are a common risk for all utilities and industries with buried infrastructure and is not unique to SoCalGas. Excavation activities can vary widely based on project scope and size. Examples include a homeowner doing landscaping work, a plumber repairing a sewer line, or a city upgrading its aging municipal water or sewer systems. Excavation damage consequences can range from minor scratches or dents potentially leading to external corrosion, to ruptures with an uncontrolled release of natural gas potentially leading to ignition and serious injuries and/or fatalities. A leak or rupture may also occur after the infrastructure has sustained damage that has accumulated over time. Damage that does not result in a release of gas is less often not reported by the responsible party. Unfortunately, SoCalGas cannot always assess the pipe for damage and make the appropriate repairs to preserve the integrity of the pipe.

Federal and state agencies acknowledge the serious consequences of dig-in risk and have responded by adopting several regulations and industry standards and by supporting awareness

[4] Pounds per square inch gauge.

efforts to help prevent dig-ins. For example, the Department of Transportation (DOT) sponsored the "Common Ground Study," completed in 1999. Subsequently, the "Common Ground Study" led to the creation of the Common Ground Alliance (CGA), a member-driven association of 1,700 individuals, organizations, and sponsors in every facet of the underground utility industry. With industry-wide support, CGA created a comprehensive consensus document that details the best practices addressing every stakeholder groups' activities in promoting safe excavation and dig-in prevention. Please see Attachment A for a list of the Compliance Drivers.

Under California state law, an excavator planning excavation work is required to contact the Regional Notification Center for their area, also known as Eight-One-One (811) or Underground Service Alert (USA), at least two full working days prior to commencing construction excavation activities, not including the day of the notification.[5] "811" is the national phone number designated by the Federal Communications Commission (FCC) that connects homeowners or contractors who plan to dig with professionals through a local call center. California has two Regional Notification Centers, DigAlert and USA North 811, that split California at the Los Angeles/Kern County and Santa Barbara/San Luis Obispo County lines; USA North 811 serves all counties north of the county lines and DigAlert serves all counties south of the county lines. DigAlert and USA North 811 will be referenced as 811 USA for the remainder of this chapter.

Once an excavator makes contact, the Regional Notification Center will issue a USA Ticket notifying local utilities and other operators of the location and areas to be inspected for potential conflicts of underground infrastructure with the pending planned excavation work. Operators are then required to provide an electronic positive response to indicate that there are no facilities in conflict or to mark their underground facilities via aboveground identifiers (*e.g.,* paint, chalk, flags, whiskers) to designate where underground utilities are positioned, thus enabling excavators, like contractors and homeowners, to know where substructures are located. The law also requires excavators to use careful, manual (hand digging) methods to expose substructures prior to using mechanical excavation tools.

While these efforts are important and commendable, and the number of dig-ins per 1,000 excavation tickets within the industry has been trending down (Figure 1), excavation damage

5 Cal. Gov. Code § 4216.2(b).

incidents continue. Excavation tickets are a common metric used throughout the industry to gauge the impact of a damage prevention program. Figure 1 represents industry trends for dig-ins on distribution lines. Excavation data for transmission incidents are less frequent and harder to trend. Thus, the DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) collects ticket totals in annual reports for distribution facilities but did not collect ticket information for transmission facilities before 2024.

Figure 1

Excavation Damage: Excavation Tickets & Incidents

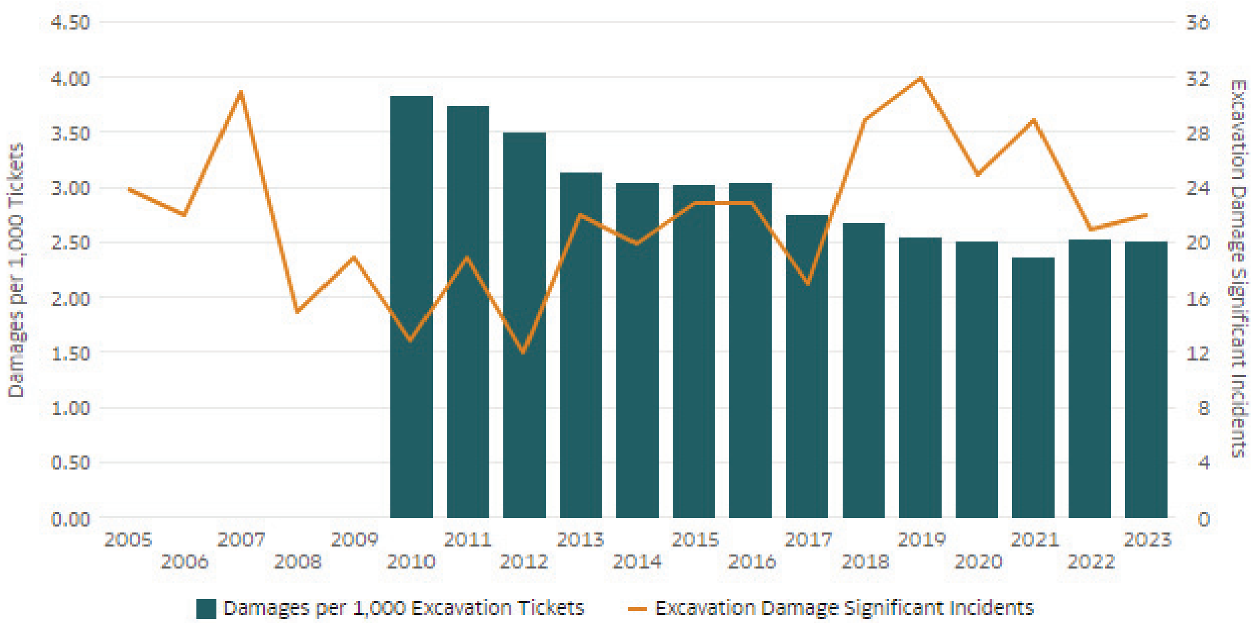
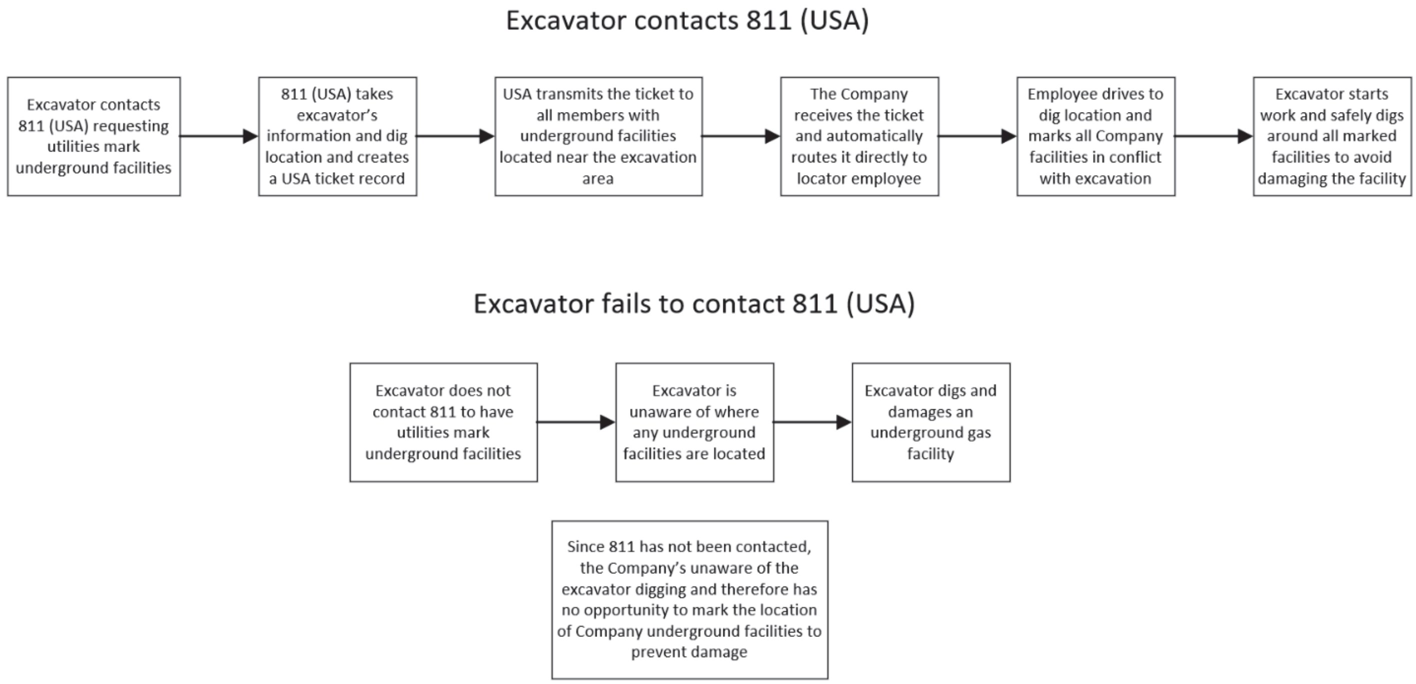


Figure 2 below illustrates the sequence of events that may occur when an excavator contacts 811 USA prior to conducting excavation work and, in contrast, the sequence that may occur when they do not. When excavators call 811 USA before excavating, the risk of a dig-in is reduced.

Figure 2

Excavation Damage: Excavation Contact Process Flow



SoCalGas managed over 1,030,000 811 USA tickets and reported approximately 2,400 dig-in excavation damage incidents in 2024. Analysis of the data collected during routine damage investigations indicates that about the majority of damages were caused by a lack of notification to 811 USA for a locate and mark ticket and the next greatest cause was inadequate excavation practices even after the excavator called 811 USA and underground facilities were properly marked.

In addition to direct involvement with excavators and 811 USA, SoCalGas promotes safe digging practices through its Public Awareness Program and safety messaging through stakeholder outreach. This messaging is presented by way of multi-formatted educational materials through mail, email, social media, television, radio, events, and association sponsorships.

B. Risk Scope

SoCalGas's analysis considers risk events owing to Excavation Damage, which includes both medium and high-pressure pipelines upstream of customer gas meters, regardless of the party (1st, 2nd, 3rd) that result in consequences including serious injuries and/or fatalities.

C. Data Sources Used to Quantify Risk Estimates[6]

SoCalGas utilized internal data sources to determine an Excavation Damage Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate, and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories. Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of Excavation Damage, including a risk Bow Tie, which delineates potential Drivers/Triggers and Potential Consequences, followed by a description of the Tranches determined for this risk.

A. Risk Selection

Excavation Damage was included as a risk in SoCalGas's 2021 RAMP and was included in SoCalGas's 2022, 2023 and 2024 Enterprise Risk Registries (ERR). SoCalGas's ERR evaluation and selection process is summarized in Chapter RAMP-2, Enterprise Risk Management Framework.

SoCalGas selected this risk in accordance with the RDF Row 9.[7] Specifically, SoCalGas assessed top risks from the Company's 2024 ERR based on the Consequence of a Risk Event (CoRE) Safety attribute. Excavation Damage was among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks on December 17, 2024, at a Pre-Filing Workshop. Excavation Damage was selected based on the qualification of its Safety risk attribute, as required under the RDF for required presentation. At the Pre-Filing Workshop, no party expressed opposition to the inclusion of this risk in SoCalGas's 2025 RAMP Report.

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6 Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

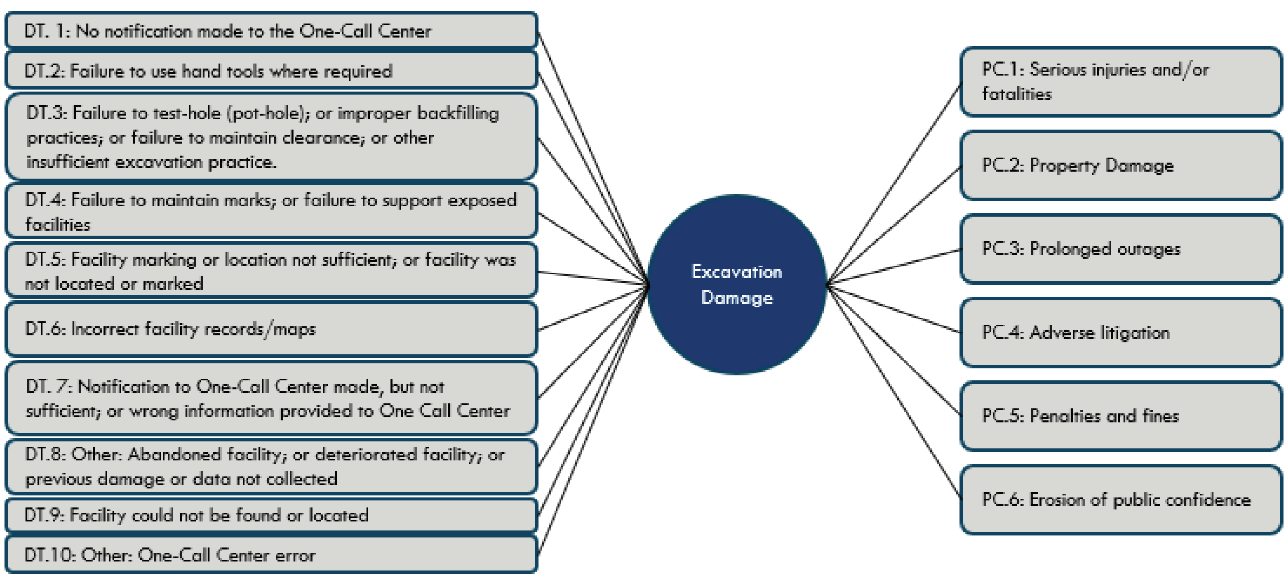
7 RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's Enterprise Risk Register (ERR) comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars".

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, possible Drivers, potential Consequences, and a mapping of the elements in the Bow Tie to the mitigations that address it.[8] As illustrated in the risk Bow Tie shown below in Figure 3, the Risk Event (center of the Bow Tie) is an asset failure owing to Excavation Damage, the left side of the Bow Tie illustrates Drivers/Triggers that could lead to the Excavation Damage that could cause asset failure, and the right side shows the Potential Consequences of the Excavation Damage. SoCalGas applies this framework to identify and summarize the information provided in Figure 3. A mapping of each mitigation to the addressed elements of the risk Bow Tie is provided in Attachment C.

Figure 3

Excavation Damage: Risk Bow Tie



[8] D.24-05-064, RDF Row 15.

C. Potential Risk Event Drivers/Triggers[9]

When performing a risk assessment for the Excavation Damage Risk, SoCalGas identifies potential leading indicators, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset.[10] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 –** No notification made to the One-Call Center: Excavators such as contractors or property homeowners/tenants do not follow 811 One-Call Dig Safe law requirements (USA) for locate and mark prior to excavation. Despite the creation of Regional Notification Centers to inform and allow excavators to have underground infrastructures located and marked, and advertising campaigns alerting excavators of the need to notify 811 USA, incidents still occur where excavations are conducted without such notification. In fact, third party failure to contact the Regional Notification Centers prior to excavating is the leading contributor of damages to Company pipelines. Third parties can damage or rupture underground pipelines and potentially cause property damage, injuries, and/or fatalities. Without receiving an 811 USA ticket, the Company has no opportunity to mark its facilities within the area of excavation and mitigate this risk, which could lead to one or many of the potential consequences listed below occurring.
- **DT.2 –** Failure to use hand tools where required: Before using any power-operated excavation equipment or boring equipment, the excavator is required to hand expose, using "Hand Tools," to verify the exact location and that no conflicts exist within 24 inches of either side of the gas pipeline. Excavators put themselves and others at risk for injury when they do not exercise caution when digging near natural gas pipelines, which could lead to one or many of the potential consequences listed below occurring.

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

10 D.24-05-064, RDF Row 10-11.

- **DT.3 –** Failure to administer a test-hole (pot-hole); or improper backfilling practices; or failure to maintain clearance; or other insufficient excavation practice: Company natural gas pipelines are at risk when an excavator fails to work safely around the buried facility. Failure to pothole can cause damage to natural gas pipelines, which could lead to one or many of the potential consequences listed below occurring.
- **DT.4** – Failure to maintain marks; or failure to support exposed facilities: Company natural gas pipelines are at risk when an excavator fails to work safely around the facilities. Failure to maintain marks or failure to support exposed facilities can cause damage to natural gas pipelines, which could lead to one or many of the potential consequences listed below occurring.
- **DT.5 –** Facility marking or location not sufficient; or facility was not located or marked: The Company, in some cases, may inaccurately mark facilities or fail to mark facilities due to incorrect operations, such as mapping/data inaccuracies, equipment signal interference, or human error. When this happens, third parties are not provided with accurate information on underground pipelines in the vicinity of excavations and the risk of damaging or rupturing gas pipelines increases, which could lead to one or many of the potential consequences listed below occurring.
- **DT.6 –** Incorrect facility records/maps: Updating of permanent mapping records could be delayed. This could result in underground infrastructure being incorrectly marked, which could lead to excavation damage. In addition, incorrect/inadequate asset records could result in underground infrastructure being incorrectly marked, which could lead to one or many of the potential consequences listed below occurring.
- **DT.7 –** Notification to One-Call Center made, but not sufficient; or wrong information provided to One-Call Center. Excavators such as contractors or property homeowners/tenants have requested an 811 USA ticket but are not knowledgeable about the details of the Dig Safe law may still damage underground facilities by performing some of the following practices:
    1. Excavating prior to the valid start date/time

2. Excavating after a valid ticket has expired
3. Excavating under another excavator's USA ticket
4. Improper job delineation and/or excavating beyond the delineation marks

These practices could lead to one or many of the potential consequences listed below occurring

- **DT.8 –** Other: Abandoned facility; or deteriorated facility; or previous damage or data not collected: Excavators such as contractors or property owners/tenants have requested an 811 USA ticket, the Company has responded to the request and an unknown abandoned facility is struck causing excavation damage. This may lead to an unexpected release of gas into the atmosphere. In addition, the requestor during their excavation process may come across a deteriorated facility or previous damage caused by some other entity. Each of these conditions present a risk that could lead to an unexpected release of gas, which could lead to one or many of the potential consequences listed below occurring.
- **DT**.**9** – Facility could not be found or located: The delay of updates to asset records/mapping, tracer wire issues, and equipment signal interference can present risk of an underground facility not being able to be located. If a known facility is unable to be located, the risk of an underground facility being damaged increases, which could lead to one or many of the potential consequences listed below occurring.
- **DT.10** – Other: One-Call Center Error: Includes mistakes made by the one call center (also known as 811 centers) during the process of managing excavation notifications. These errors can include issues such as incorrect information being provided to excavators, failure to relay accurate utility location data, or delays in processing requests, which could lead to one or many of the potential consequences listed below occurring.

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this risk by analyzing internal data sources, where available, industry data, and subject matter expertise (SME).[11] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

- **PC. 1**: Serious injuries and/or fatalities;
- **PC. 2**: Property damage;
- **PC. 3:** Prolonged outages;
- **PC. 4:** Adverse litigation;
- **PC. 5:** Penalties and fines; and
- **PC. 6**: Erosion of public confidence.

These Potential Consequences were used by SoCalGas in the scoring of Excavation Damage during the development of SoCalGas's 2024 ERR.

E. Evolution of Risk Drivers and Consequences

As specified in the Phase 3 Decision,[12] the following changes to the previous ERR and/or the 2021 RAMP include:

1. Changes to Drivers/Triggers of the Risk Bow Tie

- DT.1 – Changed from "Excavators such as, contractors or property homeowners/tenants do not call 811 one-call center (USA) for locate and mark prior to excavation" to "No notification made to the One-Call Center"
- DT.2 – Changed from "Excavator fails to contact company 'standby' personnel to "Failure to use hand tools where required"
- DT.3 – Changed from "Hand excavation is not performed in the vicinity of located underground distribution facilities" to "Failure to test-hole (pot-hole); or improper backfilling practices; or failure to maintain clearances; or other insufficient excavation practices"

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[11] D.24-05-064, RDF Row 10.

[12] *Id*., RDF Row 8.

- DT.4 – Changed from “Company does not respond to 811 requests in required timeframe” to “Failure to maintain marks; or failure to support exposed facilities”
- DT.5 – Changed from “Company does not “standby” when excavating near required facilities” to “Facility marking or location not sufficient; or facility was not located or marked”
- DT.6 – Changed from “Locator error contributing to the incorrect marking of underground distribution facilities” to “Incorrect facility records/maps”
- DT.7 – Changed from “Delayed updates to asset records of underground distribution facilities leading to incorrect locate and mark” to “Notification to One-Call Center made, but not sufficient; or wrong information provided to One Call Center”
- DT.8 – Changed from “Incorrect/inadequate information in existing asset records leading to incorrect locate and mark” to “Other: Abandoned facility; or deteriorated facility; or previous damage or data not collected”
- DT.9 – Changed from “Execution constraints” to “Facility could not be found or located”
- DT.10 – Added “Other: One-Call Center error”

2. Changes to Potential Consequences of the Risk Bow Tie

- No changes to potential consequences

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP - 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined:

Table 1: Excavation Damage Risk
Tranche Identification

Class	Number of LoRE-CoRE Pairs	Number of Resulting Tranches
HP	117	29
MP	426	20
TOTAL	**543**	**49**

Attachment D illustrates the derivation of the Tranches, as shown in Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas as logical groups of assets and systems based on the Company's operations. These classes also align risk treatments with asset risk profiles reflective of SoCalGas's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches, is provided in workpapers.

III. Pre Mitigation Risk Value

In accordance with the RDF Row 19, the table below provides the pre-mitigation risk values for the Excavation Damage Risk. Further details, including pre-mitigation risk values by Tranche, are provided workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3 Risk Quantification Framework.

Table 2: Excavation Damage Risk
Monetized Risk Values
(Direct, in 2024 $ millions)

LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
	Safety	Reliability	Financial		
3,312.62	$0.011	$0.008	$0.002	$0.021	$69.30

G. Pre Mitigation Risk Value Methodology

SoCalGas's risk modeling for the Excavation Damage risk follows RDF guidance[13] for implementing a Cost Benefit Approach, as described below:

13 *Id.,* RDF Rows 2-7.

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** Excavation Damage risk is quantified in a combined attribute hierarchy as shown in Table 2 above, such that Safety, Reliability, and Financial are presented based on available, observable. and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** Excavation Damage risk features observable and measurable CoRE values. SoCalGas utilized its database of reportable excavation damage incidents data (mentioned in the introduction of this Chapter) to represent natural units for excavation damage events.
3. **Cost Benefit Approach Principle 3-Comparison (RDF Row 4):** Excavation Damage quantification did not include any attributes that are not directly measurable, so proxy data, as described in the RDF, was not necessary.
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** The data sources used for Excavation Damage – as described in the preceding paragraphs – were sufficient to model probability distributions for use in estimating risk values.
5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas and SDG&E used a California adjusted Department of Transportation monetized equivalent to calculate the Safety CoRE attribute at $16.2 million per fatality, $49 thousand for minor injuries, and $4.1 million per serious injury;[14] the Gas Reliability CoRE attribute is valued at a monetized equivalent of $3,868 per gas meter outage; and the Financial CoRE attribute is valued at $1 per dollar.[15] The Electric Reliability CoRE attribute is not considered for SoCalGas's Excavation Damage Risk.[16]

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[14] D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost Benefit Approach in the RDF using the DOT VSL as the standard value.").

[15] *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

[16] Electric reliability CoRE is considered in SDG&E's Excavation Damage Risk.

Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, and technical references, are provided in workpapers.

6. Cost Benefit Approach Principle 6-Adjusted Attribute Level (RDF Row 7):

Table 3: Excavation Damage Risk
Risk Scaled vs Unscaled Value by CoRE Attribute
(Direct, in 2024 $ millions)

	Safety	Reliability	Financial	Total
Unscaled Risk Value	$6.7	$22.6	$6.0	$35.3
Scaled Risk Value	$35.5	$27.3	$6.4	$69.3

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for Excavation Damage Risk. Excavation Damage Risk features significant risk aversion scaling due to the potential for high impact consequence outcomes resulting from excavation damage leading to an asset failure/uncontrolled release of gas.

For further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter RAMP-3, Risk Quantification Framework.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for Excavation Damage and reflects changes to the portfolio expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place in 2024 and which are expected to be ongoing, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[17] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-

[17] D.24-12-074.

009.[18] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test Year 2029, 2030, and 2031.[19]

Table 4: Excavation Damage Risk
2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C001	Damage Prevention Strategies	X	Ongoing
C002	Damage Prevention Activities	X	Ongoing
C003	Damage Prevention - Public Awareness	X	Ongoing
C004	Damage Prevention Mapping	X	Ongoing

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place"[20] (*i.e.,* activities in this section were in place as of December 31, 2024). Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

- **C001: Damage Prevention Strategies**: Damage Prevention Strategies is a program with a multifaceted approach to promote safe excavation practices and compliance with CA State Excavation Law 4216. The core components of this strategy include Engagement, Education, Enforcement, and Enhancements.
  Engagement: This component focuses on building collaborative relationships with excavators. By engaging directly with excavators in the field, the program provides an additional layer of communication and a point of contact. Face-to-face interactions make the process more personable, fostering open communication and cooperation. The goal is to create a proactive environment where safety and communication is prioritized.
  Education: Educating excavators on safe excavation practices and the specifics of CA State Excavation Law 4216 is a crucial part of damage prevention. This

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18 D.21-11-009 at 136 (Conclusion of Law (COL) 7) (providing a definition for "baselines" and "baseline risk").

19 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

20 D.18-12-014 at 33.

component focuses on providing the necessary knowledge and resources to prevent damage and ensure compliance with legal requirements.

Key aspects of this education include:

- Instruction on the use of the 811 process: Explains how to use the 811 service to notify utility companies before digging, ensuring that underground utilities are marked and avoided.
- Proper delineation: Guidance on how to accurately mark the boundaries of the excavation site to prevent accidental damage to nearby utilities.
- Understanding utility markings: Assist excavators to interpret the markings provided by SoCalGas, which indicate the location, size and type of material of the underground utilities.
- Electronic positive response: Instruction on how to view electronic positive responses on the 811 One Call Center sites to confirm that utility companies have responded to the 811 notification and marked the utilities.
- High Priority Stand-By requirements: Explain the circumstances under which SoCalGas must have a representative on-site to ensure safe excavation around high priority facilities.

Enforcement: When incidents occur, enforcement is utilized as a corrective measure. This provides that violations are addressed promptly and that there are consequences for non-compliance, thereby reinforcing the importance of adhering to safety standards. The California Underground Safety Board (USB) is the enforcement authority that may levy fines and mandatory safety training for parties found to have violated the California digging law. Damage Prevention Strategies will impose a "stop the job" on sites where unsafe excavation activities are encountered. When negligent activities such as excavating without a valid 811 ticket result in excavation damage, Damage Prevention Strategies will submit a complaint to the Underground Safety Board for further investigation.

Enhancements: Continuous improvement is a key aspect of Damage Prevention Strategies. By reviewing collected data and industry best practices, the program utilizes this information to identify trends and implement enhancements to further promote safe excavation practices. Key enhancements include:

- Updates to the Ticket Risk Assessment Tool: This tool is refined based on new data and insights to better assess the risk associated with excavation tickets. By improving the accuracy and reliability of risk assessments, the program can more effectively prioritize and address potential hazards.
- Proactive patrolling of high-risk areas: Regular patrols are conducted in areas identified as high-risk based on historical data and current conditions. These patrols help to monitor ongoing excavation activities, provide immediate support, and prevent potential damages.
- Specific work type activities: The program focuses on activities that have recently caused excavation damages. By analyzing these incidents, Damage Prevention Strategies can develop targeted interventions and training to address the specific challenges associated with these work types.

Through these comprehensive approaches, Damage Prevention Strategies aims to mitigate risks, reduce excavation damages, and enhance the overall safety and efficiency of excavation activities. By continuously evolving and adapting to new information, the program ensures that it remains effective in promoting safe practices and compliance with CA State Excavation Law 4216.

- **C002: Damage Prevention Activities**: Damage Prevention Activities encompass a variety of approaches to promote the safety and integrity of subsurface facilities during excavation projects. To carry out these activities, the Company employs trained and qualified personnel to manage 811 ticket requests effectively, facilitating appropriate responses to each request. These responses may involve locating and marking subsurface facilities or confirming that no conflict exists in the proposed excavation area. Upon completion of each ticket, the Company provides an electronic positive response to the Regional One-Call Centers. This response allows excavators to see how the Company has addressed their requests, promoting transparency and communication. For high-priority subsurface facilities, the Company conducts stand-by activities when necessary. These stand-by activities provide additional oversight so that safe excavation practices are followed in close proximity to critical infrastructure, and any damages that occur are promptly reported and corrected. In cases where subsurface facilities are challenging to locate, the Company utilizes potholing techniques to determine their location. This method enhances the accuracy of facility identification and contributes to overall excavation safety.

Also within this control are quality assurance activities, which are an integral function of damage prevention activities. These include random inspections of completed work, reviews of locate employees, verification of policy adherence, and follow-up with corrective actions when deviations are found. These measures promote compliance with Company policies and industry standards, with the goal of maintaining high levels of safety and reliability. Through these comprehensive damage prevention activities, the Company aims to minimize risks and promote the safe and efficient execution of excavation projects.

- **C003: Damage Prevention - Public Awareness**[21]: The Company is dedicated to raising public awareness about damage prevention through a series of strategic controls and enhancements. These efforts are designed to educate the public, promote safe practices, and reduce the risk of damage to subsurface facilities. Key components include:
    - **Compliance Monitoring**: The Company endeavors to adhere to industry guidelines and legal requirements for public education and outreach. Regular audits and reviews are conducted to assess compliance and identify areas for improvement.
    - **Public Education Campaigns**: The Company conducts ongoing public education campaigns to inform the community about the importance of safe excavation practices. These campaigns utilize various media channels, including social media, print, and broadcast, to reach a wide audience.

[21] In 2028 SB1371 costs associated with media and marketing campaigns (which began in 2020) will transfer to the TY2028 GRC Base O&M request.

- **Educational Materials**: The Company develops and distributes educational materials, such as brochures, flyers, and instructional videos, to provide clear and accessible information on safe excavation practices. These materials are made available at public events, community centers, and online.
- **Collaborative Partnerships**: The Company collaborates with local governments, industry associations, and other stakeholders to enhance public awareness efforts. These partnerships help amplify messaging around safe excavation practices and promote a coordinated approach to damage prevention.
- **Community Outreach Programs**: Through community outreach programs, the Company engages directly with local communities. These programs include workshops, seminars, and informational sessions that provide valuable insights into damage prevention and the use of 811 services.
- **Feedback and Improvement**: The Company actively seeks feedback through surveys and focus groups from the public and stakeholders to continuously improve its public awareness initiatives. This feedback is used to refine messaging, identify new outreach opportunities, and enhance the overall effectiveness of the program.

By implementing these controls and enhancements, the Company aims to foster a culture of safety and awareness, with the ultimate goal of reducing the risk of damage to subsurface facilities and promoting safer excavation practices.

- **C004: Damage Prevention Mapping**: The Company is committed to enhancing the mapping of subsurface facilities to promote accurate locate and mark responses, thereby reducing the risk of excavation damage. Several key controls and initiatives are in place to achieve this goal:
  - **Map Update Request Process**: When deviations are identified in the field, the Company uses a Map Update Request process to promptly update records. This promotes current and accurate mapping data.

- **GIS Data Quality Improvement Initiative**: This initiative leverages the synergy between GPS and GIS technologies to enhance record history. By integrating precise GPS data with GIS systems, the Company improves the accuracy and reliability of subsurface facility maps.
- **Anodes Connected to Tracer Wires**: To improve the signal received by locating underground equipment, anodes are connected to tracer wires. This enhances the effectiveness of locating subsurface facilities.
- **Pipeline Optical Cables**: For newly installed transmission pipelines, the Company uses pipeline optical cables. These cables provide additional data and monitoring capabilities, contributing to more accurate mapping and safer excavation practices.
- **Warning Mesh**: Installed above newly laid pipelines, warning mesh serves as a visual indicator to prevent accidental damage during excavation. This additional layer of protection helps so that subsurface facilities are not inadvertently disturbed.

Through these comprehensive controls and initiatives, the Company aims to continuously improve the quality of subsurface facility mapping, with the goal of promoting safer excavation practices and reducing the risk of damage.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls discussed above, and reflected in Table 1, through the 2025-2031 period without any significant changes.

C. Mitigation Programs

SoCalGas does not currently foresee implementing new mitigations not described above during the 2025-2031 period.

D. Climate Change Adaptation

In assessing Excavation Damage, controls and/or mitigations that address climate adaptation planning were determined to be inapplicable (from the perspective of climate exposure, asset sensitivity, and asset adaptive capacity). A list of climate-relevant controls and mitigations is provided in Volume 1, Chapter RAMP-5: Climate Change Adaptation.

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[22] There are no activities for this risk that meet this definition of a foundational activity.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for Excavation Damage, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[23] for each enterprise risk SoCalGas uses actual results and industry data, and when that is not available, SoCalGas supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates are provided in Attachment B.

Table 5: Excavation Damage Risk
Control and Mitigation Plan –Recorded and Forecast Costs Summary
(Direct, in 2024 $thousands)

ID	Control/Mitigation Name	Recorded Costs		Forecast Costs			
		2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C001	Damage Prevention Strategies	0	1,391	1,391	0	0	6,893
C002	Damage Prevention Activities	0	29,355	31,632	0	0	98,604
C003	Damage Prevention – Public Awareness	0	2,904	3,991	0	0	11,973
C004	Damage Prevention Mapping	0	1,092	1,092	0	0	3,276

[22] D.24-05-064, Appendix A at A-4.

[23] D.24-05-064, RDF Row 10.

Table 6: Excavation Damage Risk
Risk Control & Mitigation Plan – Units Summary

Control/ Mitigation Name		Recorded Units*			Forecast Units*			
ID	**Name**	**Unit of Measure**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C001	Damage Prevention Strategies	USA Tickets	0	1,032	1,032	0	0	3,097
C002	Damage Prevention Activities	USA Tickets	0	1,032	879	0	0	2,418
C003	Damage Prevention – Public Awareness	Communications sent	0	6,333	7,177	0	0	21,532
C004	Damage Prevention Mapping	USA Tickets	0	1,032	1,032	0	0	3,097

*Units shown in thousands

In the table below, CBRs are presented in summary at the mitigation or control level for the Test Year 2028 GRC cycle. CBRs are calculated based on scaled, expected values unless otherwise noted and are calculated for each of the three required discount rates[24] in each year of the GRC cycle and for the Post-Test Years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

[24] *See* Chapter RAMP-3: Medium Pressure Gas System for definitions of discount rates, as ordered in the Phase 3 Decision.

Table 7: Excavation Damage Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C001	**Damage Prevention Strategies**	0	8.3	1.91	2.04	1.91
C002	**Damage Prevention Activities**	0	130.2	18.23	19.49	18.28
C003	**Damage Prevention – Public Awareness**	0	16.0	0.82	0.88	0.83
C004	**Damage Prevention Mapping**	0	4.4	0.03	0.01	0.01

Bold *indicates a mandated program*

Please refer to the workpapers for Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025 and D.16-08-018,[25] SoCalGas considered two alternatives to the risk mitigation plan for the Excavation Damage Risk. The alternatives analysis for this plan considers changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan and constraints, such as budget and resources.

Table 8: Excavation Damage Risk
Alternative Mitigation Plan –Forecast Costs Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Forecast Costs			
		2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A001	MP Standby for Repeat Offenders	0	0	660.132	495.099
A002	Installation of non-required EFVs	0	0	6.360	4.770

25 *See, e.g.,* D.18-12-014 at 33-35.

Table 9: Excavation Damage Risk
Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A001	MP Standby for Repeat Offenders	0	165.033	0.01	0.01	0.01
A002	Installation of non-required EFVs	0	1.590	0.04	0.02	0.02

A. Alternative 1: MP Stand-By Activities for Repeat Offenders

This alternative mitigation will require additional oversight on excavation damage repeat offenders (RO)[26] when excavating within 10 feet of company medium pressure substructures, when SoCalGas has been notified in advance. This would require company personnel to meet onsite with the RO to agree upon excavation activities prior to legal excavation start date and verify the RO is using appropriate excavation activities so that Company substructure is not damaged by the RO. This mitigation would mirror current California Code 4216.2c requirements for high priority subsurface installations.

By implementing this mitigation plan, the Company would aim to encourage responsible behavior among contractors and enhance safety standards. This approach not only promotes compliance but also fosters a collaborative relationship between the Company and excavators within the Company’s service territory. The company has not included this mitigation as part of the control plan because it would not mitigate risks beyond a narrow group of excavators and yet the costs would be significant.

B. Alternative 2: EFV Installation

Per CFR 192.385, installation of manual service line shut-off valve (a “curb”: valve or other manually operated valve) or an excess flow valve (EFV) are required on new or replaced service lines with meter capacity exceeding 1,000 Standard Cubic Foot Hours. This alternative mitigation would install EFVs on existing services that fall under the capacity requirements of CFR 192.385. By implementing this alternative mitigation plan, the Company aims to enhance the safety of its gas distribution system. The installation of EFVs on service lines will help prevent uncontrolled gas flow, reduce the risk of gas leaks, and protect both customers and

[26] Repeat Offender is defined as an excavator who has more than two damages on company substructures in a running 12-month period.

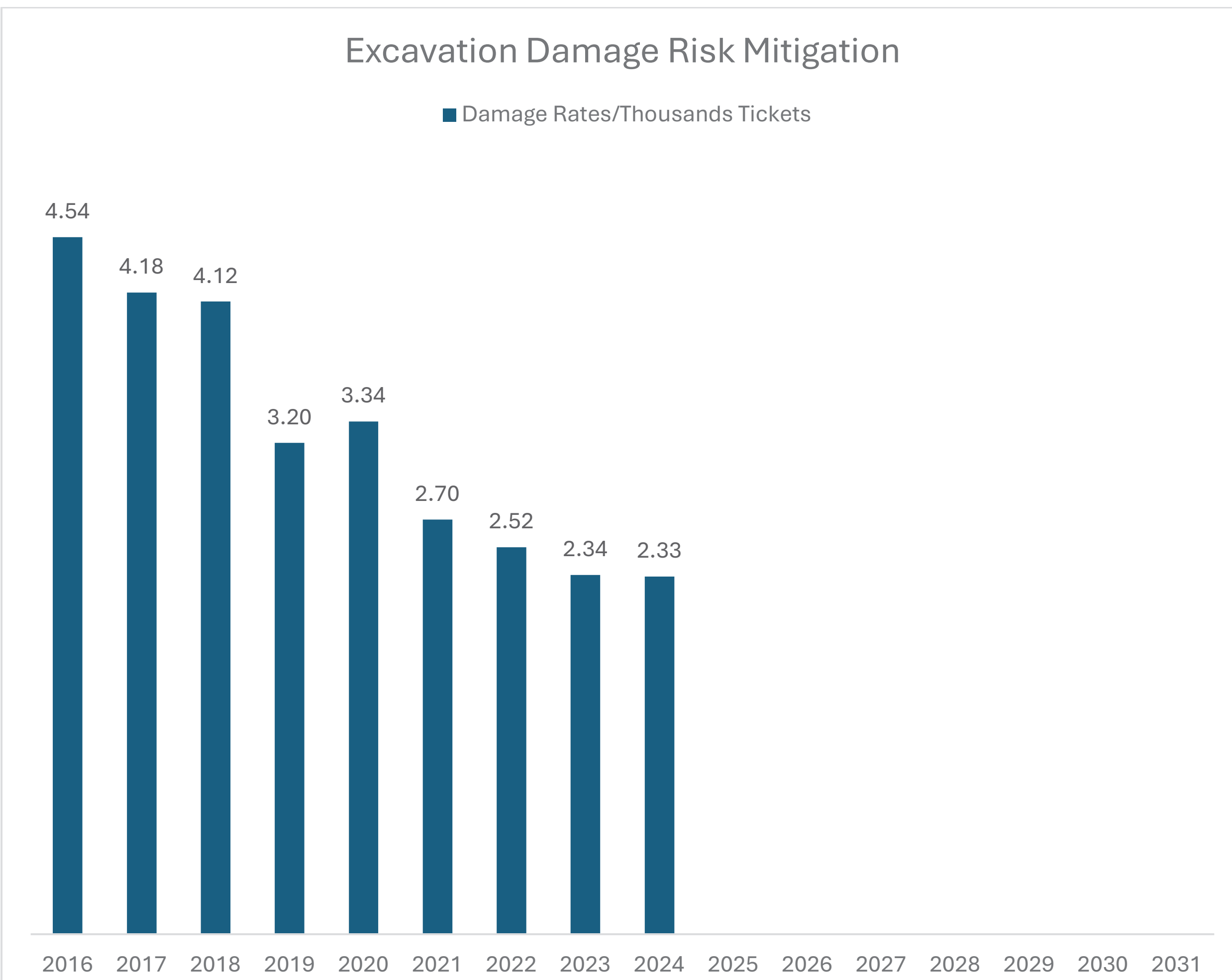
infrastructure. The Company has not included this mitigation as part of the control plan because the company is currently compliant with CFR 192.385 and additional in-depth analysis would be required to determine feasibility dependent on service line customer consumption and industry EFV technology.

VI. HISTORICAL GRAPHIC

As directed by the Commission in D.22-10-002, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a key metric that aligns with Company safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating risks.

Figure 4

Excavation Damage: Safety Progress 2016-2024



The historical safety work activities completed using the above metric from 2016-2024 include:

- 2019: Damage Prevention Strategies Program created to reduce excavation damages, educate excavation community on 811 requirements, and improve safe excavation. Create and maintain relationships with municipalities and excavators.
- 2019/2020: Ticket Risk Assessment (TRA) tool developed with continuance updates and retraining of model.
- 2020/2021 Collaborate with Public Awareness and Marketing/Communication teams to enhance the communication and awareness to the local communities of 811 and the importance of calling before digging.
- 2021: Repeat Offender Program initiated to identify and educate excavators who have more than 2 damages in a 12-month period.
- 2023: Partnership with PHMSA, CPUC and USB to develop a reporting platform for excavations caused by no notification made to 811.
- 2023: Launched 811 Ambassador Program to internal employees to report unsafe excavation activities.

The safety work that remains to be done is addressed the controls/mitigations detailed above in Section III. 2024-2031 Control & Mitigation Plan.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance drivers which underpin identified controls and mitigations.

ID	**Control/Mitigation Name**	**Compliance Driver**
C001	Damage Prevention Strategies	PHMSA, CPUC GO-112F, California Gov Code 4216
C002	Damage Prevention Activities	49 CFR § 192, CPUC GO-112F, California Gov Code 4216
C003	Damage Prevention - Public Awareness	49 CFR § 192, CPUC GO-112F

ATTACHMENT B

EXCAVATION DAMAGE - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[27] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and the description of the data.

Excavation damage was modelled as a driver in both the medium pressure and high pressure risk models. For data sources used to model risk see Attachment B in the High Pressure Gas System and Medium Pressure Gas System risk chapters. Risk data unique to quantification of excavation damage risk is provided below.

Risk Data	**Source Type**	**Source Information**
Excavation damages by cause	Internal Data	Source: Internal data managed by the Gas System Integrity Department. Description: Data was used to quantify benefits to controls and mitigation that address specific causes of excavation damage, such as locate and mark or mapping issues.
Excavation damages from repeat offenders	Internal Data	Source: Internal data managed by the Gas System Integrity Department. Description: Data was used to quantify damages caused by repeat offenders for benefits calculation.

[27] D.24-05-064, RDF Row 10 and Row 29.

ATTACHMENT C

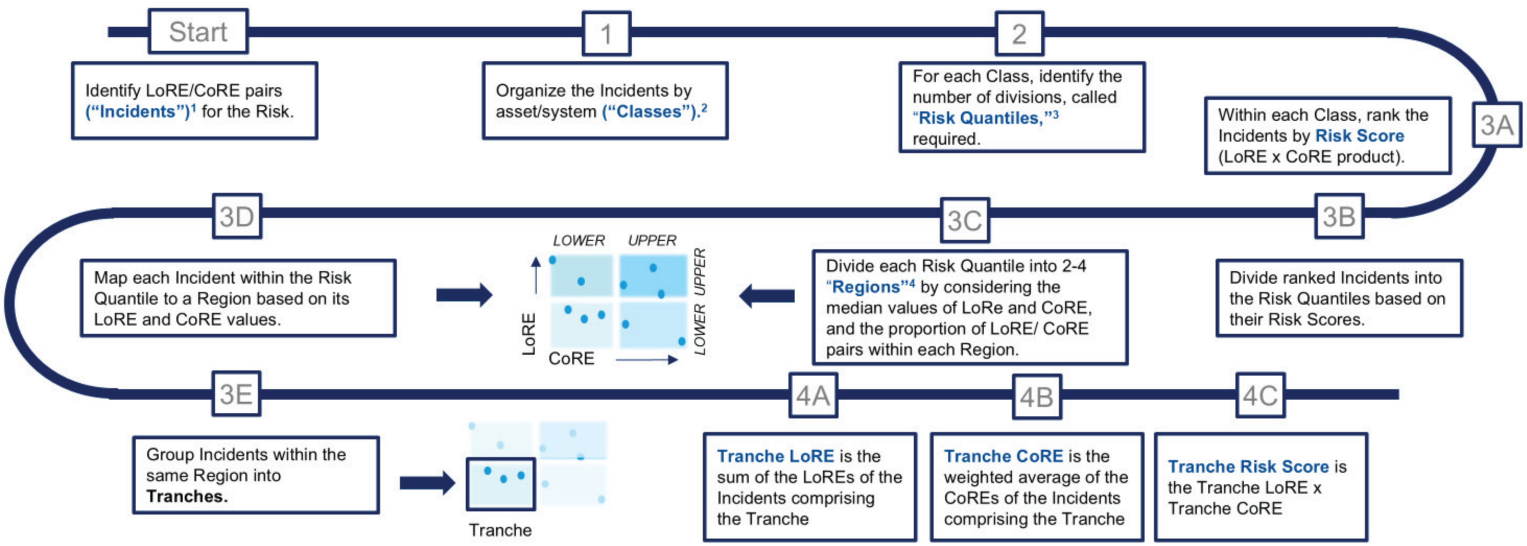
EXCAVATION DAMAGE - SUMMARY OF ELEMENTS OF BOW TIE

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C001	Damage Prevention Strategies	1, 2, 3, 4, 7, 10	1, 2, 3, 4, 5, 6
C002	Damage Prevention Activities	5, 6, 8, 9	1, 2, 3, 4, 5, 6
C003	Damage Prevention - Public Awareness	1, 2, 3	1, 2, 3, 4, 5, 6
C004	Damage Prevention Mapping	6, 8, 9	1, 2, 3, 4, 5, 6

ATTACHMENT D

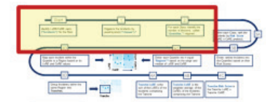
APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



NOTES

[1]*For example, **Incidents (or "Risk Incidents")** for Excavation Damage these include leaks or damages cause by dig ins.*
[2]*For example, **Classes (or "Asset Classes")** for Excavation Damage these include High or Medium pressure pipe.*
[3]***Quantiles** are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*
[4]*The four **Regions** are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*



Start

Identify LoRE/CoRE pairs **("Incidents")**[1] for the Risk.

1

Organize the Incidents by asset/system **("Classes")**.[2]

2

For each Class, identify the number of divisions, called **"Risk Quantiles,"**[3] required.

Class	LORE / CORE PAIRS	TOTAL # PAIRS
High Pressure	HCA Rupture - Transmission in Desert Region Class 3	117
	Large_Leak - Transmission in Standard Region Class 1	
	…and 115 more pairs	
Medium Pressure	Service: PLASTIC Non-State-of-the-Art N Business District L Population Density	426
	Main: STEEL State-of-the-Art N Business District H Population Density	
	…and 424 more pairs	

$$\min\left(\frac{N}{8}-1,9\right) < K \leq \min\left(\frac{N}{8},10\right)$$

10

10

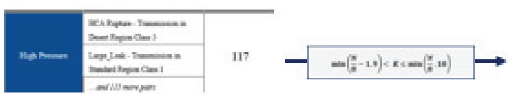
Step 3 for *High Pressure*

Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).

3A

3B

Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.

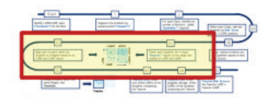


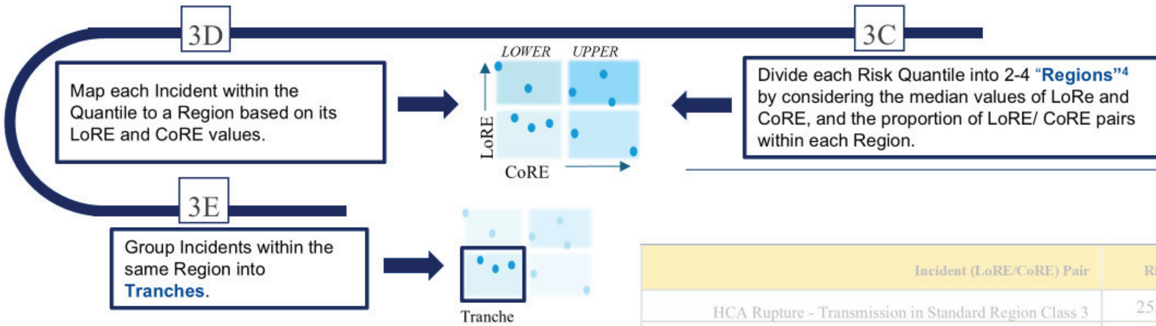
6

From Step 2 for *High Pressure*

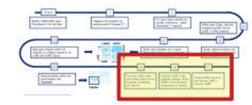
3A 3B

Incident (LoRE/CoRE) Pair	Risk Score	Rank	Risk Quantile
HCA Rupture - Transmission in Standard Region Class 3	25,833,643	1	#1
HCA Rupture - Transmission in Standard Region Class 4	3,273,125	2	
Rupture - Transmission in Standard Region Class 1	2,069,546	3	
HCA Rupture - Transmission in Standard Region Class 3	2,054,531	4	
HCA Rupture - Transmission in Desert Region Class 3	1,204,763	5	
Large_Leak - Transmission in Standard Region Class 1	917,853	6	
Rupture - Transmission in Standard Region Class 1	840,260	7	
Rupture - Transmission in Desert Region Class 1	720,080	8	
Rupture - High_Pressure_Distribution in Region Zone 3	578,915	9	
Large_Leak - Transmission in Standard Region Class 1	347,685	10	
HCA Rupture - Transmission in Standard Region Class 4	257,011	11	
Rupture - High_Pressure_Distribution in Region Zone 4	239,796	12	
Small_Leak - High_Pressure_Distribution in Region Zone 3	224,570	13	#2
Large_Leak - Transmission in Desert Region Class 1	187,332	14	
MCA Rupture - Transmission in Standard Region Class 1	148,876	15	
HCA Large_Leak - Transmission in Standard Region Class 3	144,640	16	
...	...	17-117	





		3A	3B	3C	3D
Incident (LoRE/CoRE) Pair	Risk Score	Rank	Quantile	Region	Tranche
HCA Rupture - Transmission in Standard Region Class 3	25,833,643	1	#1	LL/UC	HP-1-1
HCA Rupture - Transmission in Standard Region Class 4	3,273,125	2		LL/UC	HP-1-1
Rupture - Transmission in Standard Region Class 1	2,069,546	3		UL/LC	HP-1-2
HCA Rupture - Transmission in Standard Region Class 3	2,054,531	4		LL/UC	HP-1-1
HCA Rupture - Transmission in Desert Region Class 3	1,204,763	5		LL/UC	HP-1-1
Large_Leak - Transmission in Standard Region Class 1	917,853	6		UL/LC	HP-1-2
Rupture - Transmission in Standard Region Class 1	840,260	7		UL/LC	HP-1-2
Rupture - Transmission in Desert Region Class 1	720,080	8		UL/LC	HP-1-2
Rupture - High_Pressure_Distribution in Region Zone 3	578,915	9		UL/LC	HP-1-2
Large_Leak - Transmission in Standard Region Class 1	347,685	10		UL/LC	HP-1-2
HCA Rupture - Transmission in Standard Region Class 4	257,011	11		LL/UC	HP-1-1
Rupture - High_Pressure_Distribution in Region Zone 4	239,796	12		LL/UC	HP-1-1
Small_Leak - High_Pressure_Distribution in Region Zone 3	224,570	13	#2	UL/LC	HP-2-3
Large_Leak - Transmission in Desert Region Class 1	187,332	14		UL/LC	HP-2-3
MCA Rupture - Transmission in Standard Region Class 1	148,876	15		UL/UC	HP-2-5
HCA Large_Leak - Transmission in Standard Region Class 3	144,640	16		UL/UC	HP-2-5
...	...	17-117	..	...	



4A — **Tranche LoRE** is the sum of the LoREs of the Incidents comprising the Tranche

4B — **Tranche CoRE** is the weighted average of the CoREs of the Incidents comprising the Tranche

4C — **Tranche Risk Score** is the Tranche LoRE x Tranche CoRE

Incident (LoRE/CoRE) Pair	Tranche	Tranche LoRE (4A)	Tranche CoRE (4B)	Tranche Risk Score (4C)
HCA Rupture - Transmission in Standard Region Class 3	HP-1-1	0.022	$1,516,320,724	$32,862,869
HCA Rupture - Transmission in Standard Region Class 4	HP-1-1			
HCA Rupture - Transmission in Standard Region Class 3	HP-1-1			
HCA Rupture - Transmission in Desert Region Class 3	HP-1-1			
HCA Rupture - Transmission in Standard Region Class 4	HP-1-1			
Rupture - High_Pressure_Distribution in Region Zone 4	HP-1-1			
Rupture - Transmission in Standard Region Class 1	HP-1-2	0.301	$18,209,241	$5,474,339
Large_Leak - Transmission in Standard Region Class 1	HP-1-2			
Rupture - Transmission in Standard Region Class 1	HP-1-2			
Rupture - Transmission in Desert Region Class 1	HP-1-2			
Rupture - High_Pressure_Distribution in Region Zone 3	HP-1-2			
Large_Leak - Transmission in Standard Region Class 1	HP-1-2			
Small_Leak - High_Pressure_Distribution in Region Zone 3	HP-2-3	1.776	$419,689	$45,349
Large_Leak - Transmission in Desert Region Class 1	HP-2-3			
MCA Rupture - Transmission in Standard Region Class 1	HP-2-5	0.019	$15,386,473	$293,516
HCA Large_Leak - Transmission in Standard Region Class 3	HP-2-5			

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-2)

High Pressure Gas System

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for the High Pressure Gas System risk (HP System Risk). This chapter contains information and analysis for this risk that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (Phase 2 Decision) and D.24-05-064 (Phase 3 Decision). HP System Risk is included in the 2025 RAMP Report based on a safety risk assessment, further informed by its reliability and financial consequence attributes, consistent with RDF guidance. This risk chapter describes the basis for selection of HP System Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk-mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's HP System Risk is defined as the risk of failure of a high-pressure gas pipeline[2] (including non-line pipe, appurtenances, and facilities) that results in serious injuries, fatalities, and/or damage to the infrastructure. As discussed further below, the failure event would be a result of one or more of the risk's eleven Drivers/Triggers depicted in its Bow Tie analysis, which include eight threat categories identified by the United States Department of Transportation's (DOT) Pipeline and Hazardous Materials and Safety Administration (PHMSA). Medium pressure assets operating at a pressure of 60 psig or less are included in the Medium Pressure

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[1] As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

[2] Maximum Allowable Operating Pressure (MAOP) at higher than 60 psig. Hereinafter references in this chapter to "pipelines," "transmission," and "distribution" refer to high-pressure unless otherwise noted.

Gas System Risk chapter (SCG-Risk-3). Events caused by third-party excavation damage are included in the Excavation Damage Risk chapter (SCG-Risk-1).

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF requirements, such as those from the CPUC's General Order (GO) 112-F and PHMSA, including but not limited to, subparts of Rule 49 Code of Federal Regulation (CFR). Risks associated with aboveground gas storage facilities are evaluated under the California Air Resources Board (CARB) Oil & Gas Rule, effective October 1, 2017, which prescribes monitoring requirements for natural gas aboveground storage facilities, and California Geologic Energy Management Division (CalGEM, formerly Division of Oil, Gas, and Geothermal Resources or DOGGR). A list of compliance requirements applicable to the high pressure gas system is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as addressing tail risk, targeting high risk assets, enhancing of operations, and/or preparing for future capacity needs (such as driven by electrification or climate impacts).

2. Risk Overview

The SoCalGas natural gas transmission[3] and distribution[4] system operates in 12 counties and spans from the California-Arizona border to the Pacific Ocean and from the California-Mexico border to Fresno County. SoCalGas is the largest natural gas distribution operator in the nation and the second largest High Consequence Area (HCA)[5] transmission pipeline operator, with approximately 1,100 miles of HCA pipe out of 3,357 miles of transmission pipelines (as defined under DOT regulations). In total, SoCalGas operates approximately 6,700 miles of natural gas high-pressure pipelines in its service territory.

Title 49 Part 192 of PHMSA's CFR and American Society of Mechanical Engineers (ASME) pipeline integrity standard B31.8S, Managing System Integrity of Gas Pipelines, categorizes types of threats that could lead to a high-pressure pipeline incident. Eight of those threat types are discussed in this Chapter:

1) External Corrosion
2) Internal Corrosion

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[3] As defined in 49 C.F.R. § 192.3 (2024).

[4] *Id.*

[5] Segments in HCAs are associated with higher consequences because the primary driver of the identification of HCAs is the level of human occupancy associated with the area, as required by 49 C.F.R. § 192.903 (2024).

3) Stress Corrosion Cracking

4) Manufacturing Defect

5) Construction & Fabrication

6) Outside Forces

7) Incorrect Operation

8) Equipment Threat

These threat types, as well as three additional threat categories identified by SoCalGas, together comprise the eleven Drivers/Triggers in the Risk Bow Tie presented in Section II.B. These threat types can work independently and/or interactively together and can lead to leaks or ruptures on the pipeline system.

Leaks, which are defined by PHMSA as unintentional releases of gas, can range from non-hazardous leaks – which can usually be resolved by lubrication, adjustment, or tightening – to more severe instances where more extensive and long-term modifications (*e.g.*, welded repair bands, segment removal/replacement) to the pipe or equipment are required.

The presence of a leak alone may not necessarily represent a risk of serious injury or fatality. The risk to the public and employees can increase, however, when leaks are in close proximity to an ignition source and/or where there is potential for gas to migrate to and accumulate in a confined space. SoCalGas addresses the safety concerns of leaks through its leak indication and repair prioritization and scheduling procedures, as discussed in Section III of this chapter.

Instances of pipeline rupturing, however, are considered an elevated risk since this type of failure[6] has the potential to rapidly release a high volume of combustible energy, which could ignite, resulting in damage to the surrounding area, injury, and/or loss of life.

Whether a pipeline fails by leak versus rupture is dependent on several factors, including the stress on the pipe, the pipe material properties, and the geometry of the pipeline flaw/defect. Pipelines operating at stress levels above 20% Specified Minimum Yield Strength (SMYS), and especially above 30% SMYS, are at greater risk of rupture (sometimes referred to as a propagating fracture) as compared to pipelines operated at stress levels below 20% SMYS.[7]

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6 As defined in ASME B31.8S.

7 *See* B.N. Leis et al., Leak Versus Rupture Considerations for Steel Low-Stress Pipelines, Battelle Final Report GRI-00/0232 at 32 (January 2001): Given the results generated, the leak to rupture transition for corrosion defects in the low-wall-stress pipeline system can be taken as 30 percent of SMYS, a value that is conservative

B. Risk Scope

SoCalGas's HP System Risk analysis considers risk events associated with the failure of a high pressure pipeline (*i.e.*, pipeline with a maximum allowable operating pressure (MAOP) greater than 60 psig), including non-line pipe, appurtenances, and facilities, which result in consequences such as injuries, fatalities, and/or damages to infrastructure.

The SoCalGas HP System Risk is substantially similar to the SDG&E HP System Risk because the threats are the same, and the SoCalGas/SDG&E high pressure transmission system is managed in an integrated manner.

C. Data Sources Used to Quantify Risk Estimates[8]

SoCalGas utilized internal data sources to determine an HP System Risk System Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where if internal data is deemed insufficient, supplemental industry or national data is used, as appropriate, and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories (*i.e.*, a transmission pipeline rupture in an HCA). Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

The probability of failure component of the quantitative risk models for high pressure gas assets is primarily derived from failure rates sourced from SoCalGas, SDG&E, and broader industry data. Time-dependent phenomena such as material degradation (*e.g.*, corrosion), are accounted for using an exponential model to characterize changes in failure likelihood over time. This approach has not yet been implemented across all threat categories. Where time-dependent modeling is not yet available, the

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in comparison with in-service incidents. Thresholds for the transition from leak to rupture also were evaluated for immediate as well as delayed mechanical damage incidents with reference to full-scale test data, incident data, and mechanics and fracture analysis. Full-scale test data indicated this threshold was in excess of 30 percent of SMYS, the lowest threshold identified for rupture due to corrosion, whereas the steels represented in reportable incidents possess toughness [sic] indicated a threshold on order of 25 percent of SMYS.

[8] Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

absence of explicit time-dependent modeling should not be interpreted as indicating these assets are unaffected by time-dependent trends.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of the HP System Risk, including a risk Bow Tie, which delineates potential Drivers/Triggers and potential Consequences, followed by a description of the Tranches determined for this risk.

A. Risk Selection

HP System Risk was included as a risk in SoCalGas's 2021 RAMP and was included in the 2022, 2023, and 2024 Enterprise Risk Registries (ERR).[9] SoCalGas's ERR evaluation and selection process is summarized in Chapter RAMP-2, Enterprise Risk Management Framework and in Chapter RAMP-3 Risk Quantification Framework.

SoCalGas selected this risk in accordance with the RDF Row 9.[10] Specifically, SoCalGas assessed the top risks from the Company's 2024 ERR based on the Consequence of a Risk Event (CoRE) Safety attribute. HP System Risk was among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks on December 17, 2024 at a Pre-Filing Workshop. HP System Risk was selected based on the qualification of its Safety risk attribute, as required under the RDF. At the pre-filing workshop, no party expressed opposition to including this risk in SoCalGas's 2025 RAMP Report.

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, possible Drivers, potential Consequences, and a mapping of the elements in the Bow Tie to the mitigation(s) that address them.[11] As illustrated in the risk Bow Tie shown below in Figure 1, the risk event (center of the Bow Tie) is an HP System Risk that leads to failure of an high pressure asset, the left side of the Bow Tie illustrates Drivers/Triggers that could lead to the HP System Risk that may cause a HP System Risk event asset failure, and the right side shows the Potential Consequences of the HP System Risk event.

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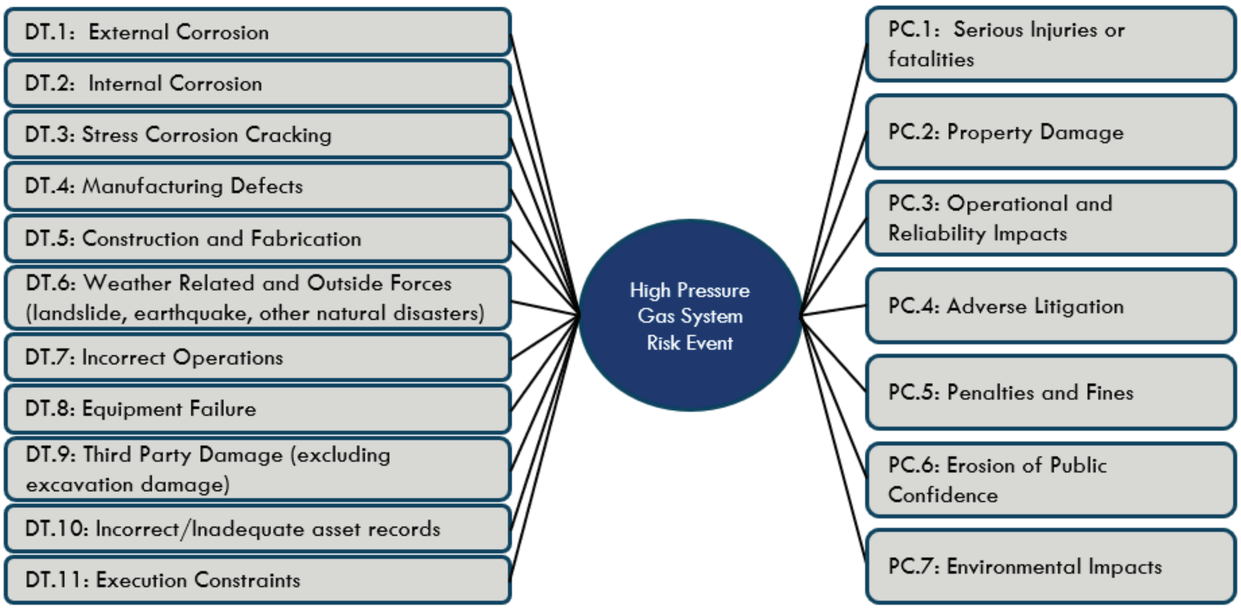
9 In the 2021 RAMP Report this risk was called Incident Related to the High Pressure System. For 2025, the following was added to the risk definition, to further define high-pressure pipeline: "(including non-line pipe, appurtenances, and facilities) that…"

10 D.24-05-064, RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's Enterprise Risk Register (ERR) comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars."

11 D.24-05-064, RDF Row 15.

SoCalGas applies this framework to identify and summarize the information provided in Figure 1. A mapping of each mitigation to the addressed elements of the risk Bow Tie is provided in Attachment C.

Figure 1
High Pressure Gas System: Risk Bow Tie



C. Potential Risk Event Drivers/Triggers[12]

When performing a risk assessment for the HP System Risk, SoCalGas identifies potential leading causes, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset.[13] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 – External corrosion:** A naturally occurring phenomenon commonly defined as the deterioration of a material (usually a metal) that results from a chemical or electrochemical reaction with its environment.[14] This risk driver is based on the potential

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

[13] D.24-05-064, RDF Rows 10-11.

[14] *See* ASME B31.8S.

for corrosion on the external surface of assets, such as steel tubing, casing, and pipelines exposed to corrosive environments.

- **DT.2 – Internal corrosion:** Deterioration of the interior of a pipeline attributable to environmental conditions inside the asset.[15]
- **DT.3 – Stress Corrosion Cracking:** A type of environmentally assisted cracking usually resulting from the formation of cracks due to various factors in combination with the environment surrounding the pipe that together reduce the pressure-carrying capability of the pipe.[16]
- **DT.4 – Manufacturing Defects:** This risk driver is based on the potential for failure due to defects introduced during the manufacturing process. It is attributable to material defects within the pipe, component, or joint due to faulty manufacturing procedures, design defects, or in-service stresses such as vibration, fatigue, and environmental cracking.
- **DT.5 – Construction and Fabrication:** This risk driver is attributable to the construction methodology applied during the installation of pipeline components typically based on the vintage of the construction standards, fabrication techniques (welding, bending, etc.), and overall guiding regulations.
- **DT.6 – Weather Related and Outside Forces (landslide, earthquake, other natural disasters):** This risk driver is attributable to causes not involving humans, and includes the effects of climate change. This driver includes events such as earth movement, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperature, thermal stress, frozen components, and high winds.
- **DT.7 – Incorrect Operations:** This risk driver may include a pipeline incident attributed to insufficient or incorrect operating procedures or the failure to follow a procedure.
- **DT.8 – Equipment Failure:** This risk driver is attributable to malfunction of a component, including but not limited to, regulators, valves, meters, flanges, gaskets, collars, and couples.

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15 *Id.*

16 *Id.*

- **DT.9 – Third-Party Damage (excluding excavation damage):**[17] This risk driver is attributable to outside force damage other than excavation damage or natural forces, such as damage by car, truck, or motorized equipment not engaged in excavation.
- **DT.10 – Incorrect/Inadequate Asset Records:** This risk driver is attributable to the use of inaccurate or incomplete information that could result in the failure to (1) construct, operate, or maintain SoCalGas's pipeline system safely and prudently; or (2) to satisfy regulatory compliance requirements.
- **DT.11 – Execution Constraints:** This risk driver refers to events (excluding those covered by outside force damages) that impact the Company's ability to perform as planned. Examples include, but are not limited to, reduced availability of materials or operational oversight, delays in response and awareness, resource constraints, and/or inefficiencies and reallocation of (human and material) resources, unexpected maintenance, or regulatory requirements.

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed on the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this Risk by analyzing internal data sources where available, industry data, and subject matter expertise (SME).[18] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

- **PC.1: Serious Injuries or Fatalities**
- **PC.2: Property Damage**
- **PC.3: Operational and Reliability Impacts**
- **PC.4: Adverse Litigations**
- **PC.5: Penalties and Fines**
- **PC.6: Erosion of Public Confidence**
- **PC.7: Environmental Impacts**

These potential consequences were used by SoCalGas to assess HP System Risk during the development of its 2024 ERR.

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17 Excavation damage is addressed in a separate risk chapter.

18 D.24-05-064, RDF Row 10.

E. Evolution of Risk Drivers and Consequences

As specified in the Phase 3 Decision[19], the following changes to the previous ERR and/or the 2021 RAMP include:

- The title of *High Pressure Gas System* was changed from *Incident Related to the High Pressure System (Excluding Dig-In*) to align an updated ERR taxonomy for 2025.
- The scope of *High Pressure Gas System* has been expanded. In the 2021 RAMP, *Incident Related to the High Pressure System (Excluding Dig-In)* was limited to high-pressure assets managed by the Transmission and Distribution Operations Departments. For the 2025 RAMP, *High Pressure Gas System* also includes aboveground assets in SoCalGas's storage fields, which were previously included in *Incident Related to the Storage System (Excluding Dig-In)*.

1. Changes to Drivers/Triggers of the Risk Bow Tie

- DT.6 – "Outside Forces (natural disasters, fire, earthquake)" in the 2021 RAMP was changed to "Natural Forces (natural disasters, fire, earthquake)" in the 2024 ERR, and "Weather Related and Outside Forces (landslide, earthquake, other natural disasters)" for the 2025 RAMP.
- DT.9 – "Third Party Damage (except underground damages)" in the 2021 RAMP was changed to "Third Party Damage (excluding excavation damage)."

2. Changes to Potential Consequences of the Risk Bow Tie

- PC.7 – Added "Environmental Impacts."

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP - 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined:

[19] D.24-05-064, RDF Row 8.

Table 1: High Pressure Gas System Risk
Tranche Identification

Class	**Number of LoRE-CoRE Pairs**	**Number of Resulting Tranches**
HP Pipe	908	20
Facilities	39	12
TOTAL	**947**	**32**

Attachment D illustrates the derivation of the Tranches, as shown in Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas subject matter experts as logical groups of assets and systems based on the Company's operations. These classes also align risk treatments with asset risk profiles reflective of SoCalGas's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches is provided in workpapers.

III. PRE-MITIGATION RISK VALUE

In accordance with RDF Row 19, the table below provides the pre-mitigation risk values for the HP System Risk. Further details, including pre-mitigation risk values by Tranche, are provided in workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3 Risk Quantification Framework.

Table 2: High Pressure Gas System Risk
Monetized Risk Values
(Direct, in 2024 $ millions)

LoRE	**CoRE [Risk-Adjusted Attribute Values]**			**Total CoRE**	**Total Risk [LoRE x Total CoRE]**
	Safety	**Reliability**	**Financial**		
81.19	$1.86	$0.09	$0.31	$2.27	$183.98

A. Risk Value Methodology

SoCalGas's risk modeling for HP System Risk follows RDF guidance[20] for implementing a Cost Benefit Approach, as described below:

[20] D.24-05-064, RDF Rows 2-7.

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** HP System Risk is quantified in a combined attribute hierarchy as shown in the table above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** SoCalGas uses observable and measurable data to estimate CoRE values for HP System Risk. SoCalGas utilized a combination of internal data and external data to estimate consequences in terms of natural units (*e.g.*, fatalities, serious injuries, and meters out) that occur as the result of a risk event that could occur on the HP System.
3. **Cost Benefit Approach Principle 3-Comparison (RDF Row 4):** HP System Risk quantification did not include any attributes that are not directly measurable, so proxy data, as described in the RDF, was not necessary.
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** The data sources used for HP System Risk, as described in the preceding paragraphs, are sufficient to model probability distributions for use in estimating risk values.
5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas and SDG&E used a California-adjusted Department of Transportation monetized equivalent to calculate the Safety CoRE attribute at a monetized equivalent of $16.2 million per fatality, and $4.1 million per serious injury;[21] the Gas Reliability CoRE attribute is valued at a monetized equivalent of $3,868 per gas meter outage; and the Financial CoRE attribute is valued at $1 per dollar.[22]

Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, and technical references is provided in workpapers.

[21] *See* D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost Benefit Approach in the RDF using the DOT VSL as the standard value.").

[22] *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

6. Cost Benefit Approach Principle 6-Adjusted Attribute Level (Row 7):

Table 3: High Pressure Gas System Risk
Risk Scaled vs Unscaled Value by CoRE Attribute
(Direct, in 2024 $ millions)

	Safety	Reliability	Financial	Total
Unscaled Risk Value	$19.4	$1.8	$23.7	$44.9
Scaled Risk Value	$151.4	$7.6	$25.0	$184.0

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for HP System Risk. Like all SoCalGas RAMP risks, a convex risk-averse scaling function is applied to the monetized levels of each CoRE attribute for high potential events, resulting in risk-adjusted attribute levels. The societal risk-averse scaled values reflect a wide range of possible outcomes, including multiple fatalities and serious injuries from a single event, such as a rupture with ignition in HCAs, such as Class 3 or 4 locations. Consequently, the risk adjustment is more significant as compared to medium pressure pipes, where the range of possible outcomes from one event is narrower.

Further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter-RAMP-3.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for HP System Risk and reflects changes expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place in 2024, and which are expected to be ongoing, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[23] information through 2027 is calculated as part of the baseline risk, in

[23] *See* D.24-12-074.

accordance with D.21-11-009.[24] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test Year (2029, 2030, and 2031).[25]

Table 4: High Pressure Gas System Risk
2024-2031 Control and Mitigation Plan Summary

ID[26]	Control/Mitigation Description[27]	2024 Control	2025-2031 Plan
C010	Pipeline Monitoring Technologies	X	Ongoing
C013	Gas Transmission Safety Rule – MAOP Reconfirmation	X	Ongoing
C104	Cathodic Protection - Capital	X	Ongoing
C108	Cathodic Protection – Maintenance	X	Ongoing
C105	SCADA Operations	X	Ongoing
C109	Control Room Monitoring Operation and Fatigue Management	X	Ongoing
C113	Leak Repair	X	Ongoing
C117	Leak Survey & Patrol	X	Ongoing
C118	Rupture Mitigation Valve Installation – Valve Rule	X	Ongoing
C125	Pipeline Relocation/Replacement	X	Ongoing
C126	Shallow/Exposed Pipe Remediations	X	Ongoing
C132	Pipeline Maintenance	X	Ongoing
C136	Compressor Stations – Capital	X	Ongoing
C142	Compressor Station – Maintenance	X	Ongoing
C145	Class Location (Hydrotest)	X	Ongoing
C151	Measurement & Regulation Station - Capital	X	Ongoing

[24] D.21-11-009 at 136 (Conclusion of Law (COL) 7) (providing a definition for "baselines" and "baseline risk").

[25] In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

[26] The order of Control Programs is based on logical groupings of similar controls rather than numerical.

[27] Controls that are conducted by different operational organizations (*i.e.*, Distribution, Transmission, and Storage operations) are separated based on how activities are accounted for. Similarity of controls (*e.g.*, C117 and C178) are a result of this delineation and reflect the different categories of high pressure assets (*i.e.*, high pressure Distribution pipelines vs. high pressure Transmission pipelines). Some of these controls also appear in SCG-Risk-3 because the controls include activities that are performed on both high pressure and medium pressure pipes (*e.g.*, C179 [Distribution Main and Service Leak Repair], which is executed within Distribution Operations).

ID[26]	Control/Mitigation Description[27]	2024 Control	2025-2031 Plan
C155	Measurement & Instrumentation - Maintenance	X	Ongoing
C156	Quality Assurance Transmission Assets	X	Ongoing
C160	Odorization	X	Ongoing
C171	Integrity Assessments & Remediation: Transmission Integrity Management Program (TIMP)	X	Ongoing
C157	PSEP Phase 1A	X	Ongoing
C185	PSEP Phase 1B	X	Ongoing
C186	PSEP Phase 2A	X	Ongoing
C014	Storage HP Field Maintenance – Aboveground Facilities	X	Ongoing
C016	Storage HP Field Maintenance – Aboveground Piping	X	Ongoing
C019	Storage HP Retrofits and Upgrades to Purification Equipment	X	Ongoing
C103	Cathodic Protection Base Activities	X	Ongoing
C116	M&R Station and EPM Inspection and Maintenance	X	Ongoing
C123	Regulator Station Replacement	X	Ongoing
C134	Pipeline Monitoring	X	Ongoing
C135	EPM Installations & Replacements	X	Ongoing
C170	CP Install/Replace Impressed Current Systems	X	Ongoing
C174	Service Replacement	X	Ongoing
C177	Main Replacements _Leakage Abnormal Op. Conditions CP Related	X	Ongoing
C178	Distribution Leak Survey	X	Ongoing
C179	Distribution Main and Service Leak Repair	X	Ongoing

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place" as called for in Step 2 of the RAMP 10-step process adopted in the Settlement

Decision[28] (*i.e.*, t activities in this section were in place as of December 31, 2024. Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

- **C010 – Pipeline Monitoring Technologies:** The Control Center Modernization (CCM) organization has begun deploying new field pipeline monitoring technologies along evacuation-challenged HCAs and new and replaced transmission pipelines. These field monitoring assets (*i.e.*, fiber optic sensing cables and methane sensors) allow Gas Control to monitor pipelines more quickly and identify and respond to abnormal operating or emergency conditions resulting from risk drivers. These new field pipeline technologies provide multiple safety and reliability benefits, including, but not limited to:
    - Faster response times to incidents and reduction of severity of incidents due to the ability to monitor and respond to unfolding incidents in real time.
    - Centralized and modernized technology, increasing operational efficiency and improving the speed and ability to manage incidents, enhancing public, infrastructure, and employee safety.
- **C013 – Gas Transmission Safety Rule – MAOP Reconfirmation:** Pursuant to 49 CFR section 192.624, which was initially published in October 2019 as part of PHMSA's Pipeline Safety: Safety of Gas Transmission Pipelines: MAOP Reconfirmation, Expansion of Assessment Requirements, and Other Related Amendments Final Rule (GTSR Part 1), SoCalGas is required to reconfirm, by July 2035, the Maximum Allowable Operating Pressure (MAOP) of transmission lines that meet the applicability requirements of 49 CFR section 192.624(a). Separate from the State-mandated Pipeline Safety Enhancement Plan (PSEP), discussed further below, SoCalGas has identified approximately 287 miles out of 3,381 miles of SoCalGas's transmission pipelines that currently fall within the scope of MAOP reconfirmation. For these pipelines, reconfirmation must be performed using one of six prescribed methods: pressure testing, replacement, pressure reduction, engineering critical assessment (ECA), pressure reduction for lines with a small Potential Impact Radius (PIR), and/or an alternative technology approved by PHMSA.

[28] D.18-12-014 at 33.

The MAOP reconfirmation program, incorporated in SoCalGas's Integrated Safety Enhancement Plan,[29] reduces the risk of failure on the high pressure gas system through the re-evaluation of a pipeline's MAOP and, when necessary, repair/remediation of each pipeline within the scope of the program. SoCalGas has begun this work and plans to continue it beyond 2031 until pipelines subject to this requirement have been reconfirmed in accordance with the deadlines established by PHMSA in 49 CFR section 192.624(b). With ongoing work on pipelines that may result in changes to records, SoCalGas continues to review and refine the total miles of pipe that require MAOP reconfirmation.

This control also includes a variety of activities related to supporting the MAOP reconfirmation program and other emergent activities resulting from new federal safety regulations (*e.g.*, data analysis and management, reporting, planning, process development, and quality assurance). Because this program includes a variety of activities to comply with GTSR Part 1, a single unit of measure was not identified to reflect the breadth of work. SoCalGas monitors and evaluates federal regulatory and industry activity to identify and, where applicable, adopt best practices and compliance measures to enhance the safety of its pipeline system.

- **C104 – Cathodic Protection – Capital:** Cathodic protection (CP) activities consist of the planning, installation, construction, and closeout of rectifiers/deep well anode beds, remote power, and pipeline coating replacements on transmission pipelines. Corrosion on pipelines increases the risk of leaks and may reduce the useful life of the pipelines. In addition to applying coating and electrical isolation, CP is a method for mitigating external corrosion on steel pipelines. CP combats corrosion by imposing an electric current flow toward the surface of the pipeline, which means keeping the pipeline negatively charged (cathodic) with respect to the surrounding soil. This results in reduced corrosion on the pipeline system. Rectifiers/deep well anode beds drive the electrochemical reaction required for cathodic protection via an impressed current system along SoCalGas pipelines. The utilization of remote power allows SoCalGas the

[29] As presented by SoCalGas in its TY 2024 GRC application, the Integrated Safety Enhancement Plan combines federal requirements (49 C.F.R. § 192.624 (2020)) and state requirements (D.19.09-051 (Ordering Paragraph (OP) 15) at 779-780) for the development of traceable, verifiable, and complete pressure test records where applicable.

flexibility to install impressed current systems without having to find a power supply and instead focus on the most effective placement for an impressed current system. Pipeline coating replacements allow SoCalGas to replace the pipeline's first line of defense against corrosion-related defects and reduce the amount of CP current needed to protect the newly recoated portion of the pipeline. These activities are necessary to maintain or improve the pipeline CP system, extend the life of pipeline assets, and maintain compliance with 49 CFR Section 192.463. The variety of described work activities in this category makes it infeasible to identify a single unit of measurement.

- **C108 – Cathodic Protection – Maintenance:** Cathodic protection maintenance activities consist of annual electrical test station (ETS) reads, bi-monthly current source inspections, and annual rectifier maintenance on transmission pipelines. These activities involve the following: read/record voltage and verify compliance, inspect ETSs for signs of damage, verify ID tags and test leads for correct information and good condition, verify rectifier proper operation, read/record voltage and amperage across rectifier, clean and tighten current carrying connections on rectifier, clean ventilating screens on rectifier units, calibrate voltage and amperage meters on rectifiers, repair damaged wires, check fuses/circuit breakers, clean off rectifier units, replace rectifier ID tags, and diagnose and troubleshoot substandard conditions or out of tolerance reads. These activities are necessary to maintain or improve the pipeline CP system, extend the life of the pipeline, and maintain CP compliance prescribed by 49 CFR Part 192 Subpart I – Requirements for Corrosion Control. The variety of work activities in this category makes it infeasible to identify a single unit of measurement.
- **C105 – SCADA Operations:** Gas Control and the Supervisory Control and Data Acquisition (SCADA) Operations groups are responsible for remote monitoring, control, and real-time operations of SoCalGas and SDG&E's combined gas transmission system, including associated pipelines, line compressor stations, and underground storage facilities. The SCADA Operations department manages the SCADA system's planning, operation, and maintenance. The SCADA system provides remote monitoring and operation of valves, compressors, pressure regulation equipment, and gas flow across the system. The organization's responsibilities include compliance with 49 CFR section 192.631 regarding alarm management, system change management, fatigue mitigation,

system operating experience, and personnel training requirements. The variety of work activities in this category makes it infeasible to identify a single unit of measurement.

- **C109 – Control Room Monitoring, Operation, and Fatigue Management:** Control Room Monitoring and Operation activities consist of 24/7 operation of the transmission pipeline system in a real-time Control Room environment. This is necessary to provide a continuous, centralized, and holistic view of system health, and where the remote monitoring and operation of valves, compressor stations, pressure regulation equipment, and gas flow across the system enables controllers to acknowledge, react, and respond to both normal and abnormal operating conditions. This allows coordination of necessary pipeline shutdowns for maintenance and/or emergency measures. The Control Room serves as a communication center between various departments conducting maintenance on the transmission pipeline system, upholding public safety, maintaining system reliability, and developing a daily operating plan that includes demand forecasts and facility utilization. It also allows for the preparation of contingencies for changes in system conditions resulting from weather patterns and loads, forecast errors, and abnormal operating conditions. Fatigue management consists of implementing methods to reduce the risk associated with controller fatigue that could inhibit a controller's ability to carry out their role and responsibilities. To validate proper fatigue management, shift lengths and schedule rotations are established to provide controllers with adequate rest, train controllers and supervisors to recognize the effects of fatigue, and educate controllers and supervisors in fatigue mitigation strategies. These methods support public safety and system reliability, and meet regulatory requirements prescribed by 49 CFR section 192.631. The variety of activities in this category makes it infeasible to identify a single unit of measurement.
- **C113 – Leak Repair:** Leak repair activities consist of the planning, installation, construction, and closeout of projects initiated due to leaks on transmission pipelines or appurtenances. Classification of leaks is based on the relative degree of hazard and must be remediated in accordance with the timelines set out by General Order 112 F. Leak repair activities are necessary to support public safety and system reliability, and meet regulatory requirements prescribed by 49 CFR section 192.717. The variety of activities in this category makes it infeasible to identify a single unit of measurement, as the scope

of work is project-specific and varies significantly from project to project.

- **C117 – Leak Survey & Patrol:** Instrument Leak Survey & Patrol activities consist of semi-annual leak and patrol surveys, quarterly patrols, and special leak and patrol surveys on transmission pipelines. These activities involve the following: observing surface conditions of rights of way, detecting leaks, reporting conditions affecting the safety or access of the pipeline, checking for right-of-way encroachments, reporting nearby development, replacing missing or damaged pipeline markers, and inspecting railroad crossings. These activities are necessary to maintain or improve the pipeline system, extend the life of pipeline assets, and maintain compliance with 49 CFR sections 192.705 and 192.706. The variety of activities described in this category makes it infeasible to identify a single unit of measurement.
- **C118 – Rupture Mitigation Valve Installation – Valve Rule:** On April 8, 2022, PHMSA amended 49 CFR Parts 192 and 195 through the publication of the *Pipeline Safety: Requirement of Valve Installation and Minimum Rupture Detection Standards* Final Rule (Valve Rule), which became effective on October 5, 2022. The rule requires operators to install rupture mitigation valves (RMVs) on newly constructed or "entirely replaced"[30] transmission pipeline segments with six inches or greater diameters, and perform risk analyses annually to identify RMV installation opportunities. The activities of this control mitigate the risk of pipeline ruptures and enable a faster response time should a failure occur due to natural forces (*e.g.*, natural disasters, fires, earthquakes, landslides), third-party damage, vandalism, or other causes.

  This control includes valve installations planned in compliance with the Valve Rule, which includes installations previously identified as part of the PSEP Valve Enhancement Plan (VEP) but which have not been completed prior to this RAMP filing.[31] SoCalGas completed its first annual risk analysis in 2023 to identify areas where RMV installations are appropriate, and the forecast of activities is an initial estimate based on

[30] 49 CFR § 192.3 provides that "Entirely replaced onshore transmission pipeline segments means, for the purposes of §§ 192.179 and 192.634, where 2 or more miles, in the aggregate, of onshore transmission pipeline have been replaced within any 5 contiguous miles of pipeline within any 24-month period. This definition does not apply to any gathering line."

[31] Historical activity reflects the work completed under the PSEP VEP up through 2024.

this analysis and the current strategy to efficiently execute Valve Rule requirements by leveraging the processes, resources, and plans developed for the PSEP VEP.

- **C125 – Pipeline Relocation/Replacement:** Pipeline relocation and replacement activities consist of planning, installation, construction, and closeout of pipeline reroutes triggered by weather-related external forces, municipality requests, right-of-way agreements, or class location changes. Pipeline replacements due to changes in operating class are time-sensitive and must be completed within 24 months of the class location change.[32] These relocation and replacement activities are necessary to reduce the potential for pipeline damage, support public safety, and maintain pipeline access. The variety of activities in this category makes it infeasible to identify a single unit of measurement, as project costs and scopes in this category vary significantly from project to project.
- **C126 – Shallow/Exposed Pipe Remediations:** Shallow or exposed pipe activities consist of the planning, installation, construction, and closeout of projects to add additional cover or protection to Transmission pipelines. Exposed pipelines are inspected for signs of corrosion, metallurgical flaws, construction flaws, and mechanical damage. Concrete revetment mats (technology designed to help prevent shoreline erosion), installation of a drop section, and/or additional earth coverage are installed to prevent damage to exposed/shallow pipes caused by corrosion, third-party damages, erosion, or other external forces. These activities are necessary to support public safety, reduce the potential for pipeline damage, and extend the life of pipeline assets. The variety of activities in this category makes it infeasible to identify a single unit of measurement.
- **C132 – Pipeline Maintenance:** Pipeline Maintenance activities consist of class location surveys, valve inspections, vault inspections, and bridge and span inspections on transmission pipelines. These activities involve the following: surveying lines to identify and report changes in population density, verifying ID tags for correct information and good condition, partially operating valves (*i.e.*, open/close) to confirm good working condition, inspecting and servicing actuators, lubricating valves, checking for atmospheric corrosion, testing for combustible gas, as well as inspecting covers, ventilation systems, the structural condition of vaults, vault ladders, steps, and handrails. These activities are

[32] 49 CFR § 192.611(d).

necessary to maintain or improve the pipeline system, extend the life of pipeline assets, and maintain compliance with 49 CFR sections 192.745 and 192.749. The variety of activities in this category makes it infeasible to identify a single unit of measurement.

- **C136 – Compressor Stations – Capital:** Compressor station activities consist of the planning, installation, construction, and closeout of compressor upgrades, pipe replacements, valve replacements, and equipment upgrades, including water, oil, and air systems at compressor stations. These upgrades are required over time due to the normal wear and tear of compressor station equipment. These activities are necessary to maintain or improve system reliability, extend equipment and system life, and support public safety. The variety of activities in this category makes it infeasible to identify a single unit of measurement.
- **C142 – Compressor Station – Maintenance:** Compressor Station Maintenance activities consist of compressor unit inspections, primary and backup power generator inspections, fire water system and emergency system inspections, programable logic controllers (PLC) and instrumentation inspections, valve inspections, vessel inspections, tank inspections, scrubber inspections, relief valve inspections, actuator/controller and regulator inspections, and leak surveys on compressor station equipment and pipeline systems. The above-mentioned activities involve the following: complete periodic performance analysis and time-based overhauls on main compressor units and generators; function test fire water systems and emergency systems (including Station ESD and gas detection systems); maintenance and calibration of PLC systems, pressure and temperature transmitters, flow meters, pressure regulators, uninterruptible power supply systems, odorant sensing equipment and gas moisture monitoring systems; verify ID tag information and good condition; examine operating valves, inspect and service actuators, and lubricate valves; check for atmospheric corrosion; test for combustible gas; test/record set points and/or verify rupture disc rating; check supply regulators for proper operation; check for leakage; blow/inspect supply filters; check hydraulic fluid levels; check controller for proper operation; and test/record set points. These activities are necessary to maintain or improve the pipeline system, extend the life of pipeline and compressor assets, and maintain compliance with 49 CFR sections 192.731. The variety of activities in this category makes it infeasible to identify a single unit of measurement.

- **C145 – Class Location (Hydrotest):** Class Location (Hydrotest) consists of hydro-testing transmission pipeline segments operating out of class due to new developments increasing population density in the area surrounding the pipeline. This activity supports the safe operation of SoCalGas's pipelines by confirming that pipe segments meet the standards prescribed by 49 CFR § 192.609 for new class locations. The variety of activities in this category makes it infeasible to identify a single unit of measurement.
- **C151 – Measurement & Regulation Station – Capital:** Measurement & Regulation Station – Capital activities consist of the planning, installation, construction, and closeout of redesigns/upgrades for pressure limiting stations, metering stations, Company-owned facilities at customer meter set assemblies, and control valve stations on transmission pipeline systems. These upgrades are required to replace aging equipment with new equipment to enhance functionality. The safety and reliability of SoCalGas's transmission system depends on the meter and regulator equipment used to control the flow of natural gas in transmission pipelines using valves and regulator stations. These activities are necessary to maintain or improve system reliability, extend equipment and system life, and support public safety. The variety of activities in this category makes it infeasible to identify a single unit of measurement, as project costs and scopes vary significantly from project to project in this category.
- **C155 – Measurement & Instrumentation – Maintenance:** Measurement & Instrumentation – Maintenance activities consist of valve inspections, vault inspections, producer station inspections, pressure limiting station inspections, relief valve inspections, and actuator/controller and regulator inspections on transmission pipelines. These activities involve the following: verifying ID tags for correct information and good condition; partially operating valves to confirm good working condition; inspecting and servicing actuators; lubricating valves; checking for atmospheric corrosion; testing for combustible gas; inspecting covers, ventilation systems, structural condition of vaults, vault ladders, and test/record set points; verifying rupture disc rating; checking supply regulators for proper operation; checking for leakage; blowing/inspecting supply filters; checking hydraulic fluid levels; checking controller for proper operation; and testing/recording set points. These activities are necessary to identify or remediate developing system deficiencies during the performed activities, to maintain or improve the

pipeline system, extend the life of the pipeline, and maintain compliance with49 CFR section 192.739. The variety of activities in this category makes it infeasible to identify a single unit of measurement.

- **C156 – Quality Assurance Transmission Assets:** The Gas Compliance Quality Management Team (GQCM) conducts annual quality assessments of a random selection of completed leak survey orders. Specifically, the GQCM team reviews required documentation (equipment logs), performs leakage equipment tests, and conducts field assessments using GIS maps. During the field assessments, the GQCM team reviews the meter and meter set assembly, checks for missed leaks, and assesses the pipe structure for integrity. These activities help to maintain system reliability, promote public and infrastructure safety, and validate compliance with applicable regulations.
- **C160 ‑ Odorization:** Odorization activities consist of delivering and safely storing odorants at SoCalGas receipt points and monthly odor intensity testing on transmission pipelines. Odorant deliveries are required throughout the year as the volume of odorants in the odorant tanks depletes at different rates based on gas throughput. Odorization is required to provide natural gas with a readily detectable smell to promote public safety. The odor intensity testing involves testing gas to verify that a recognizable amount of gas odor is detectable, testing for any harmful components, and calibrating appropriate equipment intervals. These activities are necessary to support public safety and system reliability, as well as meet regulatory requirements prescribed by 49 CFR section 192.625. The variety of activities in this category makes it infeasible to identify a single unit of measurement.
- **C171 – Integrity Assessments & Remediations: Transmission Integrity Management Program (TIMP):** Through the TIMP, SoCalGas continuously manages the integrity and safety of its transmission pipeline system, conducting a robust set of federally mandated activities.[33] SoCalGas identifies threats to transmission pipelines in HCAs, moderate consequence areas (MCAs), and Class 3 and Class 4 locations not in HCAs or MCAs; determines the risk posed by these threats; schedules prescribed assessments to evaluate these threats; collects information about the condition of pipelines; and takes

[33] 49 C.F.R. Part 192, Subpart O and 49 C.F.R. § 192.710 (2023).

actions to minimize applicable threat and integrity concerns to reduce the risk of a pipeline failure.

The TIMP Threat and Risk Assessment process includes an evaluation of the Likelihood of Failure (LOF), using threat categories such as those discussed in Section I.A. (External Corrosion, Internal Corrosion, Stress Corrosion Cracking, Manufacturing, Construction, Equipment, Third Party Damage, Incorrect Operations, and Weather Related and Outside Force), and the Consequence of Failure (COF), using pipeline operational parameters and information about the area near the pipeline. The LOF multiplied by the COF produces the pipeline's Relative Risk Score, which is then used to inform assessment scope and methods. Information about the physical condition of transmission pipelines is collected regularly through integrity assessments.

At a minimum of every seven years for pipeline segments in HCAs and every ten years for other pipeline segments, transmission pipelines within the scope of TIMP are assessed using methods such as In-Line-Inspection (ILI), Direct Assessment, or Pressure Test, and remediated as needed. Generally, ILI is the preferred assessment method to identify potential pipeline integrity threats due to the amount of data that can be collected on the pipeline during this process. During an ILI, intelligent pipeline inspection devices are inserted into pipelines to collect pipeline condition data via sensors; such data includes but is not limited to wall thickness measurements, geographical positioning of features, as well as measurements and locations of anomalies such as dents and cracks. Assessment method selection depends on factors such as the threats that require assessment,[34] pipeline characteristics, and operational considerations.

Upon detection during pipeline assessments, anomalies are classified and addressed based on severity, with the most severe requiring immediate action. Actions are then taken to address applicable threats and integrity issues to increase safety and prevent pipeline failures. SoCalGas may remediate pipe to reduce risk where corrosion, welding joint failure, or other forces are occurring or have occurred. When appropriate, post-assessment pipeline repairs or replacements are intended to increase public and employee safety by reducing or eliminating conditions that might lead to an incident.

[34] 49 CFR §§ 192.921(a) & 192.937(c).

The number and types of TIMP activities vary yearly and are based on the timing of previous assessments performed in the same locations. The TIMP consists of both O&M and capital activities, which are primarily driven by the number of assessments completed and the results of those assessments. Capital activities consist of data application improvements and a variety of remedial actions, dependent upon the O&M assessment activities, which cannot be unitized.

The TIMP reduces the risk of failure to the transmission system, and, on a continual basis, the Integrity Management department evaluates the effectiveness of the program and scheduled assessments.

- **Pipeline Safety Enhancement Plan (PSEP):** SoCalGas's PSEP is an ongoing plan to replace, or pressure test all natural gas transmission pipelines that have not been strength tested or for which traceable, verifiable, and complete records of such testing are not available, as directed by the California Public Utilities Commission in D.11-06-017 and later codified in California Public Utilities Code sections 957 and 958. Separate from the testing or replacement of pipelines within the scope of PSEP, the program also includes a valve enhancement plan, as required by the Commission in D.11-06-017.[35]

  The primary objectives of PSEP are to enhance public safety, comply with Commission directives and California statutory mandates, maximize cost-effectiveness, and minimize customer and community impacts from these safety investments. As directed by the Commission, the program includes a risk-based prioritization methodology that prioritizes pipelines located in more populated areas ahead of pipelines located in less populated areas and further prioritizes pipelines operated at higher stress levels above those operated at lower stress levels. PSEP is divided into two phases, and each phase is further subdivided into two parts, resulting in four separate phases described below: Phase 1A, Phase 1B, Phase 2A, and Phase 2B.[36]

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[35] D.11-06-017 at 30 (COL 9), 32 (OP 8).

[36] Phase 2B pipelines are those that have documentation of a pressure test that predates the adoption of federal testing regulations in 1970, specifically, 49 C.F.R. Part 192, Subpart J. In D.19-09-051, the Commission ordered the development of a Phase 2B implementation plan with specific directives to be included. In response, SoCalGas proposed in its 2024 GRC application to integrate Phase 2B with GTSR Part 1 as part of an Integrated Safety Enhancement Plan (ISEP). SoCalGas also proposed limiting the scope of PSEP to previously authorized Phase 1A, 1B, and 2A projects. As a result, PSEP has not initiated any standalone Phase

PSEP Phase 1A, Phase 1B, and Phase 2A each include projects that recorded costs in 2024, and these phases are discussed below in this section and denoted by control ID.[37]

SoCalGas's PSEP is comprised of projects with spending that is classified in this RAMP Report as either "balanced" or "GRC based." Cost recovery for balanced projects occurs through reasonableness reviews or other means and is not anticipated to be part of the GRC forecast. SoCalGas nevertheless includes a discussion of these classes of projects in this RAMP Report to inform the Commission and stakeholders of these safety risk mitigating activities and to help eliminate potential confusion with respect to projects for which SoCalGas will request cost recovery in the TY 2028 GRC. The balanced PSEP projects are not included in the HP System Risk mitigation plan, and the GRC-based projects are included in the HP System Risk mitigation plan.

- **C157 – PSEP Phase 1A:** Phase 1A encompasses replacing or pressure testing pipelines located in Class 3 and 4 locations and Class 1 and 2 locations in HCAs that do not have sufficient documentation of a pressure test to at least 125% of the MAOP of the pipeline. For reference, determining the Class of a pipeline depends on the type and density of dwellings and human activity within 220 yards of the pipeline. Phase 1A projects are classified as balanced. As of February 28, 2025 SoCalGas has addressed approximately 98.1 miles of Phase 1A pipeline with approximately 2.8 miles remaining to be addressed.
- **C185 – PSEP Phase 1B:** The scope of Phase 1B is to replace pipelines installed prior to 1946 that are incapable of being assessed via inline inspection tools (*i.e.*, "non-piggable" pipelines) with new pipe constructed using state-of-the-art methods and to modern standards, including current pressure test standards. SoCalGas developed this scope of work in response to the Commission's directive to "address retrofitting pipelines to allow for in-line inspection tools that assess pipeline integrity" in D.11-06-017. Non-piggable pipelines cannot accommodate in-line inspection tools that assess pipeline integrity. Pre-1946 pipelines were built

2B projects to date and does not anticipate executing Phase 2B projects during the forecast period (2025-2028). Therefore, Phase 2B has not been assigned a control ID and is not part of this RAMP filing.

37 Some Phase 2B mileage has been incorporated into the scope of Phase 1A, 1B, and 2A projects to realize efficiencies and enhance project constructability.

using historic construction methods and materials (e.g., using girth welds) thar are no longer used today. As of February 28, 2025, SoCalGas has addressed approximately 79.1 miles of Phase 1B mileage with approximately 114.4 miles remaining to be addressed. Phase 1B projects are classified as GRC-based.

- **C186 – PSEP Phase 2A:** Phase 2A encompasses replacing or pressure testing pipelines that do not have sufficient documentation of a pressure test to achieve at least 125% of MAOP and are in Classes 1 and 2 of non-HCAs. Phase 2A projects are classified as both balanced and GRC-based, with the latter being the majority of the projects.[38] As of February 28, 2025 SoCalGas has addressed approximately 326.1 miles of Phase 2A mileage with approximately 348.3 miles remaining to be addressed. The remaining Phase 2A mileage primarily consists of large hydrotest projects in the desert regions of SoCalGas's service territory.

- **C014 – Storage HP Field Maintenance – Aboveground Facilities:** SoCalGas uses its storage assets to efficiently meet gas balancing **requirements** on its transmission pipeline and distribution system. To satisfy these needs, the individual storage facilities act as "gas suppliers" or "consumers," depending upon the withdrawal or injection requirements, as managed by SoCalGas's Gas Control department. Gas withdrawn at high pressure is delivered into the transmission system, and during injection, gas is drawn from the transmission system and further compressed for storage. Fluctuating demands may require storage operations to perform gas injection or withdrawal functions at any hour of the day, 365 days per year. Storage fields are continuously staffed with operating crews and on-call personnel to support these critical 24/7 operations.

  Aboveground storage operation and maintenance activities include, but are not limited to, injection and withdrawal operations, waste water management, electrical infrastructure inspection and maintenance, surface facility inspection and maintenance, corrosion control, compressor station maintenance and operations, dehydration

[38] In D.16-08-003 at OP 5 and 6, the CPUC approved an Energy Division proposal detailing a framework to incorporate PSEP into SoCalGas and SDG&E's next GRCs. Specifically, D.16-08-003 provided for two additional standalone applications for after-the-fact review of the costs incurred to complete Phase 1A projects and one forecast application for authorization to recover the costs of Phase 2 projects. All Phase 1A projects completed after the filing of the two reasonableness reviews, as well as remaining forecasted projects not included in the forecast application, were to be submitted for approval in subsequent GRCs.

maintenance and operations, supervision and engineering and other maintenance regularly throughout the year, including maintenance of pressure monitoring and alarm systems. Storage is critical to maintaining a reliable supply of natural gas in Southern California, particularly during periods of extreme weather conditions occurring locally or out of state, unforeseen pipeline maintenance, or the temporary reduction of interstate supplies for other reasons. Continuous maintenance activities and ongoing investments are necessary for the storage system to provide supply during such periods.

- **C016 – Storage HP Field Maintenance – Aboveground Piping:** SoCalGas performs inspections on certain piping segments within the Storage facilities, including segments that meet the environmentally sensitive criteria outlined in California Code of Regulations, Title 14, section 1774.2.

  Aboveground piping maintenance is completed to maintain compliance with applicable regulations (including California Geologic Energy Management Division (CalGEM), DOT, and PHMSA regulations), safety, and reliability. These activities include, but are not limited to, pipeline patrols, inspections, repairs, leakage surveys, integrity testing, corrosion maintenance, and other maintenance.
- **C019 – Storage HP Storage Retrofits and Upgrades to Purification Equipment:** Purification equipment is used primarily for removing impurities from, or the conditioning of, natural gas withdrawn from storage. Examples of equipment included in this area are dehydrators, coolers, scrubbers, boilers, and tanks. Upgrades to this equipment allow SoCalGas to address potential safety issues related to uncontrolled releases due to equipment failures, maintain or improve reliability, meet gas quality requirements (CPUC GO-58A), and meet the required capacities and specifications of various purification systems.

  Upgrades to purification equipment help mitigate the risk of failure of pressure vessels, heat exchangers, or piping components that could release natural gas or liquids. Dehydration equipment that does not function properly could result in gas that does not meet the pipeline gas quality specifications (CPUC GO 58A), potentially resulting in safety issues or impacts on customer service due to the possible formation of liquids in downstream piping.

- **C103 – Cathodic Protection Base Activities:** This control is specific to cathodic protection activities on Distribution pipelines. Corrosion is a natural process that can deteriorate steel assets and lead to leaks or asset failure. If the gas released from a leak was to migrate and accumulate in a confined space and if a potential ignition source is present or introduced, there is the potential for combustion and injuries or damage to the property. Although SoCalGas operations groups endeavor to respond immediately to such leak situations when notified, such conditions have the potential to lead to an incident within a short amount of time. To mitigate the risk of corrosion and associated leaks and failures, SoCalGas uses CP, coating, and monitoring to protect and extend the life of a steel asset. The application of a CP current is necessary to overcome local corrosion currents along the pipeline that, left unabated, can result in localized corrosion at anodic sites. As discussed earlier, CP can be achieved through the installation of sacrificial anodes or impressed current systems. Each cathodic protection rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding 2 1/2 months, to assess that it is functioning.[39]SoCalGas plans to continue this schedule for these CP-based activities.

  The directives prescribed by 49 CFR Part 192, and followed by SoCalGas, include the monitoring of CP areas, remediation of CP areas that are out of tolerance, and preventative installations to avoid out-of-tolerance areas.
- **C116 – Meter & Regulator (M&R) Station and Electronic Pressure Monitors (EPM) Inspection and Maintenance:** Regulator stations reduce the pressure of gas entering the distribution system from high-pressure pipelines to provide lower pressure within the MAOP limits of the distribution pipeline system. A failure of a regulator station due to mechanical failure, corrosion, contamination, or other causes could result in over-pressurization of the gas distribution system, which may compromise the integrity of distribution pipelines and/or jeopardize public safety.

  Title 49 CFR section 192.739 requires inspections/tests of regulator stations to be conducted annually, at intervals not to exceed 15 months, to maintain these stations and EPMs in good mechanical condition. Functional regulation and monitoring equipment

39 49 CFR § 192.465(a) and (b).

tests are performed as part of the annual inspections. Internal maintenance and inspections are conducted if any device does not perform properly. This consists of disassembling, inspecting, and cleaning the internal components of the regulator. Any worn, corroded, or damaged components are repaired/replaced, and the regulator is reassembled and verified to be in working order prior to being placed back into service.

As regulator stations age, their parts and equipment can begin to wear and become harder to disassemble, increasing maintenance requirements. Regulator stations are designed to maintain continued safe and reliable operation of the station in the event of a failure within either of the station's two "runs."[40] Annual maintenance and inspections are used to record the condition of each station and EPM and identify items that require immediate and long-term action. The overall inspection of the station includes evaluation of the design, condition of the equipment, valves, vaults, and EPMs, and exposure to other outside forces, including flooding and traffic conditions.

- **C123 – Regulator Station Replacement:** SoCalGas's operating and maintenance practices allow the useful lives of regulator stations to be extended. SoCalGas proactively replaces regulator stations prior to the end of their useful life to reduce overall system risk. SoCalGas developed a district regulator station (DRS) relative risk assessment to inform the prioritization of enhancements and replacements of stations. SoCalGas plans to apply the results of the risk assessment by increasing the number of regulator station replacements to reduce safety risks. Risk reduction is achieved when addressing either or both equipment failure probability (LoRE) and consequences (CoRE). Industry practices and philosophies have evolved to modernize antiquated station designs to essentially reduce over/under pressure and outside force risks. While stations have been replaced in the past to address safety concerns, this risk assessment-based approach enables the prioritization and focus of this activity to be driven by safety risk, which will inform this multi-year program.
- **C134 – Pipeline Monitoring:** SoCalGas conducts comprehensive pipeline monitoring and inspection activities to proactively address risk factors before they lead to operational

[40] "Runs" refer to the parallel paths within a regulator station that allow gas to flow through one path while the other is shut off for maintenance or in case of failure. This design is intended to enable continuous operation and pressure control.

and safety issues. The monitoring activities performed by the Gas Distribution Department on high pressure pipelines include pipeline patrols, valve inspections, and maintenance.

The objective of the patrol program is to observe surface conditions on and adjacent to high pressure pipeline rights-of-way for indications of leaks, construction activity, and other factors affecting safety and operation to comply with 49 CFR sections192.705 and192.721.

Pipeline patrols are conducted by trained personnel familiar with the location and operation of the high pressure pipelines. Qualified Distribution Field employees are responsible for using Pipeline Patrol Maps that depict the location of the high pressure pipe and the frequency with which the pipe should be patrolled to aid in pipeline patrol activities. Employees are responsible for installing and maintaining pipeline markers in their operating territories. They replace or repair missing signs or sign information that is no longer legible, dirty, damaged, or containing outdated information (such as incorrect phone numbers).

Valve inspections are performed to promote the proper operation of valves within the high pressure distribution system, which enhances public safety by enabling SoCalGas to control the pressure and flow of gas in the system. Valves operating at optimum effectiveness aim to have areas fully isolated to reduce the risk of incidents in the event of an earthquake or fire. More frequently, when excavation damage occurs, these valves can be operated to quickly create a safe environment to complete repairs and minimize the risk of further incidents. These preventative measures are undertaken in compliance with 49 CFR section 192.747.

- **C135 – Electronic Pressure Monitor Installations & Replacements:**

The purpose of Electronic Pressure Monitoring (EPM) is to monitor and record system operating pressures and generate alarms when pressures exceed or drop below alarm set points, monitoring for MAOP exceedance or under-pressure conditions as required by 49 CFR sections 192.741, 192.201(a), 192.739(a)(2) and GO-112F 122.2. Pressure alarms are maintained and evaluated, and appropriate corrective actions, such as new installs and replacements, are taken to promote public safety and the safe operation of Company infrastructure. The pressure zones and pressure districts are monitored and reported as part of GO 112-F requirements for over-MAOP and under-pressure events. EPMs are required to indicate the gas pressure in each distribution system supplied by more than one district pressure regulating station. In addition, for distribution systems supplied by a single district pressure regulating station, it is up to the operator to determine the necessity of installing an EPM.

- **C170 – Cathodic Protection Install/Replace Impressed Current Systems:** This control is specific to Cathodic Protection activities on the Distribution high pressure pipeline system. Buried steel pipelines will revert back to their natural state as iron oxide (corrode) without proper intervention. As previously discussed, corrosion on pipelines increases the risk of leaks and may reduce the useful life of the pipelines. In addition to applying coating and electrical isolation, CP is a method for mitigating external corrosion on steel pipelines. CP combats corrosion by imposing an electric current flow toward the surface of the pipeline, which means keeping the pipeline negatively charged (cathodic) with respect to the surrounding soil. This results in reduced corrosion on the pipeline system. Title 49 CFR Part 192, Subpart I, and GO-112-F set forth the regulatory standards that govern pipeline corrosion control. SoCalGas utilizes impressed current systems to provide CP to existing pipelines. Impressed current systems utilize a rectifier to generate the direct current and sacrificial anodes as primary components in the system. Third-party drilling contractors install anodes in wells drilled into the surrounding soil. Each protected pipe segment requires multiple anodes, collectively referred to as an "anode bed." The number of rectifiers and anodes needed to achieve the desired level of protection, and the average life of the anode bed, can vary based on pipeline length, coating effectiveness, soil conditions, and interference that may occur in the system. Impressed current cathodic protection system maintenance, installation, and replacement are all ongoing activities on Distribution high pressure pipelines.
- **C174 – Service Replacements – Leakage Abnormal Op. Conditions CP Related:** High pressure service replacements are conducted for various reasons, including large leaks or a disproportionate frequency of past leaks. Steel services, in particular, are replaced when active corrosion is detected or when a leak is found on a non-cathodically protected steel service. During maintenance activities, it is possible to encounter services containing obsolete materials such as cellulose acetate butyrate (CAB) or polyvinyl

chloride, which will prompt SoCalGas to replace the service line. High pressure service pipelines may also be replaced when the service is found to contain Aldyl-A Material. Whereas pipeline replacements performed under the Distribution Integrity Management Program (DIMP) through C182 (Distribution Risk Evaluation & Monitoring System), discussed in Chapter SCG-Risk-3 are informed by a quantitative risk model and are prioritized based on likelihood and consequence of failure, replacement activities under C174 are executed in response to real-time field findings related to leaks and abnormal operating conditions.

Service replacements in this category are specific to replacing existing high pressure service lines to maintain system reliability and safely deliver gas to the customer, thus mitigating the risks associated with loss of service and public safety. High pressure services are replaced through two construction methods, insertion and direct bury. With the insertion method, a new plastic replacement service pipe is inserted into the to-be-abandoned steel service pipe such that the steel service becomes a casing for the plastic pipe. The direct bury technique instructs the construction crews installing the new pipe that the pipe does not need a casing, and any installation method can be utilized, such as a boring or open trench. Service replacements are critical to sustain operational reliability and public safety, especially since these laterals enter private property.

- **C177 – Main Replacements – Leakage Abnormal Operating Conditions CP Related:** Activities under Main Replacements include the installation of new mains to replace existing high pressure ones, high pressure main replacements in advance of public infrastructure projects, service line replacements, existing service line tie-overs, and meter set rebuilds in connection with newly installed replacement mains.

  Leakage is often the driving factor for pipeline replacements; however, there are other considerations. Other criteria considered include whether the steel pipe meets cathodic protection mandates (such as those codified in 49 CFR Part 192, Subpart I) or whether the main is found to have active corrosion. In addition, the pipeline may be deemed unsafe or unfit for service under pressure due to manufacturing or other defects. Leak history and pending leaks on individual segments are the primary factors in identifying the majority of SoCalGas's high pressure main replacements. These replacements are critical to sustain operational reliability and public safety.

- **C178 – Distribution Leak Survey:** SoCalGas performs leak survey monitoring activities by searching for gas leak indications in an assigned area and reporting detectable leaks using an approved survey method. The leak survey process can be separated into routine and special leak surveys.

  The monitoring and inspections must follow certain prescribed processes as prescribed in 49 CFR section.

  Special leak surveys are one-time, additional surveys to the routine scheduled survey that are driven by a specific circumstance. Special leak surveys are performed:

  - Upon discovery that the MAOP of a pipeline was exceeded by 10% or more at any time during the life of the pipeline;
  - After the occurrence of a specified incident (*e.g.*, train derailment, explosion, earthquake, flooding, landslides, etc.) over or adjacent to high pressure pipelines or related facilities;
  - When there is a danger of public exposure to leaking gas, a special survey is performed using the appropriate leak detection method.
  - When increasing the MAOP of a pipeline;
  - When the routinely scheduled survey frequency is not considered adequate because of pipe condition, limited opportunity for gas to vent safely, or other reasons.
  - There is a need to monitor pipe condition for special situations, such as material evaluations, proposed street improvement projects, as a mitigated measure for the Integrity Management Program; and
  - Special leak surveys may also be considered in conjunction with major underground construction projects.
- **C179 – Distribution Main & Service Leak Repair:** Following the identification of leaks through SoCalGas's comprehensive leak survey process, the Main and Service Leak Repair control aims promptly assess and repair detected leaks to maintain the safety and integrity of the gas pipeline system. This activity establishes guidelines and requirements for assessing the degree of hazard and coding of leaks or leak indications found on the Company's below-ground piping system and actions required to provide for public safety and repair of the leak as required by SoCalGas's Gas Standards in compliance with 49

CFR 192, Subpart M. Trained and qualified employees classify leak indications on Company facilities according to location, spread, concentration of gas, possibility for accumulation of gas, possible sources of ignition, potential migration, and imminence of hazard to people or property. Classifications of leaks or leak indications are based on the relative degree of hazard. The judgment of the qualified person evaluating the leak or leak indication, after consideration of all factors involved, is the primary criterion for classification and mitigation. Hazardous indications of underground leaks are reported, and action is taken in accordance with applicable Company procedures until the hazard has been eliminated and the leak has been either temporarily or permanently repaired, or until it is determined that the leak is from a source other than the Company's piping system.

Each segment of the pipeline is assessed, and if unsafe, it is repaired, altered, or removed from service. Each imperfection or damage that would impair the serviceability of Polyethylene (PE) pipe or fittings is repaired or removed. Appropriate temporary repairs, such as plugging or clamping, are made if permanent repairs are not possible during discovery.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls discussed above, and reflected in Table 1, through the 2025-2031 period, without significant changes.

C. Mitigation Programs

SoCalGas does not currently foresee implementing new mitigations not described above during the 2025-2031 period beyond the mitigations described in this chapter.

D. Climate Change Adaptation

Pursuant to Commission decisions in the Climate Adaptation OIR (R.18-04-019),[41] SoCalGas performed a Climate Adaptation Vulnerability Assessment (CAVA) focused on years 2030, 2050, and 2070, with the aim of identifying asset and operational vulnerabilities to climate hazards across the SoCalGas system. SoCalGas recognizes the need to address climate vulnerabilities to promote the safety and reliability of its pipeline infrastructure and mitigate the increasing climate-related hazards through innovative and community-centric approaches. Some of the climate hazards that will have short- and

[41] D.19-10-054; D.20-08-046.

long-term ramifications in the Southern California region include extreme temperatures, wildfire, inland flooding, coastal flooding and erosion, and landslides. Climate change is recognized as a factor that can drive, trigger, or exacerbate multiple RAMP risks. Implementing climate change adaptation measures and integrating climate vulnerability considerations into RAMP controls and mitigations can enhance system infrastructure longevity and reduce the severity of long-term negative climate impacts. The controls and mitigations described in further detail in this chapter, as shown below, align with the goal of increasing SoCalGas's physical and operational resilience to the increasing frequency and intensity of climate hazards. Additional information on the CAVA and a list of climate-relevant controls and mitigations included in RAMP, are provided in Chapter RAMP-5: Climate Change Adaptation.

Table 5: High Pressure Gas System Risk
Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C010	Pipeline Monitoring Technologies	Inland Flooding and Landslides
C013	Maximum Allowable Operating Pressure (MAOP) Reconfirmation	Inland Flooding and Landslides
C014	Storage Field Maintenance Aboveground Facilities	Inland and Coastal Flooding, Coastal Erosion, Landslides, and Wildfires
C016	Storage Field Maintenance Aboveground Piping	Inland and Coastal Flooding, Coastal Erosion, Landslides, and Wildfires
C019	Storage Upgrade to Purification Equipment	Inland Flooding and Landslides
C104	Cathodic Protection - Capital	Inland Flooding and Landslides
C105	SCADA Operations	Inland Flooding and Landslides
C109	Control Room Monitoring, Operation and Fatigue Management	Inland Flooding and Landslides
C113	Leak Repair	Inland Flooding and Landslides
C119	Engineering, Oversight and Compliance Review	Inland Flooding and Landslides
C125	Pipeline Relocation/Replacement	Inland Flooding and Landslides
C126	Shallow Exposure/Exposed Pipe Remediations	Inland Flooding and Landslides
C134	Pipeline Monitoring	Inland Flooding and Landslides
C135	Electronic Pressure Monitoring (EPM) Installations & Replacements	Inland Flooding, Landslides, and Extreme Temperatures
C138	Right of Way	Inland Flooding, Landslides, and Wildfires
C157	PSEP Phase 1A	Inland Flooding and Landslides

ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C171	TIMP	Inland Flooding and Landslides
C174	Service Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
C177	Main Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
C178	Distribution Leak Survey	Inland Flooding and Landslides
C179	Distribution Main & Service Leak Repair	Inland Flooding and Landslides
C185	PSEP Phase 1B	Inland Flooding and Landslides
C186	PSEP Phase 2A	Inland Flooding and Landslides

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[42] Control C178 Distribution Leak Survey is a foundational program that supports high pressure distribution main and service repair activities. These surveys, mandated by federal and state regulations (49 CFR 192, Subpart M, section192.723), involve comprehensive monitoring and inspections to detect gas leaks in designated areas. Upon identification, these leaks are promptly assessed and repaired to advance the safety and integrity of the gas pipeline system. Below in Table 5 is the Foundational Program that is applicable to the HP System Risk and the mitigation activities that are supported.

Table 6: High Pressure Gas System Foundational Activities (Direct, in 2024 $ millions)

ID	Foundational Activity Name	Enabled Control/Mitigation	2025 O&M Costs	2025-2031 Capital Costs
C178	Distribution Leak Survey	C179 Distribution Main and Service Repair	3.9	0

[42] D.24-05-064, Appendix A at A-4.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for High Pressure Gas System, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[43] for each enterprise risk, SoCalGas uses actual results and industry data, e, and when that is not available, supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates are provided in see Attachment B.

Table 7: High Pressure Gas System Risk Control and Mitigation Plan –Recorded and Forecast Costs Summary (Direct, in 2024 $ thousands)

ID	Control/Mitigation Name	Recorded Costs		Forecast Costs			
		2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C010	Pipeline Monitoring Technologies	6,214	17	5,906	29,928	6,008	21,380
C013	Gas Transmission Safety Rule - MAOP Reconfirmation	39,914	2,900	2,988	327,687	249,701	8,964
C014	Storage HP Field Maintenance – Aboveground Facilities	0	34,703	32,847	0	0	98,541
C016	Storage HP Field Maintenance – Aboveground Piping	0	4,231	3,986	0	0	11,958
C019	Storage HP Retrofits and Upgrades to Purification Equipment	12,619	0	0	50,476	37,857	0
C103	Cathodic Protection Base Activities	0	1,052	1,052	0	0	3,156
C104	Cathodic Protection - Capital	9,132	0	0	85,852	68,952	0
C105	SCADA Operations	0	1,735	1,734	0	0	5,202
C108	Cathodic Protection - Maintenance	0	1,265	3,077	0	0	9,261

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43 D.24-05-064, RDF Row 10.

ID	Control/Mitigation Name	Recorded Costs		Forecast Costs			
		2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C109	Control Room Monitoring Operation and Fatigue Management	0	3,472	3,471	0	0	10,413
C113	Leak Repair	18,716	0	0	74,864	56,148	0
C116	M&R Station and EPM Inspection and Maintenance	0	817	789	0	0	2,367
C117	Leak Survey & Patrol	0	848	847	0	0	2,541
C118	Rupture Mitigation Valve Installation - Valve Rule	31	0	0	143,965	121,536	0
C123	Regulator Station Replacement	248	0	0	992	744	0
C125	Pipeline Relocation/Replacement	26,085	0	0	106,940	80,205	0
C126	Shallow/Exposed Pipe Remediations	15,735	0	0	62,940	47,205	0
C132	Pipeline Maintenance	0	5,049	5,238	0	0	15,714
C134	Pipeline Monitoring	0	660	659	0	0	1,977
C135	EPM Installations & Replacements	196	0	0	1,020	765	0
C136	Compressor Stations - Capital	24,802	0	0	104,604	78,453	0
C142	Compressor Station - Maintenance	0	9,837	10,302	0	0	30,906
C145	Class Location (Hydrotest)	0	92	601	0	0	1,803
C151	Measurement & Regulation Station Capital	63,363	0	0	253,448	190,086	0
C155	Measurement & Instrumentation Maintenance	0	3,418	3,418	0	0	10,254
C156	Quality Assurance Transmission Assets	0	0	370	0	0	1,110
C157	PSEP Phase 1A	11,763	2,515	0	11,124	9,119	0
C160	Odorization	0	487	487	0	0	1,461
C170	CP Install/Replace Impressed Current Systems	960	0	0	3,840	2,880	0

ID	Control/Mitigation Name	Recorded Costs		Forecast Costs			
		2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C171	Integrity Assessments & Remediation	133,627	150,125	146,877	626,276	458,914	563,976
C174	Service Replacements-Leakage Abnormal Op. Conditions CP Related	608	0	0	2,432	1,824	0
C177	Main Replacements-Leakage Abnormal Op. Conditions CP Related	5,393	0	0	21,568	16,176	0
C178	Distribution Leak Survey	0	3,881	3,881	0	0	11,643
C179	Distribution Main & Service Leak Repair	0	630	629	0	0	1,887
C185	PSEP Phase 1B	13,721	0	0	78,534	277,792	0
C186	PSEP Phase 2A	60,605	41,941	61,144	149,605	104,045	177,503
Total		**443,732**	**269,675**	**290,303**	**2,136,095**	**1,808,410**	**992,017**

Table 8: High Pressure Gas System Risk
Control & Mitigation Plan – Units Summary

ID	Control/Mitigation		Recorded Units		Recorded Units (Direct 2024 $ thousands)			
	NAME	Units	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C010	Pipeline Monitoring Technologies	HCA Methane Sensors and OPM stations	16	0	9	903	235	30
C013	Gas Transmission Safety Rule - MAOP Reconfirmation	Miles	5	0	0	148	67	0
C014	Storage HP Field Maintenance – Aboveground Facilities	Storage HP Field Maintenance Aboveground Facilities	0	4	4	0	0	12
C016	Storage HP Field Maintenance – Aboveground Piping	Storage Field	0	4	4	0	0	12

ID	Control/Mitigation		Recorded Units		Recorded Units (Direct 2024 $ thousands)			
	NAME	Units	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C019	Storage HP Retrofits and Upgrades to Purification Equipment	Storage Field	4	0	0	16	12	0
C113	Leak Repair	N/A	0	0	0	0	0	0
C116	M&R Station and EPM Inspection and Maintenance	Work Orders	0	1,318	1,211	0	0	3,633
C117	Leak Survey & Patrol	N/A	0	0	0	0	0	0
C118	Rupture Mitigation Valve Installation - Valve Rule	Valves	15	0	0	46	30	0
C123	Regulator Station Replacement	Work Orders	3	0	0	12	9	0
C125	Pipeline Relocation/Replacement	N/A	0	0	0	0	0	0
C126	Shallow/Exposed Pipe Remediations	N/A	0	0	0	0	0	0
C132	Pipeline Maintenance	N/A	0	0	0	0	0	0
C134	Pipeline Monitoring	Work Orders	0	3,833	3,833	0	0	11,499
C135	EPM Installations & Replacements	Installations or Replacements	68	0	0	292	219	0
C136	Compressor Stations - Capital	N/A	0	0	0	0	0	0
C142	Compressor Station - Maintenance	N/A	0	0	0	0	0	0
C145	Class Location (Hydrotest)	N/A	0	0	0	0	0	0
C151	Measurement & Regulation Station Capital	N/A	0	0	0	0	0	0
C155	Measurement & Instrumentation Maintenance	N/A	0	0	0	0	0	0
C156	Quality Assurance Transmission Assets	FTEs	0	0	3	0	0	9
C157	PSEP Phase 1A	Miles	1	0	0	1	1	0
C160	Odorization	N/A	0	0	0	0	0	0
C170	CP Install/Replace Impressed Current Systems	Work Orders	52	0	0	208	156	0
C171	Integrity Assessments & Remediation	Miles	0	365	438	0	0	904
C174	Service Replacements-	Replacements	25	0	0	100	75	0

ID	Control/Mitigation		Recorded Units		Recorded Units (Direct 2024 $ thousands)			
	NAME	Units	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
	Leakage Abnormal Op. Conditions CP Related							
C177	Main Replacements-Leakage Abnormal Op. Conditions CP Related	Feet – Main Replacements	324	0	0	1,296	972	0
C178	Distribution Leak Survey	Feet	0	60,862,510	60,862,510	0	0	182,587,530
C179	Distribution Main & Service Leak Repair	Leaks Repaired	0	191	191	0	0	573
C185	PSEP Phase 1B	Miles	0	0	0	1	65	0
C186	PSEP Phase 2A	Miles	0	30	69	13	49	163

In the table below, CBRs are presented in summary at the mitigation or control level for the Test Year 2028 GRC cycle. CBRs are calculated based on scaled, expected values unless otherwise noted, and are calculated for each of the three required discount rates[44] in each year of the GRC cycle and for the post-test years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

Table 9: High Pressure Gas System Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name[45]	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C010	Pipeline Monitoring Technologies	$14.8	$27.3	1.46	1.10	0.93
C013	**Gas Transmission Safety Rule - MAOP Reconfirmation**	$328.9	$12.0	0.35	0.25	0.22

[44] See Chapter RAMP-3: for definitions of discount rates, as ordered in the Phase 3 Decision.

[45] Please note that some costs encompass projects at various stages in the project lifecycle, which may include costs incurred in prior GRC cycles, which may impact overall CBRs.

ID	Control/Mitigation Name[45]	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C014	**Storage HP Field Maintenance – Aboveground Facilities**	$0	$131.4	0.33	0.35	0.33
C016	**Storage HP Field Maintenance – Aboveground Piping**	$0	$15.9	0.31	0.33	0.31
C019	**Storage HP Retrofits and Upgrades to Purification Equipment**	$50.5	$0	14.71	15.76	14.71
C103	**Cathodic Protection Base Activities**	$0	$4.2	50.18	50.11	50.02
C104	**Cathodic Protection - Capital**	$91.9	$0	3.67	3.92	3.67
C105	**SCADA Operations**	$0	$6.9	1.85	1.85	1.85
C108	**Cathodic Protection - Maintenance**	$0	$12.3	20.99	22.43	20.98
C109	**Control Room Monitoring Operation and Fatigue Management**	$0	$13.9	0.73	0.79	0.73
C113	**Leak Repair**	$74.9	$0	3.30	3.31	3.30
C116	**M&R Station and EPM Inspection and Maintenance**	$0	$3.2	21.36	22.58	21.38
C117	**Leak Survey & Patrol**	$0	$3.4	1.46	1.57	1.47
C118	**Rupture Mitigation Valve Installation - Valve Rule**	$162	$0	0.28	0.08	0.08
C123	**Regulator Station Replacement**	$1	$0	32.91	15.46	12.01

ID	Control/Mitigation Name[45]	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C125	**Pipeline Relocation/Replacement**	$106.9	$0	0.21	0.08	0.06
C126	**Shallow/Exposed Pipe Remediations**	$62.9	$0	0.68	0.14	0.09
C132	**Pipeline Maintenance**	$0	$21	18.81	19.78	18.82
C134	**Pipeline Monitoring**	$0	$2.6	0.54	0.54	0.54
C135	**EPM Installations & Replacements**	$1	$0	3.85	3.85	3.84
C136	**Compressor Stations - Capital**	$104.6	$0	3.73	1.66	1.29
C142	**Compressor Station - Maintenance**	$0	$41.2	0.40	0.42	0.40
C145	**Class Location (Hydrotest)**	$0	$2.4	0.48	0.52	0.48
C151	**Measurement & Regulation Station Capital**	$253.5	$0	0.83	0.32	0.24
C155	**Measurement & Instrumentation Maintenance**	$0	$13.7	1.48	1.58	1.48
C156	**Quality Assurance Transmission Assets**	$0	$1.5	1.02	1.07	1.01
C157	**PSEP Phase 1A**	$10.2	$0	1.20	0.28	0.18
C160	**Odorization**	$0	$1.9	0.07	0.07	0.07
C170	**CP Install/Replace Impressed Current Systems**	$3.8	$0	1.52	1.52	1.52
C171	**Integrity Assessments & Remediation**	$595.2	$710.9	3.97	3.82	3.43
C174	**Service Replacements-Leakage Abnormal Op. Conditions CP Related**	$2.4	$0	12.82	1.95	1.95

ID	Control/Mitigation Name[45]	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C177	**Main Replacements-Leakage Abnormal Op. Conditions CP Related**	$21.6	$0	2.75	0.41	0.40
C179	**Distribution Main & Service Leak Repair**	$0	$2.5	1.38	1.38	1.38
C185	**PSEP Phase 1B**	$340.8	$0	0.51	0.12	0.08
C186	**PSEP Phase 2A**	$173.7	$238.6	0.23	0.05	0.04

Bold *indicates this control/program includes mandated program/activities.*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

G. Other Considerations

Excavation Damage is a pipeline threat that can result in similar outcomes to the risk events caused by the Drivers or Triggers mentioned above. As discussed in SCG-Risk-1, Excavation Damage SoCalGas classifies Excavation Damage as a separate risk in its Enterprise Risk Registry. Consequently, to avoid double counting mitigation benefits, benefits to infrastructure risk related to excavation damage prevention activities are not included in the benefit-cost ratios for HP System Risk mitigations. To assess the impact of excavation risk reduction not being captured in the SoCalGas HP System Risk Chapter, the table below shows a comparison of CBR ranges for the period 2028-2031, under the three discount scenarios, for applicable mitigations. This analysis will be further developed for consideration in SoCalGas's TY 2028 GRC, as well as a similar analysis for the Medium Pressure Gas System Risk.

Table 10: High Pressure Gas System Risk
Excavation Damage Impact to High Pressure CBRs
(2028-2031 Range)

ID	Control /Mitigation Name	CBR without Excavation	CBR with Excavation
C010	Pipeline Monitoring Technologies	0.93 – 1.46	1.15 – 1.80
C013	Gas Transmission Safety Rule - MAOP Reconfirmation	0.22 – 0.35	0.22 – 0.36
C157	PSEP Phase 1A	0.18 – 1.20	0.19 – 1.24
C185	PSEP Phase 1B	0.08 – 0.51	0.13 – 0.69

ID	Control /Mitigation Name	CBR without Excavation	CBR with Excavation
C186	PSEP Phase 2A	0.04 – 0.23	0.04 – 0.24
C179	Distribution Main & Service Leak Repair	1.38	1.47 – 1.48
C171	Integrity Assessments & Remediation	3.43 – 3.97	4.17 – 4.81
C118	Rupture Mitigation Valve Installation - Valve Rule	0.08 – 0.28	0.09 – 0.31
C151	Measurement & Regulation Station Capital	0.24 – 0.83	0.27 – 0.93
C155	Measurement & Instrumentation Maintenance	1.48 – 1.58	1.83 – 1.96
C160	Odorization	0.07	0.08 – 0.09
C105	SCADA Operations	1.85	2.33 – 2.35

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025, D.16-08-018, and D.18-12-014,[46] SoCalGas considered two alternatives to the risk mitigation plan for HP System Risk. Typically, analysis of alternatives occurs when implementing activities to obtain the best result or product for the cost. The alternatives analysis for this plan considers changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan and constraints, such as budget and resources.

Table 11: High Pressure Gas System Risk
Alternative Mitigation Plan – Forecast Costs Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Forecast Costs			
		2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A125	Pipeline Rerouting to Mitigate Landslide Impacts	144,456	108,342	0	0
A171	DIMP - High Pressure Pipeline In-Line Inspections	24,192	18,144	121,020	90,765
Total		**168,648**	**126,486**	**121,020**	**90,765**

46 D.18-12-014 at 33-35.

Table 12: High Pressure Gas System Risk
Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A125	Pipeline Rerouting to Mitigating Landslide Impacts	36,114	0	0.01	~0.00	~0.00
A171	DIMP – High Pressure Pipeline In-Line Inspections	6,048	30,255	0.13	0.12	0.11

A. Alternative 1: Pipeline Rerouting to Mitigate Landslide Impacts

The Pipeline Rerouting – Landslide Exposure alternative consists of identifying transmission pipelines currently in areas susceptible to landslides and rerouting them to more desirable locations. In recent years, SoCalGas has experienced an increase in extreme weather events throughout its service territory that have resulted in landslides that have impacted high-pressure pipelines. This alternative would mitigate the likelihood of failure associated with landslide-driven pipeline damages and promote public safety and operational reliability.

Proposed work for this mitigation includes surveying, planning, construction, and closeouts of identified pipeline reroutes. At this time, SoCalGas estimates approximately 41 miles of transmission pipelines are in high landslide risk areas. This proposal estimates that one mile of pipeline would be identified and replaced each year. SoCalGas currently replaces pipeline segments on an as-needed basis following extreme weather events. While replacements under this rerouting program would subsume such replacements, the cost to execute this alternative is estimated to be higher, and there is uncertainty about whether all identified pipeline segments would benefit from rerouting.

Before pursuing the mitigation, a more in-depth analysis of the benefits and costs associated with this alternative is required. This work would require additional resources or redirection of existing resources.

B. Alternative 2: DIMP – High Pressure Pipeline In-Line Inspections

Through the DIMP, SoCalGas is federally mandated to demonstrate an understanding of its gas distribution system; identify threats to its gas distribution system; determine the risk posed by these threats; and take actions to minimize applicable threat and integrity concerns to reduce the risk of a pipeline failure. These actions include identifying and implementing risk reduction measures, monitoring the results of these measures, and evaluating their effectiveness.

The alternative mitigation of conducting ILI assessments on high pressure distribution pipeline segments installed in more populated areas would enhance SoCalGas's evaluation and management of the integrity of high-pressure pipe, which is associated with a higher consequence of failure. This activity would enable SoCalGas to collect additional information about the physical condition of high-pressure pipelines that are not within the scope of TIMP regulations. SoCalGas would evaluate collected data and detect conditions that are validated and addressed based on severity. Risk reduction measures would be taken to address applicable threats and integrity concerns to reduce the likelihood of failure and increase the safety of the pipeline.

SoCalGas does not propose at this time to adopt this alternative as a programmatic risk reduction measure for two primary reasons. As discussed in PHMSA's 2024 report *Integrity Assessment of Distribution Pipelines*, which was mandated by Section 122 of the "Protecting Our Infrastructure of Pipelines and Enhancing Safety Act of 2020" (PIPES Act of 2020), ILI technology is not readily available for all distribution pipe configurations.[47] A more in-depth evaluation of SoCalGas's distribution pipelines and available technology is necessary to determine the actual scope of a high pressure distribution in-line inspection program. This would then require an updated evaluation of costs, risk reduction, and overall benefits. Additionally, there is not currently a set of ILI assessment policies within the industry that apply to this category of assets.

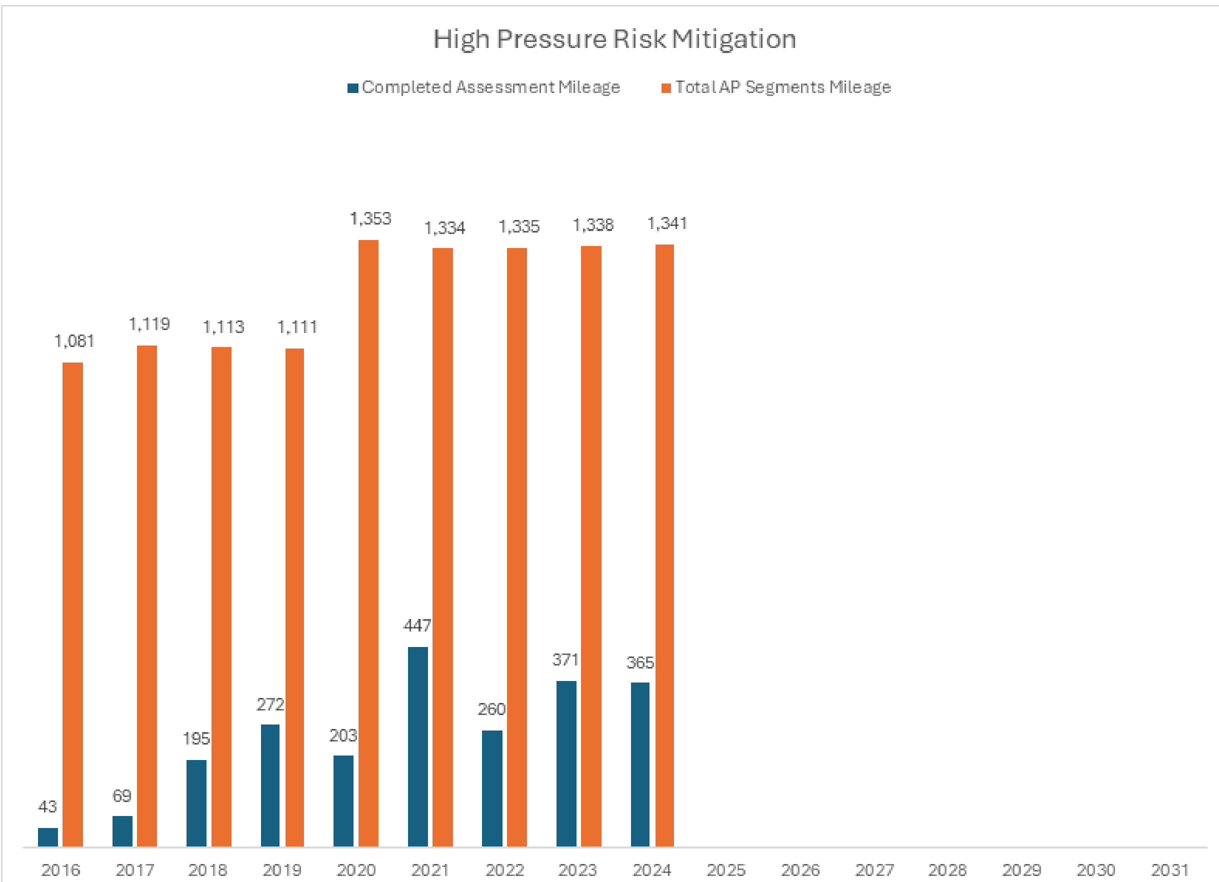
Currently, SoCalGas continuously assesses risks on its distribution pipeline system through the DIMP and manages those associated with high pressure distribution pipe through activities such as pipeline repair and replacement under C177 (Main Replacements Leakage Abnormal Op. Conditions CP Related). In accordance with compliance requirements to identify and implement measures to address risk and periodically improve the DIMP, SoCalGas is beginning to plan and execute pilot projects to evaluate technology and inform a set of policies and practices that can be applied to a high pressure distribution ILI assessment program. The costs associated with these activities are forecasted as a component of the general DIMP management costs that have been allocated across the following

47 PHMSA, *Integrity Assessments of Distribution Pipelines* (January 2024) at Section 6, *available at:* https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2024-09/Report%20to%20Congress%20-%20Integrity%20Assessments%20of%20Distribution%20Pipelines.pdf.

DIMP-related controls in the Medium Pressure Risk chapter (SCG-Risk-3) under: C120 (DRIP), C121 (GIPP), C122 (SLIP), C129 (CP System Improvement), and C182 (DREAMS).

VI. HISTORICAL GRAPHICS

As directed by the Commission in the Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a TIMP metric that aligns with Company safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating risks. It presents completed assessment mileage and total assessment plan (AP) mileage.



As described in Section III.A., the TIMP (C171 – Integrity Assessments & Remediations: Transmission Integrity Management Program) is a prescriptive program that includes continuous cycles of assessments and remediations to manage pipeline integrity. Regular evaluations are conducted at intervals no greater than every seven years for HCAs and every ten years for other segments, using methods such as ILI, Direct Assessment, or Pressure Testing.

From 2016 to 2024, SoCalGas successfully conducted regular pipeline assessments, improved data integration, and completed necessary remediations to enhance pipeline safety through the TIMP. In the forecast years, continuous improvements in threat and risk analyses, the expansion of assessments with advanced technologies, and evaluations and applications of preventive measures will continue to enhance the integrity and safety of the high-pressure gas pipeline system.

Due primarily to the reassessment requirements established in 49 CFR section 192.939, TIMP activity levels vary from year to year based on assessment findings and pipeline safety considerations. The planning and execution of assessment projects primarily depends on the timing and intervals of prior assessments and compliance dates, as well as external factors such as applicable risks and threats. The cyclical nature of TIMP results in a somewhat stable scope of work (*i.e.*, pipeline miles) that is not expected to decrease over time. In 2020, there was an increase to the overall miles scoped under the TIMP due to the issuance of the *Pipeline Safety: Safety of Gas Transmission Pipeline: MAOP Reconfirmation, Expansion of Assessment Requirements, and Other Related Amendments* Final Rule, which mandates integrity assessments on pipeline segments in non-HCA Class 3 and Class 4 locations, as well as newly-defined MCAs.

The safety work that remains to be done is addressed in the controls/mitigations detailed above in Section III. 2024-2031 Control and Mitigation Plan.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance Drivers that underpin identified controls and mitigations.

ID	Control/Mitigation Description	Compliance Driver
C013	Gas Transmission Safety Rule – MAOP Reconfirmation	49 CFR § 192.624
C014	Storage HP Field Maintenance – Aboveground Facilities	PHMSA, OSHA, EPA, FERC, NTSB, FEMA, CPUC, DOT. LA County, CA state and city compliance requirements, CARB, SCAQMD, National Fire Protection Agency (NFPA), CalGEM
C016	Storage HP Field Maintenance – Aboveground Piping	PHMSA, OSHA, EPA, FERC, NTSB, FEMA, CPUC, DOT. LA County, CA state and city compliance requirements, CARB, SCAQMD, National Fire Protection Agency (NFPA), CalGEM, California Code of Regulations, Title 14. Section 1774.2.
C019	Storage HP Upgrade to Purification Equipment	PHMSA, OSHA, Env Protection Agency (EPA), FERC, NTSB, FEMA, CPUC GO 58A, DOT, SCAQMD, TSA - Transportation Security Administration, CalGEM, National Fire Protection Agency (NFPA)
C104	Cathodic Protection – Capital	49 CFR 192, Subpart I
C108	Cathodic Protection – Maintenance	49 CFR 192, Subpart I
C105	SCADA Operations	49 CFR § 192.631
C109	Control Room Monitoring Operation and Fatigue Management	49 CFR 192 Subpart L
C113	Leak Repair	49 CFR 192 Subpart M
C116	M&R Station and EPM Inspection and Maintenance	PHMSA/DOT Regulation 49 CFR 192, Subpart M, § 192.739 and CPUC GO 112-F
C117	Leak Survey & Patrol	49 CFR 192 Subpart M
C118	Rupture Mitigation Valve Installation – Valve Rule	PHMSA "Pipeline Safety: Requirement of Valve Installation and Minimum Rupture Detection Standards" final rule (49 CFR Parts 192 and 195)
C132	Pipeline Maintenance	49 CFR 192 Subpart M

ID	Control/Mitigation Description	Compliance Driver
C142	Compressor Station – Maintenance	49 CFR 192 Subpart M
C145	Class Location (Hydrotest)	49 CFR 192 Subpart L
C151	Measurement & Regulation Station – Capital	49 CFR 192 Subpart M
C155	Measurement & Instrumentation - Maintenance	49 CFR 192 Subpart M
C156	Quality Assurance Transmission Assets	49 CFR 192.605
C160	Odorization	49 CFR 192 Subpart L
C171	Integrity Assessments & Remediation: Transmission Integrity Management Program (TIMP)	49 CFR Part 192, Subpart O 49 CFR § 192.710
C157	PSEP Phase 1A	California Public Utilities Code Sections 957 and 958
C185	PSEP Phase 1B	California Public Utilities Code Sections 957 and 958
C186	PSEP Phase 2A	California Public Utilities Code Sections 957 and 958
C103	Cathodic Protection Base Activities	49 CFR 192 Subpart I and CPUC GO 112-F
C116	M&R Station and EPM Inspection and Maintenance	49 CFR 192 Subpart M and CPUC GO 112-F
C123	Regulator Station Replacement	49 CFR 192 Subpart L
C125	Pipeline Relocation/Replacement	49 CFR 192 Subpart M
C126	Shallow/Exposed Pipe Remediations	49 CFR 192 Subpart M
C134	Pipeline Monitoring	49 CFR 192
C135	EPM Installations & Replacements	49 CFR 192
C136	Compressor Stations – Capital	49 CFR 192 Subpart M
C170	CP Install/Replace Impressed Current Systems	49 CFR 192 Subpart I
C174	Service Replacement	49 CFR 192 Subpart L
C177	Main Replacements _Leakage Abnormal Op. Conditions CP Related	49 CFR 192 Subpart L
C178	Distribution Leak Survey	49 CFR 192 Subpart M
C179	Distribution Main and Service Leak Repair	49 CFR 192 Subpart M

ATTACHMENT B

HIGH PRESSURE GAS SYSTEM RISK - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[48] Appropriate data may include Company-specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and a description of the data.

Risk Data	Source Type	Source Information
Likelihood of failure	Internal Model results	Source: Internal TIMP, HP Distribution and FIMP models Description: A combination of internal and external PHMSA data to model likelihood of failure by outcome and cause for SoCalGas and SDG&E's high pressure pipelines and facilities
Population Density	Internal Data	Source: Results from sliding mile data along SoCalGas and SDG&E's high pressure pipelines, and census data. Links: https://data.census.gov/profile/California?g=040XX00US06 https://data.census.gov/table/ACSDT1Y2022.B11016?q=B11016:%20Household%20Type%20by%20Household%20Size Description: SoCalGas and SDG&E population density data used to determine average value and distributions for potential safety consequences per class or zone locations.
National Pipeline Incidents (2010-2024)	External Data	Agency: PHMSA Link: https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data

48 D.24-05-064, RDF Row 10 and Row 29.

Risk Data	Source Type	Source Information
		Description: National data was used to estimate the proportion of high pressure pipeline incidents that resulted in customer outages because internal data was not available. This source was also used to model serious injuries.
Meter Outages	Internal Data	Source: SME judgment and GIS data Description: SME expertise was used to determine scenarios that could result in significant reliability impact and GIS data was used to determine the number of meters downstream that would be impacted.
National High Pressure Incident Cost data	External Data	Agency: PHMSA Link: https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-flagged-files Description: National data was used to estimate costs such as property damage in current year (2024) dollars, because internal data was not available
Average cost of a fatality	External Data	Agency: National Safety Council (NSC) Link: https://injuryfacts.nsc.org/work/costs/work-injury-costs/ Description: Costs include wage losses, medical expenses, administrative expenses and employer costs, which are not included in PHMSA costs.
Average Cost of a serious injury	External Data	Agency: CDC Link: https://wisqars.cdc.gov/cost/?y=2022&o=TAR&i=0&m=3000&g=00&s=0&u=TOTAL&u=AVG&t=COMBO&t=MED&t=LIFE&t=WORK&a=5Yr&g1=0&g2=199&a1=0&a2=199&r1=MECH&r2=INTENT&r3=NONE&r4=NONE&c1=NONE&c2=NONE Description: Wage loss and medical costs associated with non-fatal injuries that require hospitalization are not included in PHMSA costs.

ATTACHMENT C

HIGH PRESSURE GAS SYSTEM – SUMMARY OF ELEMENTS OF BOW TIE

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C010	Pipeline Monitoring Technologies	DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C013	Gas Transmission Safety Rule – MAOP Reconfirmation	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C104	Cathodic Protection - Capital	DT.1, DT.2, DT.4, DT.6, DT.8	PC.1, PC.3, PC.7
C108	Cathodic Protection – Maintenance	DT.1, DT.2, DT.4, DT.8	PC.1, PC.3, PC.7
C105	SCADA Operations	DT.4, DT.6, DT.7, DT.8	PC.1, PC.2, PC.3, PC.7
C109	Control Room Monitoring Operation and Fatigue Management	DT.6, DT.7, DT.8, DT.9	PC.1, PC.2, PC.3, PC.7
C113	Leak Repair	DT.6, DT.9	PC.3, PC.7
C117	Leak Survey & Patrol	DT.1, DT.2, DT.4, DT.8, DT.9	PC.1, PC.2, PC.3, PC.7
C118	Rupture Mitigation Valve Installation – Valve Rule	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C125	Pipeline Relocation/Replacement	DT.4, DT.5, DT.6, DT.9, DT.10	PC.3, PC.4, PC.5, PC.7
C126	Shallow/Exposed Pipe Remediations	DT.5, DT.6	PC.3, PC.4, PC.5, PC.7
C132	Pipeline Maintenance	DT.7, DT.8	PC.3
C136	Compressor Stations – Capital	DT3, DT.4, DT.5, DT.8	PC.1, PC.3, PC.5, PC.7
C142	Compressor Station – Maintenance	DT.3, DT.4, DT.5, DT.10	PC.1, PC.3, PC.5, PC.7
C145	Class Location (Hydrotest)	DT.10	PC.3, PC.7
C151	Measurement & Regulation Station Capital	DT.4, DT.7, DT.8	PC.1, PC.3, PC.5, PC.7
C155	Measurement & Instrumentation Maintenance	DT.4, DT.7, DT.8, DT.10	PC.1, PC.3, PC.5, PC.7
C156	Quality Assurance Transmission Assets	DT.1, DT.6, DT.8, DT.9	PC.1, PC.2, PC.3, PC.4, PC.5
C160	Odorization	DT.7, DT.8	PC.4, PC.5, PC.6, PC.7

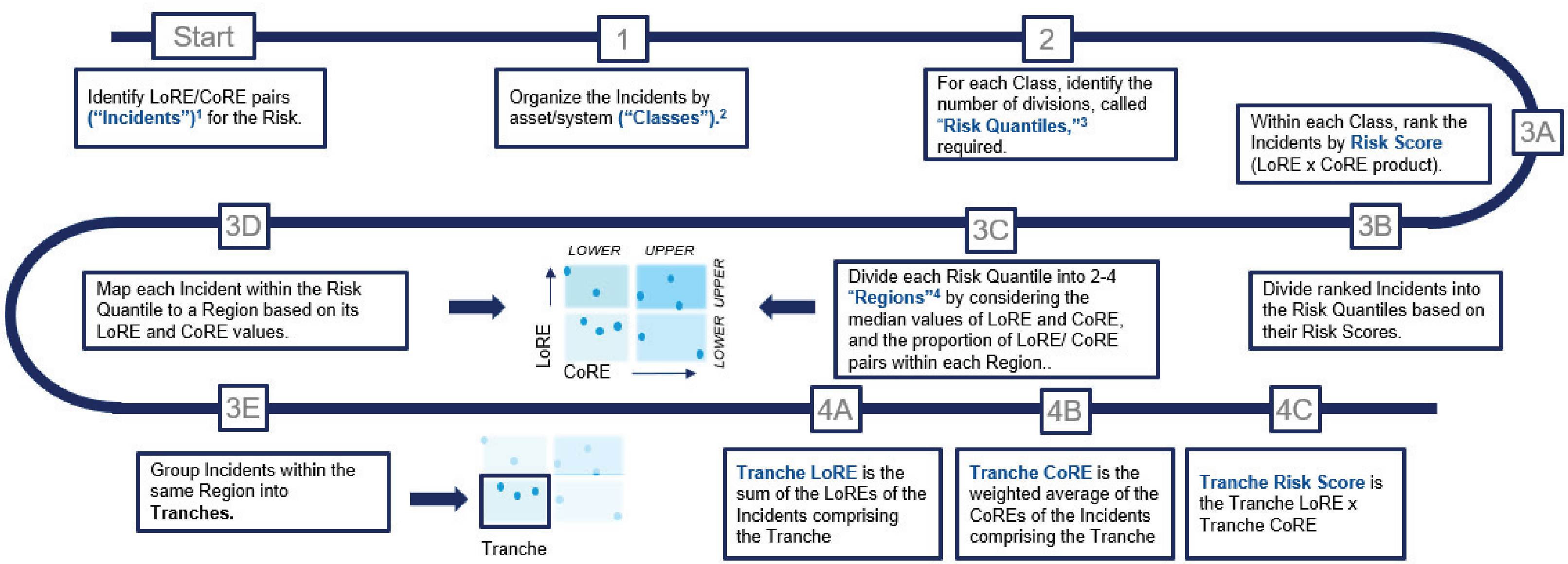
SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C171	Integrity Assessments & Remediation	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C157	PSEP Phase 1A	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C185	PSEP Phase 1B	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C186	PSEP Phase 2A	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C014	Storage HP Field Maintenance – Aboveground Facilities	DT.1, DT. 2, DT. 6, DT, 8, DT.9	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6 PC.7
C016	Storage HP Field Maintenance – Aboveground Piping	DT.1, DT. 2, DT. 6, DT. 8, DT. 9	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C019	Storage HP Upgrade to Purification Equipment	DT.1, DT.2, DT.5, DT.6, DT.7, DT.8, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C103	Cathodic Protection Base Activities	DT.1	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C116	M&R Station and EPM Inspection and Maintenance	DT.1, DT.7, DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C123	Regulator Station Replacement	DT.1, DT.4, DT.5, DT.7. DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C134	Pipeline Monitoring	DT.1, DT.4, DT.5, DT.6. DT.7. DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C135	EPM Installations & Replacements	DT.1, DT.4, DT.5, DT.6, DT.7, DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C170	CP Install/Replace Impressed Current Systems	DT.1	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C174	Service Replacement - Leakage Abnormal Op. Conditions CP Related	DT.1, DT.4, DT.7 DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C177	Main Replacements - Leakage Abnormal Op. Conditions CP Related	DT.1, DT.4, DT.7, DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C178	Distribution Leak Survey	DT.1, DT.4, DT.7, DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C179	Distribution Main and Service Leak Repair	DT.1, DT.4, DT.7, DT.8	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7

ATTACHMENT D

APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



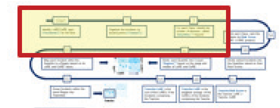
NOTES

[1]*For example, **Incidents (or "Risk Incidents")** for High Pressure are generally modes of failure of High Pressure assets in various environments such as low or high population densities.*

[2]*For example, **Classes (or "Asset Classes")** for High Pressure include Facilities and High Pressure Pipe.*

[3]***Quantiles** are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*

[4]*The four **Regions** are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*



Start

Identify LoRE/CoRE pairs **("Incidents")**[1] for the Risk.

1

Organize the Incidents by asset/system **("Classes")**.[2]

2

For each Class, identify the number of divisions, called **"Risk Quantiles,"**[3] required.

Class	LORE / CORE PAIRS	TOTAL # PAIRS
Facilities	Honor Rancho Storage Other Aliso Canyon Storage Other Playa Del Rey Storage Other Aliso Canyon Storage Piping …and 35 more pairs	39
HP Pipe	Transmission (Class 3) HCA installed >=1946. MFG Rupture High_Pressure_Distribution (Zone 3) None installed None. Equipment Failure Small_Leak …and 906 more pairs	908

$$\min\left(\frac{N}{8}-1, 9\right) < K \leq \min\left(\frac{N}{8}, 10\right)$$

4

10

Step 3 for *Facilities*

4

From Step 2 for *Facilities*

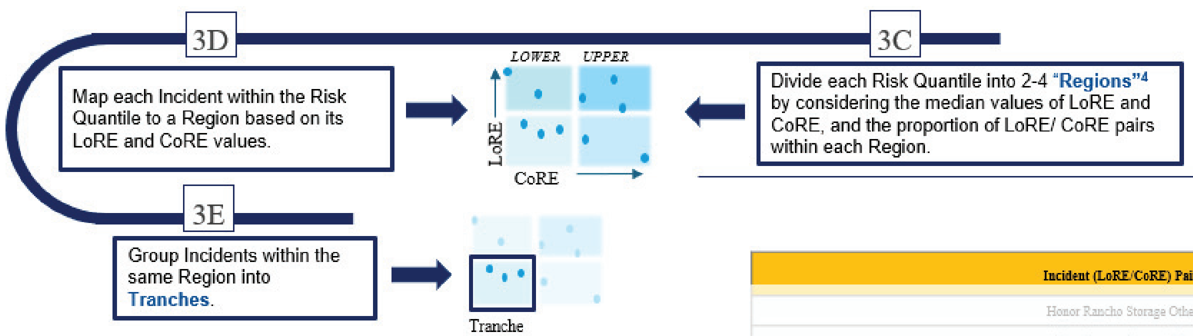
3A

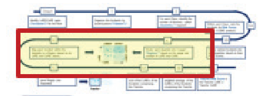
Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).

3B

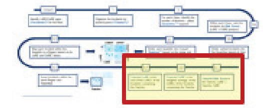
Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.

Incident (LoRE/CoRE) Pair	Risk Score	Rank (3A)	Quantile (3B)
Honor Rancho Storage Other	$ 5,822,838	1	#1
Aliso Canyon Storage Other	$ 2,485,736	2	
Playa Del Rey Storage Other	$ 1,303,449	3	
La Goleta Storage Other	$ 1,245,154	4	
Aliso Canyon Storage Piping	$ 793,197	5	
Newberry Compressor Other	$ 639,508	6	
Blythe Compressor Other	$ 593,634	7	
South Needles Compressor Other	$ 490,456	8	
Honor Rancho Storage Piping	$ 430,150	9	
Newberry Compressor Piping	$ 413,606	10	
Blythe Compressor Piping	$ 363,676	11	
North Needles Compressor Other	$ 280,470	12	#2
Wheeler Ridge Compressor Other	$ 256,821	13	
South Needles Compressor Piping	$ 237,045	14	
Kelso Compressor Other	$ 173,612	15	
Ventura Compressor Piping	$ 166,625	16	
Wheeler Ridge Compressor Piping	$ 139,017	17	
...	...	18-39	





Incident (LoRE/CoRE) Pair	Risk Score	Rank (3A)	Risk Quantile (3B)	Region (3C)	Tranche (3D)
Honor Rancho Storage Other	$ 5,822,838	1	#1	LL/UC	Facilities-1-1
Aliso Canyon Storage Other	$ 2,485,736	2		UL/LC	Facilities-1-2
Playa Del Rey Storage Other	$ 1,303,449	3		LL/UC	Facilities-1-1
La Goleta Storage Other	$ 1,245,154	4		LL/UC	Facilities-1-1
Aliso Canyon Storage Piping	$ 793,197	5		LL/UC	Facilities-1-1
Newberry Compressor Other	$ 639,508	6		UL/LC	Facilities-1-2
Blythe Compressor Other	$ 593,634	7		UL/LC	Facilities-1-2
South Needles Compressor Other	$ 490,456	8		UL/LC	Facilities-1-2
Honor Rancho Storage Piping	$ 430,150	9		LL/UC	Facilities-1-1
Newberry Compressor Piping	$ 413,606	10		UL/LC	Facilities-1-2
Blythe Compressor Piping	$ 363,676	11	#2	UL/LC	Facilities-2-3
North Needles Compressor Other	$ 280,470	12		UL/LC	Facilities-2-3
Wheeler Ridge Compressor Other	$ 256,821	13		UL/UC	Facilities-2-4
South Needles Compressor Piping	$ 237,045	14		UL/UC	Facilities-2-4
Kelso Compressor Other	$ 173,612	15		UL/LC	Facilities-2-3
Ventura Compressor Piping	$ 166,625	16		LL/UC	Facilities-2-5
Wheeler Ridge Compressor Piping	$ 139,017	17		LL/UC	Facilities-2-5
...	...	18-35		...	...



4A

Tranche LoRE is the sum of the LoREs of the Incidents comprising the Tranche

4B

Tranche CoRE is the weighted average of the CoREs of the Incidents comprising the Tranche

4C

Tranche Risk Score is the Tranche LoRE x Tranche CoRE

Incident (LoRE/CoRE) Pair	Tranche	Tranche LoRE (4A)	Tranche CoRE (4B)	Tranche Risk Score (4C)
Honor Rancho Storage Other	Facilities-1-1	0.2927	32,773,260	9,594,788
Playa Del Rey Storage Other	Facilities-1-1			
La Goleta Storage Other	Facilities-1-1			
Aliso Canyon Storage Piping	Facilities-1-1			
Honor Rancho Storage Piping	Facilities-1-1			
Aliso Canyon Storage Other	Facilities-1-2	0.4019	11,502,357	4,622,939
Newberry Compressor Other	Facilities-1-2			
Blythe Compressor Other	Facilities-1-2			
South Needles Compressor Other	Facilities-1-2			
Newberry Compressor Piping	Facilities-1-2			
Blythe Compressor Piping	Facilities-2-3	.1165	7,016,155	817,758
North Needles Compressor Other	Facilities-2-3			
Kelso Compressor Other	Facilities-2-3			
Wheeler Ridge Compressor Other	Facilities-2-4	.0558	8,842,993	493,866
South Needles Compressor Piping	Facilities-2-4			
Ventura Compressor Piping	Facilities-2-5	.0214	16,681,177	358,446
Wheeler Ridge Compressor Piping	Facilities-2-5			
Ventura Compressor Other	Facilities-2-5			

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-3)

Medium Pressure Gas System

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for SoCalGas's medium pressure gas system risk (MP System Risk). This chapter contains information and analysis for this risk that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (the Phase 2 Decision)[2] and D.24-05-064 (the Phase 3 Decision).[3] MP System Risk is included in the 2025 RAMP Report based on a safety risk assessment, further informed by its reliability and financial consequence attributes, consistent with RDF guidance. This risk chapter describes the basis for selection of MP System Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's MP System Risk is defined as "the risk of failure of a medium pressure[4] pipeline (including appurtenances to and at the meter) which results in serious injuries, fatalities, and/or damages to the infrastructure."

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[1] As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

[2] D.22-12-027 is the "Phase II Decision Adopting Modifications to the Risk-Based Decision-Making Framework Adopted in Decision 18-12-014 and Directing Environmental and Social Justice Pilots" (December 21, 2022).

[3] D.24-05-064 is the "Phase III Decision" (June 6, 2024).

[4] "Medium pressure" pipelines are those for which the Maximum Allowable Operating Pressure (MAOP) is no greater than 60 pounds per square inch (psi).

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF reporting requirements, including but not limited to General Order (GO) 112-F and subparts of Code of Federal Regulations (CFR) Rule 49. A list of compliance requirements applicable to MP System Risk is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as enhancing operations and/or preparing for future capacity needs (such as driven by electrification or climate impacts).

2. Risk Overview

Medium pressure gas systems consist of an interconnected network of mostly underground mains that feed service lines. The system includes regulator stations, meters, and other appurtenances (such as couplings, joints, risers that connect service lines to meters, and meter set assemblies). Main lines are defined by PHMSA as distribution lines that serve as a common source of supply for more than one service line.[5] Service lines are smaller diameter pipes that feed customer homes, businesses, and some commercial applications, and end at the customer meter or at the connection to a customer's piping, whichever is further downstream (or at the connection to customer piping if there is no meter, which is where SoCalGas's responsibility ends).[6] Medium pressure pipelines are made of steel or plastic.

SoCalGas currently operates approximately 100,000 miles of medium pressure mains and services. This includes approximately 40,200 miles of steel mains and services and approximately 59,600 miles of plastic mains and services. These medium pressure pipelines serve over 21.1 million SoCalGas consumers. For safety and compliance, Title 49 of the CFR Part 192, GO 58, and GO 112 are the leading sources of requirements for SoCalGas's distribution pipelines (among other legal and regulatory provisions). Title 49 CFR Part 192 prescribes safety requirements for pipeline facilities and the transportation of gas at the federal level and is enforced by both the U.S. Department of Transportation's (DOT) Pipeline and Hazardous Material Safety Administration (PHMSA) and the CPUC. GO 58 and GO 112 complement and enhance the requirements of 49 CFR 192 at the state level and are enforced by the CPUC.

5 49 C.F.R. § 192.3.

6 *Id.*

B. Risk Scope

SoCalGas's analysis considers risk events associated with failure of a medium pressure gas pipeline including appurtenances to and at the meter, which result in serious injuries, fatalities, and/or damages to the infrastructure.

SoCalGas notes that when the loss of gas cannot be resolved by lubing, tightening, or adjusting, it is defined as a "leak." A leak in and of itself may present little-to-no risk of serious injury or fatality. Risk to the public and employees can increase when leaks are in close proximity to an ignition source and/or where there is a potential for gas to migrate and accumulate in a confined space. The safety concern caused by the leak is addressed by SoCalGas's leak indication prioritization and repair schedule procedures. In most cases, where leaks are non-hazardous, a pipe with a leak will continue to transport gas and therefore is not considered a pipeline "failure" using the definition in American Society of Mechanical Engineering (ASME) Code section B31.8S.[7] However, SoCalGas actively monitors and prioritizes such leaks in accordance with 49 CFR 192.723, which requires leakage surveys to be conducted at least once annually in business districts and at least once every five years outside of business districts.

C. Data Sources Used to Quantify Risk Estimates[8]

SoCalGas utilized internal data sources to determine MP System Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories. Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of

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[7] American Society of Mechanical Engineering standard B31.8S: Managing System Integrity of Gas Pipelines. AMSE B31.8S is specifically designed to provide the operator with the information necessary to develop and implement an effective integrity management program utilizing proven industry practices and processes.

[8] Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

The probability of failure component within the quantitative risk models for medium pressure gas distribution assets primarily relies on failure rates sourced from SoCalGas, SDG&E, and broader industry data, generally covering the period from approximately 2010 to the present. The exact date range varies by asset type according to data availability; thus, the resulting risk values represent average annual risks over these respective periods. For specific asset types and threats, time-dependent phenomena such as material degradation, have been accounted for using an exponential model to characterize changes in failure likelihood over time. However, this approach has not yet been comprehensively implemented across all asset types or threat categories, therefore, the absence of explicit time-dependent modeling should not be interpreted as indicating these assets are unaffected by time-dependent trends. The use of an exponential model is consistent with industry precedent for analyzing the time-dependent failure likelihood trends on buried infrastructure, including natural gas and water pipelines.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of the MP System Risk, including a risk Bow Tie which delineates potential Drivers/triggers and potential Consequences, followed by a description of the Tranches determined for this risk and the risk's Pre-Mitigated Risk Value.

A. Risk Selection

The MP System Risk was included as a Risk in SoCalGas's 2021 RAMP and was included in SoCalGas's 2022, 2023 and 2024 Enterprise Risk Registries (ERR).[9] The ERR evaluation and selection process is summarized in Chapter RAMP-2, Enterprise Risk Management Framework.

SoCalGas selected this risk in accordance with the RDF Row 9.[10] Specifically, SoCalGas assessed the top risks from the Company's 2024 Enterprise Risk Registry based on the

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9 In the 2021 RAMP Report this risk was called Incident Related to the Medium Pressure System (Excluding Dig-In). The risk definition and elements are unchanged.

10 RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's ERR comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars".

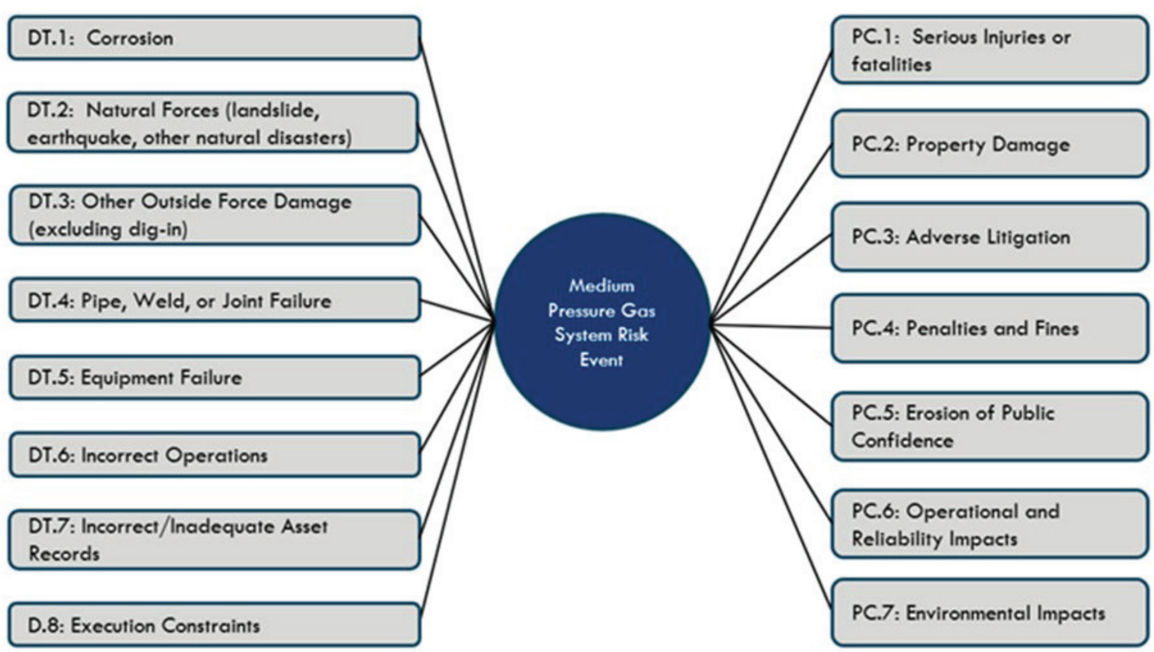
Consequence of a Risk Event (CoRE) Safety attribute. The MP System Risk was among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks at the December 17, 2024, at a Pre-Filing Workshop. MP System Risk was selected based on the qualification of its Safety risk attribute, as required under the RDF. At the pre-filing workshop, no party expressed opposition to inclusion of this risk in SoCalGas's 2025 RAMP Report.

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the Risk Bow Tie, possible Drivers, potential Consequences, and a mapping of the elements in the Bow Tie to the mitigation(s) that addresses it.[11] As illustrated in the Risk Bow Tie shown below in Figure 1, the Risk Event (center of the Bow Tie) is a MP System incident (*i.e.*, pipeline failure that leads to gas release causing fatalities and injuries to employees and/or the public), the left side of the Bow Tie illustrates Drivers/triggers that could lead to the MP System incident, and the right side shows the Potential Consequences of the MP System incident. SoCalGas applies this framework to identify and summarize the information provided in Figure 1. A mapping of each mitigation to the addressed elements of the Risk Bow Tie is provided in Attachment C.

Figure 1:

Medium Pressure Gas System: Risk Bow Tie



[11] D.24-05-064, RDF Row 15.

C. Potential Risk Event Drivers/Triggers[12]

When performing a risk assessment for the MP System Risk, SoCalGas identifies potential leading indicators, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset.[13] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 Corrosion**: This Driver includes external corrosion, which is a naturally occurring phenomenon commonly defined as the deterioration of a material (usually a metal) that results from a chemical or electrochemical reaction with its environment. This Driver also includes internal corrosion which is the deterioration of the interior of an asset as a result of the environmental conditions on the inside of the pipeline.[14] In pipelines, corrosion can occur internally and/or externally, both potentially resulting in a pipeline incident; therefore, both internal and external corrosion are referred to as "corrosion" in the remainder of this chapter, unless otherwise indicated.
- **DT.2 Natural Forces (landslide, earthquake, other natural disasters)**: This Driver includes forces attributable to causes not involving humans, but includes effects of climate change, such as earth movement, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperature, thermal stress, frozen components, wildfires, and high winds.
- **DT.3 Other Outside Force Damage (excluding excavation damage)**: This Driver includes effects attributable to outside damage other than excavation damage or natural forces, such as damage by car, truck, or motorized equipment not engaged in excavation.
- **DT.4 Pipe, Weld, or Joint failure**: This Driver includes materials defects within the pipe, component, or joint due to faulty manufacturing procedures, design

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

[13] D.24-05-064, RDF Row 10-11.

[14] ASME B31.8S, "Managing System Integrity of Gas Pipelines".

defects, improper construction or fabrication, or in-service stresses such as vibration, fatigue, and environmental cracking.

- **DT.5 Equipment Failure**: This Driver is similar to DT.4, but unrelated to pipe (main and services). These failures are attributable to the malfunction of a component including, but not limited to, regulators, valves, meters, flanges, gaskets, collars, and couples. This Driver is specific to the material properties related to the manufacturing process or post installation of the equipment.
- **DT.6 Incorrect Operations**: This Driver includes a pipeline incident attributed to insufficient or incorrect operating procedures or the failure to follow a procedure.
- **DT.7 Incorrect/Inadequate Asset Records**: This Driver includes forces attributable to the use of inaccurate or incomplete information that can result in the failure to (1) construct, operate, and maintain SoCalGas's pipeline system safely and prudently, or (2) to satisfy regulatory compliance requirements.
- **DT.8 Execution Constraints**: This Driver includes constraints including third-party vendor issues, Quality Assurance/Quality Control issues related to materials and operational oversight, resource constraints (*e.g.*, workforce, material), re-allocation or unexpected maintenance or regulatory requirements or the inability to complete project initiatives or meet operational compliance.

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this Risk by analyzing internal data sources, where available, industry data, and subject matter expertise (SME).[15] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, can include:

- **PC.1: Serious Injuries or fatalities**
- **PC.2: Property Damage**
- **PC.3: Adverse Litigation**
- **PC.4: Penalties and Fines**

15 D.24-05-064, RDF Row 10.

- **PC.5: Erosion of Public Confidence**
- **PC.6: Operational and Reliability Impacts**
- **PC.7: Environmental Impacts**

These potential consequences were used by SoCalGas in the scoring of the MP System Risk during the development of its ERR.

E. Evolution of Risk Drivers and Consequences

As specified in the Phase 3 Decision,[16] the following changes to the previous ERR and/or the 2021 RAMP include:

- The title of *Medium Pressure Gas System* was changed from *Incident Related to the Medium Pressure System (Excluding Dig-In)* to align with the 2024 ERR.
- The scope of *Medium Pressure Gas System* has been narrowed. In the 2021 RAMP, *Incident Related to the Medium Pressure System (Excluding Dig-In)* was a combination of two separate risks: (a) Incident Related to the Gas Distribution System (Excluding Dig-In), and (b) Customer and Public Safety. *Customer and Public Safety* has been renamed to *Beyond the Meter* and is a standalone risk in SoCalGas's 2024 ERR, which is not included in the 2025 RAMP due to not meeting the top 40% of safety risks threshold. SoCalGas has also made several updates to the Drivers and Potential Consequences to improve alignment with the terminology used in its policies and procedures.

1. Changes to Drivers/Triggers of the Risk Bow Tie

- DT.1 – "External corrosion" in the 2024 ERR was change to "Corrosion" for the 2025 RAMP.
- DT.2 – "Natural forces (natural disasters, fires, earthquakes)" in the 2021 RAMP was changed to Natural forces (landslides, fires, earthquakes) in the 2024 ERR, and "Natural Forces (landslide, earthquakes, other natural disasters)" for the 2025 RAMP.

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16 *Id.*, RDF Row 8.

- DT.3 – “Other Outside Force Damage (excluding dig-in)” in the 2024 ERR was changed to “Other Outside Force Damage (excluding excavation damage)” for the 2025 RAMP.

2. Changes to Potential Consequences of the Risk Bow Tie

The following change from the 2021 RAMP was made:

- PC.7 – Added “Environmental Impacts.”

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP - 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined:

Table 1: Medium Pressure Gas System Risk Tranche Identification

Class	**Number of LoRE-CoRE Pairs**	**Number of Resulting Tranches**
Aboveground	254	27
Belowground	3,073	40
TOTAL	**3,327**	**67**

Attachment D illustrates the derivation of the Tranches, as shown in Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas as logical groups of assets and systems based on the Company’s operations. These classes also align risk treatments with asset risk profiles reflective of SoCalGas’s operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches, are provided workpapers of this risk chapter.

III. PRE MITIGATION RISK VALUE

In accordance with the RDF Row 19 below provides the pre-mitigation risk values for the MP System Risk. For further details, including pre-mitigation risk values by Tranche, please refer to the workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3 Risk Quantification Framework.

Table 2: Medium Pressure Gas System Risk
Monetized Risk Values
(Direct, in 2024 $ millions)

LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
	Safety	Reliability	Financial		
58,846.77	$0.00014	$0.00012	$0.00171	$0.00197	$115.90

A. Risk Value Methodology

SoCalGas's risk modeling for the MP System risk follows RDF guidance[17] for implementing a Cost Benefit Approach, as described below:

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** MP System Risk is quantified in a combined attribute hierarchy as shown in the table above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** MP System Risk used observable and measurable data in the estimation of CoRE values. SoCalGas utilized a combination of internal and external data to estimate consequences in terms of natural units, (*e.g.* fatalities, serious injuries, and meters out) that can occur as the result of a risk event on the MP System.
3. **Cost Benefit Approach Principle 3-Comparison (RDF Row 4):** The MP System Risk quantification did not include any attributes that are not directly measurable, so proxy data, as described in the RDF, was not necessary.
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** The data sources used for MP System Risk – as described in the preceding paragraphs – were sufficient to model probability distributions for use in estimating risk values.
5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas and SDG&E used a California-adjusted Department of Transportation monetized equivalent to calculate the Safety CoRE attribute at a monetized

[17] D.24-05-064, RDF Rows 2-7.

equivalent of $16.2 million per fatality, and $4.1 million per serious injury;[18] the Gas Reliability CoRE attribute is valued at a monetized equivalent of $3,868 per gas meter outage; and the Financial CoRE attribute is valued at $1 per dollar.[19] Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, technical references, are provided in workpapers.

6. Cost Benefit Approach Principle 6 - Adjusted Attribute Level (RDF Row 7):

Table 3: Medium Pressure Gas System Risk
Risk Scaled vs Unscaled Value by CoRE Attribute
(Direct, in 2024 $ millions)

	Safety	**Reliability**	**Financial**	**Total**
Unscaled Risk Value	$6.4	$7.0	$100.0	$113.3
Scaled Risk Value	$8.4	$7.0	$100.5	$115.9

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CORE attributes for the MP System Risk. The MP System does not feature a significant risk aversion scaling impact because a relatively small proportion of the observed events rise to the level at which scaling is applicable, and the magnitudes of the consequences are not as high (*e.g.*, multiple-fatality event) as can occur with other risks.

For further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter-RAMP-3.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for MP System Risk and reflects changes to the portfolio expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place

18 D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

19 *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

in 2024 and which are expected to be on-going, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[20] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-009.[21] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test Year 2029, 2030, and 2031.[22]

Table 4: Medium Pressure Gas System Risk
2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C103	Cathodic Protection Base Activities	X	Ongoing
C106	Cathodic Protection-CP10 Activities	X	Ongoing
C116	M&R Station and EPM Inspection and Maintenance	X	Ongoing
C120	Distribution Riser Inspection Program (DRIP)	X	Ongoing
C121	Gas Infrastructure Protection Program (GIPP)	X	Ongoing
C122	Sewer Lateral Inspection Program (SLIP)	X	Ongoing
C123	Regulator Station Replacement	X	Ongoing
C124	Regulator Station Installation Replacement & Enhancement	X	Ongoing
C129	Cathodic Protection System Improvement	X	Ongoing
C130	MSA Inspection and Maintenance	X	Ongoing
C134	Pipeline Monitoring	X	Ongoing
C135	EPM Installations & Replacements	X	Ongoing
C159	Quality Assurance Gas Distribution Assets	X	Ongoing
C170	CP Install/Replace Impressed Current Systems	X	Ongoing
C174	Service Replacements – Leakage Abnormal Op. Conditions CP Related	X	Ongoing
C175	Residential Meter Protection	X	Ongoing
C177	Main Replacements – Leakage Abnormal Op. Conditions CP Related	X	Ongoing
C178	Distribution Leak Survey	X	Ongoing
C179	Distribution Main and Service Leak Repair	X	Ongoing

20 D.24-12-074.

21 D.21-11-009 at 136 (Conclusion of Law (COL) 7) (providing a definition for "baselines" and "baseline risk").

22 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C182	Distribution Risk Evaluation & Monitoring System (DREAMS)	X	Ongoing

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place,"[23] (*i.e.,* activities in this section were in place as of December 31, 2024). Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

- **C103: Cathodic Protection Base Activities:** Corrosion is a natural process that can deteriorate steel assets and potentially lead to leaks or failure of such assets. If the gas released from a leak was to migrate and accumulate in a confined space and an potential ignition source is present or introduced, there is also the potential for injuries and/or fatalities. Although SoCalGas operations groups endeavor to respond quickly to leaks when notified, such conditions have the potential to lead to an incident within a short amount of time.

  To mitigate the risk of corrosion and associated leaks and failures, SoCalGas uses Cathodic Protection (CP), coating, and monitoring to protect and extend the life of a steel asset. The application of a CP current is necessary to overcome local corrosion currents along the pipeline that, left unabated, would result in localized corrosion at anodic sites. Cathodic protection can be achieved by the installation of sacrificial anodes or impressed current systems.[24] Each cathodic protection rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding 2 1/2

[23] D.18-12-014 at 33.

[24] SoCalGas utilizes both impressed current and magnesium anode (galvanic) systems to provide CP to existing pipelines. Impressed current systems utilize rectifiers for the generation of the direct current. Both systems utilize sacrificial anodes as a primary component in the system. Anodes are installed in wells drilled into the surrounding soil by third-party drilling contractors. Each protected pipe segment requires multiple anodes, collectively referred to as an "anode bed." The number of anodes needed to achieve the desired level of protection, and the average life of the anode bed can vary based on pipeline length, coating effectiveness, soil conditions and interference that may occur on the system.

months, to assess that it is functioning.[25] SoCalGas plans to continue this schedule for these cathodic protection base activities.

The directives prescribed by 49 CFR 192 Subpart I and followed by SoCalGas include the monitoring of CP areas, remediation of CP areas that are out of tolerance,[26] and preventative installations to avoid out of tolerance areas.

- **C106: Cathodic Protection-CP10 Activities:** SoCalGas also tests each pipeline that is under cathodic protection as prescribed by 49 CFR § 192.465. The following summarizes the required intervals for completing preventative measures, like CP10, as prescribed in 49 CFR § 192.465 External Corrosion Control (Monitoring).

  Each pipeline that has cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of 49 CFR § 192.463. However, if tests at those intervals are impractical for separately protected short sections of mains or transmission lines, not in excess of 100 feet (30 meters), or separately protected service lines, these pipelines may be surveyed on a sampling basis. At least ten percent of these protected structures, distributed over the entire system must be surveyed each calendar year, with a different ten percent checked each subsequent year, so that the entire system is tested in each ten-year period. SoCalGas plans to continue these CP10 activities according to this schedule.
- **C116: Meter & Regulator (M&R) Station and Electronic Pressure Monitors (EPM) Inspection and Maintenance:** Regulator stations reduce the pressure of gas entering the medium-pressure (distribution) system from higher-pressure pipelines to lower pressure to within the MAOP limits of the distribution pipeline system. A failure of a regulator station due to mechanical failure, corrosion, contamination, or other cause could result in over-pressurization of the gas distribution system, which may compromise the integrity of medium-pressure

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25 49 C.F.R. § 192.465(a) and (b).

26 "Out of tolerance" areas are defined as areas where CP reads are outside of pre-determined read tolerances, and if left unaddressed, CP measures may not effectively mitigate the effect of the corrosive environment on steel assets.

pipelines and/or jeopardize public safety resulting from potential over-pressure events.

49 CFR § 192.739 requires inspections/tests of regulator stations to be conducted annually, not to exceed 15 months to maintain these stations and EPMs in good mechanical condition. Functional tests of regulation and monitoring equipment are performed as part of the annual inspections. If a device does not perform properly, internal maintenance and inspections are conducted. This consists of disassembling, inspecting, and cleaning the internal components of the regulator. Worn, corroded, or damaged components are repaired/replaced, and the regulator is reassembled and verified to be in working order prior to being placed back into service.

As regulator stations age, their parts and equipment can begin to wear and become harder to disassemble, increasing maintenance requirements. Regulator stations are designed to maintain continued safe and reliable operation of the station in the event of a failure within either of the station's two "runs."[27] Annual maintenance and inspections are used to record the condition of each station and EPM and identify items that require immediate and long-term action. The overall inspection of the station includes evaluation of the design, condition of the equipment, valves, vaults and EPMs, and exposure to other outside forces including flooding and traffic conditions.

The following summarizes the requirements, which are followed by SoCalGas, for completing these preventative measures as prescribed within 49 CFR § 192.739 Pressure Limiting and Regulating Stations: Inspection and testing:

Each pressure-limiting station, relief device (except rupture discs), and pressure-regulating station and its equipment must be subjected at intervals not exceeding fifteen (15) months, but at least once each calendar year, to inspections and tests to determine that it is:

1) In good mechanical condition;

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27 "Runs" refer to the parallel paths within a regulator station that allow gas to flow through one path while the other is shut off for maintenance or in case of failure. This redundant design is intended for continuous operation and pressure control.

2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed.

3) Except as provided in paragraph (b) of this section[28], set to control or relieve at the correct pressure consistent with the pressure limits of § 192.201(a);

4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

- **C120: Distribution Riser Inspection Program (DRIP):** The Distribution Riser Inspection Program (DRIP) is one of SoCalGas's programs/projects developed and managed under the DIMP in response to requirements in 49 CFR Part 192, Subpart P. This program addresses the threat of failure associated with anodeless risers (ALRs) as a result of corrosion. ALRs are service line components that have shown a propensity to fail before the end of their useful lives. ALRs were first introduced in the 1970s as a new technology, replacing steel risers used to connect underground plastic pipe to above ground steel meter sets. When an ALR was originally installed, it was set at a height where the gas carrying portion of the ALR was above ground. However, as grade conditions change due to landscaping and hardscaping or other conditions, this gas carrying portion may no longer be at the proper height above the ground. When the gas carrying portion of the ALR is buried or set too low, it can potentially corrode due to contact with the soil. Since ALRs are attached to meter set assemblies that are usually located next to residences, the consequence addressed by this program is that of an ALR failing and the failure resulting in an unintentional release of gas which if met with an ignition source, could result in serious injuries or fatalities.

  SoCalGas's research-based efforts to develop an effective means of mitigating above-ground and ground-level corrosion on anodeless risers has led to the implementation of using an epoxy composite wrap in lieu of ALR replacements. The epoxy composite wrap provides a protective barrier for the above-ground section of the riser to mitigate the effects of the environmental

[28] For more details, *see* 49 C.F.R. § 192.739(b), *available at:* https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-192/subpart-M/section-192.739#p-192.739(b).

conditions that are typical of riser installations. Through the DRIP, SoCalGas inspects ALRs and where the threat of corrosion-driven failure is present, SoCalGas will remediate the issue by implementing an epoxy composite wrap to provide a protective barrier for the above-ground section of the ALR.

- **C121: Gas Infrastructure Protection Program (GIPP):** The Gas Infrastructure Protection Program (GIPP) is a DIMP program developed and managed in response to requirements in 49 CFR Part 192, Subpart P and addresses the risk of third-party vehicular damage to above-ground pressurized natural gas facilities. An incident involving vehicular damage of a distribution facility can cause serious injuries or fatalities if an unintentional release of gas meets a source of ignition. GIPP was also developed in response to PHMSA guidance that indicated operators should consider low frequency but potentially high consequence events under the DIMP.[29]

  Through the GIPP, SoCalGas identifies, evaluates, recommends, and implements damage prevention solutions for at-risk above-ground pressurized gas facilities that are exposed to possible vehicular impacts. The current solutions have been effective at reducing the number of incidents on pressurized piping and/or reducing the potential consequences after vehicular collisions. Activities include: investigating historical claims data; developing risk assessment algorithms; conducting record reviews and physical inspections of facilities; developing risk exposure categories; identifying and implementing mitigation measures; updating policies, practices, and procedures; and developing performance measures. The prioritization of GIPP inspections and remediations is based on field assessments.

  GIPP remediation measures include the installation of barriers between facilities and vehicular traffic (*e.g.*, bollards or block wall), relocation of a facility, or installation of an excess flow valve. Barriers are intended to be a

[29] U.S. Department of Transportation PHMSA, *Gas Distribution Pipeline Integrity Management Enforcement Guidance – 49 CFR Part 192 – Subpart P* (December 7, 2015), *available at:* https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/DIMP_Enforcement_Guidance_12_7_2015.pdf.

visual rather than structural deterrent since they are not able to stop vehicular impacts, particularly those of large vehicles. The installation of excess flow valves can aid in the reduction of unrestrained gas flow should a gas release occur after impact. Considerations for the relocation of a facility include the type of road nearby, the volume of traffic, and the type of area (*e.g.*, commercial or residential).

The GIPP has been scoped to focus on high pressure residential first stage regulators and commercial and industrial (C&I) MSAs. Overall, there are approximately 372,000 C&I and HP residential first stage regulation customer sites in the system, of which – approximately 47,600 are estimated to require some type of mitigation.

The GIPP control includes both capital and O&M expenditures associated with this activity, which is measured by the number of capital mitigations completed per year. O&M activities and costs include an allocation of DIMP management such as data management, program/project evaluation and development, and reporting, which cannot be unitized.

- **C122: Sewer Lateral Inspection Program (SLIP):** The Sewer Lateral Inspection Program (SLIP) is a DIMP program developed and managed in response to requirements in 49 CFR Part 192, Subpart P and addresses the low frequency but high consequence risk of pipeline damage that occurs as a result of a sewer lateral crossing. Where gas pipe inadvertently crosses a sewer line (or "lateral") due to trenchless installation and penetrates, or bores, through the sewer line, a "cross bore" is created and exposes the gas pipeline to potential integrity risks. For example, a plumber or property owner may use a cleanout technology – such as a sewer line auger – to clean out what is seemingly normal sewer debris and blockage but unknowingly pierce a gas pipeline crossing the sewer line. Depending on how extensive the damage is, the gas pipeline may then release gas into and around the sewer line, enabling the migration of gas towards and into a residence or other type of property. If this migration of gas is then met with an ignition source, serious injuries or fatalities could occur.

Through the SLIP, SoCalGas inspects gas services for points of intrusion into residential sewer lines. Should an intrusion be found, the issue is remediated, which mitigates the potential of an incident. Since the start of the program in 2010, over 630,000 services have been inspected in the field. The forecast for the number of remaining services to be inspected is driven by the findings of SoCalGas's SLIP records review, but is currently estimated to be an additional 300,000 services. At the present rate, SoCalGas expects to complete SLIP records research by the end of 2025.

- **C123: Regulator Station Replacement:** SoCalGas's operating and maintenance practices allow the useful lives of regulator stations to be extended. SoCalGas proactively replaces regulator stations prior to the end of their useful life to reduce overall system risk. SoCalGas developed a district regulator station (DRS) relative risk assessment to inform the prioritization of enhancements and replacements of stations. SoCalGas plans to apply the results of the risk assessment by increasing the number of regulator station replacements to reduce safety risks. Risk reduction is achieved when addressing either or both equipment failure probability (LoRE) and consequences (CoRE). Industry practices and philosophies have evolved to modernize antiquated station designs to essentially reduce over/under pressure and outside force risks. While stations have been replaced in the past to address safety concerns, this risk assessment-based approach enables the prioritization and focus of this activity to be driven by safety risk and will inform this multi-year program.
- **C124: Regulator Station Installation Replacement & Enhancement:** SoCalGas's Control Center Modernization (CCM) organization is deploying remote control and real-time monitoring at distribution regulator stations, which will provide Gas Control visibility into the dynamic pressures and flows across the gas distribution system. This work includes the installation of remote real-time automated control valves, pressure sensing equipment, flow measurement, and communication devices. These enhancements will provide Gas Control personnel with comprehensive operational awareness by receiving information

from the regulator stations through a centralized data management system to the Gas Control Room.

With these enhancements, Gas Control personnel will have improved visibility and control over assets within the distribution system, enabling them to more quickly identify, respond, and remediate abnormal operating pressures. This is intended to help prevent overpressure situations by providing earlier awareness that, in turn, facilitates more timely response.

- **C129: Cathodic Protection System Improvement:** The Cathodic Protection System Improvement Plan (SIP), and its associated activities, was developed to address the threat of corrosion on SoCalGas's Non-State-of-the-Art (NSOTA) steel medium-pressure pipelines, which are also referred to as NSOTA steel pipelines. The SIP is a DIMP program developed and managed in response to requirements in 49 CFR Part 192, Subpart P.

  Through field examinations, SoCalGas has determined that the presence of Southern Counties number 7 and number 9 coal tar coating on installed pipe is conducive to cathodic protection. SoCalGas conducted an analysis of its Geographical Information System (GIS) distribution data and identified 23 operating districts in its service territory with pre-1971 pipelines categorized as bare steel that are coated with these specific coating types. To reduce the risk of corrosion on pipe that may not be prioritized for accelerated replacement under C182 (DREAMS) and/or decrease the amount of pipe that requires accelerated replacement, SoCalGas plans to convert these NSOTA pipelines to cathodically protected pipelines with impressed current systems.

  SIP consists of both capital and O&M activities and costs, which are primarily driven by the number of feet replaced. O&M activities and costs include an allocation of DIMP management such as data management, program/project evaluation and development, and reporting, which cannot be unitized.

  Through both the SIP and the replacement of higher risk NSOTA pipe under C182 (DREAMS), SoCalGas comprehensively mitigates the risk of corrosion-driven failure on NSOTA steel pipelines.

- **C130: Meter Set Assembly (MSA) Inspection and Maintenance:** Meter and regulator activities include maintaining, inspecting, or replacing approximately 18 percent of the total 105,000 medium and large M&R MSAs in the SoCalGas service territory annually. The MSAs reduce the pressure of natural gas and measure the volume of natural gas delivered to the customer. General Order 58-A requires that meters, regulators, and other components be maintained, repaired, and tested periodically to meet customers' capacity requirements, measure gas volume accurately, and deliver natural gas at an adequate pressure for the houseline and home appliances. Additionally, if MSAs are housed in vaults, the vaults must be inspected and repaired, if necessary, to protect the MSA. Should the regulators fail, a household could potentially see a much higher pressure of natural gas which could lead to an incident. Scheduled inspections of meter set assemblies proactively target the risk of equipment failures, corrosion, and outside force before operation and safety issues arise. In addition, as required by 49 CFR § 192.481, above ground piping facilities such as MSAs must be inspected for atmospheric corrosion and complete necessary remediation no less than once every three calendar years and at intervals not to exceed 39 months.
- **C134: Pipeline Monitoring:** SoCalGas conducts comprehensive pipeline monitoring and inspection activities to proactively address risk factors that can lead to operational and safety issues. The monitoring activities performed by the Gas Distribution Department on Medium Pressure pipelines includes bridge and span inspections, unstable earth inspections, and valve inspections and maintenance.

  Bridge and Span inspections involve Distribution pipeline spans, pipe supported on bridges, above ground (or jacketed) pipelines, and other exposed pipelines (as installed). In accordance with regulatory requirements, 49 CFR § 192.481, each pipeline or portion of pipeline that is exposed to the atmosphere must be inspected for evidence of atmospheric corrosion. During inspections employees performing the inspection must give particular attention to pipe at soil-to-air interfaces.

Company employees performing the pipeline inspections on bridges and spans, and above ground pipelines will investigate and report on the following:

- Indications of gas leakage
- Corrosion damage to pipe
- Stress on the pipe
- Deterioration of protective coatings
- Pipe supports
- Soil Erosion
- Condition of pipeline markers and stenciling
- Condition of fencing and personnel barriers
- Damage to the pipe
- Any other condition which might affect the operation or safety of the pipe

Unstable Earth inspections are performed where physical movement or external loading that could cause failure or leakage is anticipated. Additional special patrols for transmission pipelines and distribution mains are conducted as necessary immediately after events that could cause pipeline movement or loading conditions to change. These events may include earthquakes, heavy rain, flooding, sinkholes, landslides, or indications of earth movement, surface subsidence or cracking, that would result in "unstable earth" conditions.

Conditions that must be reported as part of unstable earth inspections, as required by 49 CFR § 192.613, include the following:

- Landslides or indications of earth movement, such as cracks or slumping
- Flooding or unusual erosion of roads, banks, rights of way, etc.
- Surface subsidence or cracking of land and paved surfaces
- Evidence of gas leakage
- Needed repairs on adjacent foreign structures that might endanger the pipeline
- Needed maintenance of Company facilities, *e.g.*, gates, fences, patrol roads, weed or brush removal, etc.

Valve inspections are performed to ensure the proper operation of valves within the distribution system, which enhances public safety by enabling

SoCalGas to control the pressure and flow of gas in the system. Valves operating at optimum effectiveness provide that, in the event of an earthquake or fire, areas are capable of being fully isolated to reduce the risk of incident. More frequently, when excavation damage occurs, these valves can be operated to create a safe environment to complete repairs and minimize the risk of further incidents. The following summarizes the requirements for completing these preventative measures as prescribed within the 49 CFR § 192.747 and followed by SoCalGas:

1. Each valve, the use of which may be necessary for the safe operation of a distribution system, must be checked and serviced at intervals not exceeding 15 months, but at least once each calendar year.
2. Each operator must take prompt remedial action to correct any valve found inoperable, unless the operator designates an alternative valve.

- **C135: Electronic Pressure Monitor (EPM) Installations & Replacements:** The purpose of EPM is to monitor and record system operating pressures, and generate alarms when pressures exceed or drop below alarm set points, monitoring for maximum allowable operating pressure (MAOP) exceedance or under-pressure conditions as required by 49 CFR 192.741, 192.201(a), 192.739(a)(2) and GO 112F 122.2. Pressure alarms are maintained and evaluated and the appropriate corrective actions such as new installs and replacements are administered. The pressure zones and pressure districts are monitored and reported as part of GO 112-F requirements for Over-MAOP and Under-Pressure events. EPMs are required to indicate the gas pressure in each distribution system supplied by more than one district pressure regulating station. In addition, for distribution systems supplied by a single district pressure regulating station, the operator determines the necessity of installing an EPM. EPM installations and replacements are ongoing activities.
- **C159: Quality Assurance Gas Distribution Assets:** The Gas Compliance Quality Management Team (GQCM) conducts annual quality assessments on a random selection of completed leak survey orders. Specifically, the GQCM team reviews the required documentation (equipment logs), performs leakage equipment tests, and conducts field assessments using GIS maps. During the field

assessments, the GQCM team reviews the meter and meter set assembly, checks for missed leaks, and assesses the pipe structure for integrity.

- **C170: Cathodic Protection (CP) Install/Replace Impressed Current Systems:** Buried steel pipelines revert back to their natural state as an iron oxide without anti-corrosion intervention. Corrosion of pipelines increases the risk for leaks and may reduce the useful life of pipelines. In addition to the application of coating and electrical isolation, CP is a method for mitigating external corrosion on steel pipelines. CP combats corrosion by imposing an electric current flow toward the surface of the pipeline, which keeps the pipeline negatively charged (cathodic) with respect to the surrounding soil, in turn resulting in reduced corrosion on the pipeline system. 49 C.F.R. § 192, Subpart I, and GO 112-F set forth the regulatory standards for pipeline corrosion control. SoCalGas utilizes impressed current systems to provide CP to existing pipelines. Impressed current systems utilize a rectifier for the generation of the direct current and sacrificial anodes as primary components in the system. Anodes are installed in wells drilled into the surrounding soil by third-party drilling contractors. Each protected pipe segment requires multiple anodes, collectively referred to as an "anode bed." The number of rectifiers and anodes needed to achieve the desired level of protection and the average life of the anode bed can vary based on pipeline length, coating effectiveness, soil conditions, and interference that may occur on the system. Impressed current cathodic protection system maintenance, installation, and replacement are all ongoing activities.
- **C174: Service Replacements – Leakage Abnormal Op. Conditions CP Related:** Service replacements are conducted for various reasons, including the occurrence of large leaks or a disproportionate frequency of past leaks. Steel services in particular are replaced when active corrosion is detected or when a leak is found on a non-cathodically protected steel service. During maintenance activities, it is possible to encounter services containing obsolete materials such as cellulose acetate butyrate (CAB) or polyvinyl chloride which prompts the service to be replaced. Services may also be replaced on an accelerated basis when the makeup of the service contains Aldyl-A material. Whereas pipeline replacements

performed under the DIMP through C182 (Distribution Risk Evaluation & Monitoring System) in SDG&E-Risk-3 are informed by a quantitative risk model and are prioritized based on likelihood and consequence of failure, replacement activities under C174 are executed in response to real-time field findings related to leaks and abnormal operating conditions.

Service replacements in this category are specific to the replacement of existing service lines to maintain system reliability and to safely deliver gas to the customer, thus mitigating the risks associated with loss of service and public safety. Services are replaced by two construction methods, "insertion" and "direct bury". With the insertion method, a new plastic replacement service pipe is inserted into the to-be abandoned steel service pipe such that the steel service becomes casing for the plastic pipe. The direct bury technique specifies to the construction crews that the installation of new pipe does not need casing, and any installation method can be utilized such as boring or open trench. Service replacements are an important part of operational reliability and public safety.

- **C175: Residential Meter Protection:** The Residential Meter Protection Project (RMPP) addresses the prevention of potential vehicular damage associated with above-ground distribution facilities at residential properties. This control minimizes the potential for vehicular damage for above ground gas equipment (*e.g.*, the meter set assembly, or MSA) by placing various forms of physical devices or barriers to mitigate damage in case of a potential collision. Barriers are intended to be a visual, not structural, deterrent and are not intended to or capable of stopping all vehicular traffic, particularly large vehicles. Where adequate mitigation cannot be achieved, gas equipment can be relocated or removed. In certain instances a meter guard can provide protection during incidents like earthquakes, landslides, and floods by providing the meter with protection from debris that would otherwise directly strike the meter.
- **C177: Main Replacements – Leakage Abnormal Operating Conditions CP Related:** Activities under Main Replacements include installation of new mains to replace existing ones, main replacements in advance of public infrastructure

projects, and service line replacements, existing service line tie-overs, and meter set rebuilds in connection with newly installed replacement mains.

Leakage is often the driving factor for pipeline replacements; however, there are other considerations. Other criteria taken into consideration include whether the steel pipe meets cathodic protection mandates, or the main is found to have active corrosion. In addition, other criteria include whether the pipeline may be deemed unsafe or unfit for service under pressure due to manufacturing or other defects. Leak history and pending leaks on individual segments are the primary factors in identifying the majority of SoCalGas's main replacements. These replacements are critical to sustain operational reliability and public safety.

- **C178: Leak Survey:** SoCalGas performs leak survey monitoring activities by conducting a thorough search for gas leak indications in an assigned area and reporting detectable leaks using an approved survey method. The leak survey process can be separated into routine leak survey and special leak survey.

  The monitoring and inspections must follow certain prescribed processes included in 49 CFR Part § 192.723 and incorporated into SoCalGas's Gas Standards.

  Special leak surveys are one-time, additional surveys to the routine scheduled surveys that are driven by a specific circumstance. Special leak surveys are performed:

  - Upon discovery that the MAOP of a pipeline is exceeded by 10% or more at any time during the life of the pipeline;
  - After the occurrence of any incident (*e.g.*, train derailment, explosion, earthquake, flooding, landslides, etc.) over or adjacent to high pressure pipelines or related facilities;
  - When there is the danger of public exposure to leaking gas; the special survey is performed using the appropriate leak detection method;
  - When increasing the MAOP of a pipeline;
  - When the routine scheduled survey frequency is not considered adequate because of pipe condition, limited opportunity for gas to vent safely, or other reasons;

- There is a need to monitor pipe condition for special situations, such as: material evaluations, proposed street improvement projects, as a mitigated measure for the Integrity Management Program; and
- In conjunction with major underground construction projects.

- **C179: Main & Service Leak Repair:** Following the identification of leaks through the comprehensive leak survey process, the Main and Service Leak Repair control provides for detected leaks to be promptly assessed and repaired to maintain the safety and integrity of the gas pipeline system and public safety. This activity establishes guidelines and requirements for assessing the degree of hazard and coding of leaks or leak indications found on the Company's below ground piping system, and actions required to provide for public safety and repair of the leak as required by SoCalGas's Gas Standards, which comply with 49 CFR Subpart M. Leak indications on Company facilities are classified by trained and qualified employees according to location, spread, concentration of gas, possibility for accumulation of gas, possible sources of ignition, potential migration, and imminence of hazard to people or property. Classifications of leaks or leak indications are based on the relative degree of hazard. The judgment of the qualified person evaluating the leak or leak indication, after consideration of all factors involved, is the primary criterion for classification and mitigation. Hazardous indications of leaks are reported, and action is taken according to the applicable Gas Standard until the hazard has been eliminated and the leak has been either temporarily or permanently repaired; or until it is determined that the leak is from a source other than the Company piping system.

  Each segment of pipeline that is assessed as unsafe must be repaired, altered, or removed from service. Each imperfection or damage that would impair the serviceability of PE pipe or fittings must be repaired or removed. Appropriate temporary repairs such as plugging, or clamping shall be made if permanent repairs are not possible at the time of discovery.
- **C182: Distribution Risk Evaluation & Monitoring System (DREAMS):** The DREAMS was developed to manage the replacement of NSOTA pipes with State-Of-The-Art (SOTA) pipes, which SoCalGas has undertaken to comply with the

DIMP requirements mandated by 49 CFR Part 192, Subpart P, to reduce the risk of serious incidents and enhance the overall safety and reliability of the natural gas distribution system. The NSOTA pipe population consists of vintage Aldyl-A and bare steel pipe, which have been recognized by federal and state regulators as high-risk pipes that necessitate action by pipeline operators.[30] Specific to Aldyl-A, slow crack growth fundamentally poses a higher level of risk due to the nature of leaks created by this mode of failure.[31] Leak surveys do not completely mitigate the risk as leaks can occur suddenly and result in risk events.[32]

SoCalGas mitigates the risk associated with both vintage Aldyl-A pipe and bare steel pipe through the execution of pipe placement projects informed by the DREAMS model. The DREAMS model, which was previously a relative risk model, was recently updated with the use of a segment-specific quantitative risk assessment (QRA) algorithm that combines internal datasets and external publicly available data sources, and includes pipe attributes, operational conditions, and potential impact of an incident on the general population, to estimate the safety risk of NSOTA main pipelines. This model and its results are used to determine appropriate actions to address risk for each segment and inform the prioritization of replacement investments. In the absence of an established safety risk threshold from PHMSA and other regulatory bodies, SoCalGas has established a threshold of an annual probability greater than 6×10^{-6} of a serious incident for medium pressure distribution main locations. NSOTA medium pressure distribution mains with QRA results that exceed this threshold are targeted for replacement under the DREAMS program.

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30 CPUC, *Hazard Analysis and Mitigation Report: Aldyl A Polyethylene Gas Pipelines* (June 11, 2014) at 11, *available at:* https://www.cpuc.ca.gov/regulatory-services/safety/gas-safety-and-reliability-branch/pipeline-documents, and the Pipeline Safety: Safety of Gas Distribution Pipelines and Other Pipeline Safety Initiatives, 88 Fed. Reg. 172,61751 (September 7, 2023) (to be codified at 49 C.F.R. Parts 191, 192, and 198), *available at:* https://www.govinfo.gov/content/pkg/FR-2023-09-07/pdf/2023-18585.pdf.

31 CPUC, *Hazard Analysis and Mitigation Report: Aldyl A Polyethylene Gas Pipelines* (June 11, 2014) at 25, *available at:* https://www.cpuc.ca.gov/regulatory-services/safety/gas-safety-and-reliability-branch/pipeline-documents.

32 *Id.* at 26

As more data is accumulated through inspections and other pipeline activities, SoCalGas expects continuous improvement in its risk evaluations, including consideration of the current state of risk in the system as well as the projected long-term risks such as environmental changes to the material and impacts from construction activity since threats affecting these vintage materials are time-dependent (*e.g.*, corrosion) and the associated risks can escalate at different rates (*e.g.*, corrosion vs. material degradation). SoCalGas monitors the performance of DREAMS pipeline replacements by reviewing benefits and risk reduction achieved through indicators such as leak repair and incident rates related to vintage pipe. Program metrics are monitored on a continual basis and SoCalGas will increase or decrease replacement rates based on findings.

SoCalGas's DREAMS consists of both capital and O&M activities and costs, which are primarily driven by the number of miles replaced through this control. While Capital activities are measured by miles replaced, O&M activities and costs cannot be measured by a singular unit due to the variety of work included, such as data management, risk analysis, reporting, training, and an allocation of general DIMP management activities including the evaluation and development of prospective risk programs/projects.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls, discussed above and reflected in Table 1, through the 2025-2031 period without any significant changes, with the exception of C121 (GIPP) which is currently projected to be completed by 2030.

C. Mitigation Programs

SoCalGas does not currently foresee implementing new mitigations not described above during the 2025-2031 period.

D. Climate Change Adaptation

Pursuant to Commission decisions[33] in the Climate Adaptation OIR (R.18-04-019), SoCalGas performed a Climate Adaptation Vulnerability Assessment (CAVA) focused on years 2030, 2050, and 2070, with the aim of identifying asset and operational vulnerabilities to climate

[33] D.19-10-054; D.20-08-046.

hazards across the SoCalGas system. SoCalGas recognizes the need to address climate vulnerabilities to promoting safety and reliability of its services to its customers and mitigate the increasing climate-related hazards through innovative and community-centric approaches. Some of the climate hazards that will have short- and long-term ramifications in the Southern California region include extreme temperatures, snowstorms, wildfire, inland flooding, coastal flooding and erosion, and landslides. Climate change is recognized as a factor that can drive, trigger, or exacerbate multiple RAMP risks. Implementing climate change adaptation measures and integrating climate vulnerability considerations into RAMP controls and mitigations can enhance system infrastructure longevity and reduce the severity of long-term negative climate impacts. The controls and mitigations described in further detail in this chapter, as shown below, align with the goal of increasing SoCalGas's physical and operational resilience to the increasing frequency and intensity of climate hazards. Additional information on the CAVA and a list of climate-relevant controls and mitigations included in RAMP, are provided in Chapter RAMP-5: Climate Change Adaptation.

Table 5: Medium Pressure Gas System Risk
Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

Relevant ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C120	DIMP - Distribution Riser Inspection Program (DRIP)	Inland Flooding and Landslides
C124	Regulator Station Installation Replacement & Enhancement	Inland Flooding, Landslides, and Wildfires
C134	Pipeline Monitoring	Inland Flooding and Landslides
C135	EPM Installations & Replacements	Inland Flooding, Landslides, and Extreme Temperatures
C174	Service Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
C175	Residential Meter Protection	Inland Flooding and Landslides
C177	Main Replacements - Leakage Abnormal Operating Conditions CP Related	Inland Flooding and Landslides
C178	Distribution Leak Survey	Inland Flooding and Landslides
C179	Distribution Main & Service Leak Repair	Inland Flooding and Landslides
C182	DIMP - Distribution Risk Evaluation & Monitoring System (DREAMS)	Inland Flooding and Landslides

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[34]

The C178 Distribution Leak Survey is a foundational program that supports distribution main and service repair activities. These surveys, mandated by federal and state regulations (PHMSA/DOT Regulation 49 CFR 192, Subpart M, § 192.723) involve comprehensive monitoring and inspections to detect gas leaks in designated areas. Upon identification, these leaks are promptly assessed and repaired to seek the safety and integrity of the gas pipeline system.

Below in Table 6 are the Foundational Programs that are applicable to the MP System Risk and the mitigation activities that they support.

Table 6: Medium Pressure Gas System Foundational Activities (Direct, in 2024 $ millions)

ID	Foundational Activity Name	Enabled Control/Mitigation	2025 O&M Costs	2025-2031 Capital Costs
C178	Distribution Leak Survey	C179 Distribution Main and Service Repair	7.88	0

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for MP System Risk, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[35] for each enterprise risk, SoCalGas uses actual results and industry data and when that is not available, supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates are provided in Attachment B.

[34] D.24-05-064, Appendix A at A-4.

[35] D.24-05-064, RDF Row 10.

Table 7: Medium Pressure Gas System
Control and Mitigation Plan – Recorded and Forecast Costs Summary
(Direct, in 2024 $ thousands)

Control/Mitigation		Recorded Costs		Forecast Costs			
ID	Name	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C103	Cathodic Protection Base Activities	0	12,102	12,102	0	0	36,306
C106	Cathodic Protection-CP10 Activities	0	1,328	1,665	0	0	4,995
C116	M&R Station and EPM Inspection and Maintenance	0	3,988	3,855	0	0	11,565
C120	Distribution Riser Inspection Program (DRIP)	0	20,468	26,056	0	0	76,628
C121	Gas Infrastructure Protection Program (GIPP)	13,510	1,471	1,522	48,599	11,747	1,514
C122	Sewer Lateral Inspection Program (SLIP)	0	13,260	21,113	0	0	63,224
C123	Regulator Station Replacement	4,479	0	0	17,916	13,437	0
C124	Regulator Station Installation Replacement & Enhancement	25,630	0	0	112,075	87,170	0
C129	Cathodic Protection System Improvement	7,057	235	537	19,917	15,568	1,652
C130	MSA Inspection and Maintenance	0	1,618	1,618	0	0	4,854
C134	Pipeline Monitoring	0	868	868	0	0	2,604
C135	EPM Installations & Replacements	320	0	0	1,632	1,224	0
C159	Quality Assurance Gas Distribution Assets	0	0	331	0	0	993

Control/Mitigation		Recorded Costs		Forecast Costs			
ID	Name	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C170	CP Install/Replace Impressed Current Systems	11,041	0	0	44,164	33,123	0
C174	Service Replacements-Leakage Abnormal Op. Conditions CP Related	32,903	0	0	144,441	137,196	0
C175	Residential Meter Protection	10,649	0	0	12,572	9,429	0
C177	Main Replacements-Leakage Abnormal Op. Conditions CP Related	10,975	0	0	57,761	74,508	0
C178	Distribution Leak Survey	0	7,880	16,393	0	0	49,179
C179	Distribution Main & Service Leak Repair	0	20,364	60,528	0	0	181,584
C182	Distribution Risk Evaluation & Monitoring System (DREAMS)	157,688	4,963	3,877	620,101	458,427	11,718
Total		**274,252**	**88,545**	**150,465**	**1,079,178**	**841,829**	**446,816**

Table 8: Medium Pressure Gas System Risk Control & Mitigation Plan – Units Summary

Control/Mitigation		Recorded Units		Forecast Unit				
ID	Name	Unit of Measure	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C103	Cathodic Protection Base Activities	Work orders	0	38,403	38,403	0	0	115,209
C106	Cathodic Protection-CP10 Activities	CP and follow-up reads	0	34,651	35,525	0	0	106,575
C116	M&R Station and EPM Inspection and Maintenance	Work orders	0	6,437	5,913	0	0	17,739
C120	Distribution Riser	Inspectio ns	0	197,95 3	237,95 3	0	0	628,859

Control/Mitigation		Recorded Units		Forecast Unit				
ID	**Name**	**Unit of Measure**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
	Inspection Program (DRIP)							
C121	Gas Infrastructure Protection Program (GIPP)	Mitigations	4,278	0	0	5,050	3,250	0
C122	Sewer Lateral Inspection Program (SLIP)	Inspections	0	53,249	86,249	0	0	258,747
C123	Regulator Station Replacement	Work orders	32	0	0	128	96	0
C124	Regulator Station Installation Replacement & Enhancement	SCADA Enhanced Sites	8	0	0	90	70	0
C129	Cathodic Protection System Improvement	Feet	405,181	0	0	2.112*	1.584*	0
C130	MSA Inspection and Maintenance	Work orders	0	6,316	6,316	0	0	18,948
C134	Pipeline Monitoring	Work orders	0	5,081	5,081	0	0	15,243
C135	EPM Installations & Replacements	Installations or Replacements	110	0	0	476	357	0
C159	Quality Assurance Gas Distribution Assets	FTEs	0	0	3	0	0	9
C170	CP Install/Replace Impressed Current Systems	Work orders	596	0	0	2,384	1,788	0

Control/Mitigation		Recorded Units		Forecast Unit				
ID	Name	Unit of Measure	2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C174	Service Replacements- Leakage Abnormal Op. Conditions CP Related	Replacements	3,956	0	0	16,367	13,497	0
C175	Residential Meter Protection	Repairs – meter protection sites mitigated	11,341	0	0	13,388	10,041	0
C177	Main Replacements- Leakage Abnormal Op. Conditions CP Related	Feet – main replacements	38,535	0	0	157,296	125,073	0
C178	Distribution Leak Survey	Feet	0	123.569*	143.474*	0	0	430.422*
C179	Distribution Main & Service Leak Repair	Leaks Repaired	0	6,162	12,672	0	0	38,016
C182	Distribution Risk Evaluation & Monitoring System (DREAMS)	Miles	143	0	413	333		0

*This unit is in millions

In Table 9 below, CBRs are presented in summary at the mitigation or control level for the Test Year 2028 GRC cycle. CBRs are calculated based on scaled, expected values unless otherwise noted and calculated for each of the three required discount rates[36] in each year of the GRC cycle and for the post-test years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

[36] *See* Chapter RAMP-3: for definitions of discount rates, as ordered in the Phase 3 Decision.

Table 9: Medium Pressure Gas System Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C103	**Cathodic Protection Base Activities**	0	48.4	6.64	6.65	6.61
C106	**Cathodic Protection-CP10 Activities**	0	6.7	0.80	0.80	0.80
C116	**M&R Station and EPM Inspection and Maintenance**	0	15.4	1.40	1.42	1.40
C120	**Distribution Riser Inspection Program (DRIP)**	0	102.7	0.11	0.02	0.01
C121	**Gas Infrastructure Protection Program (GIPP)**	23.6	3	0.01	0.01	0.01
C122	**Sewer Lateral Inspection Program (SLIP)**	0	84.3	0.01	0.01	0.01
C123	**Regulator Station Replacement**	17.9	0	0.15	0.06	0.05
C124	Regulator Station Installation Replacement & Enhancement	118.3	0	0.10	0.04	0.04
C129	**Cathodic Protection System Improvement**	20.8	2.2	0.28	0.22	0.22
C130	**MSA Inspection and Maintenance**	0	6.5	0.15	0.15	0.15
C134	**Pipeline Monitoring**	0	3.5	1.94	1.95	1.94
C135	**EPM Installations & Replacements**	1.6	0	8.68	8.72	8.66
C159	**Quality Assurance Gas Distribution Assets**	0	1.3	0.22	0.22	0.22
C170	**CP Install/Replace Impressed Current Systems**	44.2	0	7.28	7.28	7.25

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C174	**Service Replacements – Leakage Abnormal Op. Conditions CP Related**	182.9	0	12.48	1.37	1.31
C175	**Residential Meter Protection**	12.6	0	0.02	0.01	0.01
C177	**Main Replacements – Leakage Abnormal Op. Conditions CP Related**	99.3	0	8.33	0.86	0.81
C179	**Distribution Main and Service Leak Repair**	0	242.1	0.50	0.51	0.50
C182	**Distribution Risk Evaluation & Monitoring System (DREAMS)**	611.9	15.6	2.28	0.23	0.22

Bold *indicates a mandated program*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025 and D.16-08-018,[37] SoCalGas considered two alternatives to the Risk Mitigation Plan for the MP System Risk. The alternatives analysis for this plan considered changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan and constraints, such as budget and resources.

[37] *See, e.g.,* D.18-12-014 at 33-35.

Table 10: Medium Pressure Gas System Risk
Alternative Mitigation Plan – Forecast Costs Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Forecast Costs			
		2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A009	Comprehensive Replacement of Bare Steel Pipelines	312.928	234.696	0	0
A106	CP10 Service Replacement	603.436	452.577	0	0

Table 11: Medium Pressure Gas System Risk
Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A009	Comprehensive Replacement of Bare Steel Pipelines	78.232	0	1.48	0.14	0.14
A106	CP10 Service Replacement	150.859	0	1.46	0.15	0.14

A. Alternative 1: Replacement of 10-year Cycle Cathodically Protected Services (CP10s)

SoCalGas considered replacing all of its 301,718 CP10 services rather than continuing to monitor, inspect and maintain them on a ten-year cycle. CP10 services are separately protected service lines that are surveyed on a sampling basis where at least 10% of system inventory are sampled each year, so that the entire system is tested in a 10-year period. However, due to the number of CP10 services in the system, a program targeting complete replacement of CP10 services would exceed $4.5 billion and likely take decades to complete. As complete replacement is not currently feasible, further evaluation of CP10 services is required to evaluate and quantify the risk reduction benefits, and potentially develop a risk based targeted replacement program. In the interim, CP10s will continue to be replaced based on performance history and current protection levels.

B. Alternative 2: Comprehensive Replacement of Bare Steel Pipelines

SoCalGas continues to evaluate whether replacing all NSOTA bare steel pipelines is more effective at reducing risk associated with this specific category of medium pressure pipe, as an alternative to the CP SIP control (C129) and the current QRA-driven replacements of NSOTA bare steel under the DREAMS (C182). In this alternative, SoCalGas would target all NSOTA bare steel pipelines (mains and services) for replacement, prioritizing segments to maximize cost-efficiency and expediency.

SoCalGas developed a cost estimate of $78 million per year that assumes the level of activity authorized in D.24-12-074[38] for the DREAMS Bare Steel Replacement Program (BSRP) and would plan to increase the replacement rate over time to remove as much of this NSOTA pipe population as possible. For this alternative, SoCalGas assumed that the cost of replacing bare steel pipe would align with the average cost per mile forecasted for the BSRP, though there would be measures taken to maximize cost efficiency, such as prioritizing work in the same geographical areas. SoCalGas also assumed that the increased prioritization on efficiency would result in a more randomized risk reduction as compared to the targeted risk reduction that would result from prioritizing work based on SoCalGas's QRA results that are currently driving DREAMS replacements.

SoCalGas is not currently pursuing wholesale replacement of bare steel pipelines, which is estimated to exceed $27 billion over the life of such a program, but is instead leveraging the QRA-driven replacement program to prioritize higher-risk pipeline segments. The planned combination of QRA-driven replacement of bare steel under the DREAMs and the application of cathodic protection on select pipeline segments under the CP SIP ultimately balances risk reduction with long-term impact to ratepayers.

VI. HISTORICAL GRAPHICS

As directed by the Commission in Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a key DIMP metric that aligns with Company safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating this risk.

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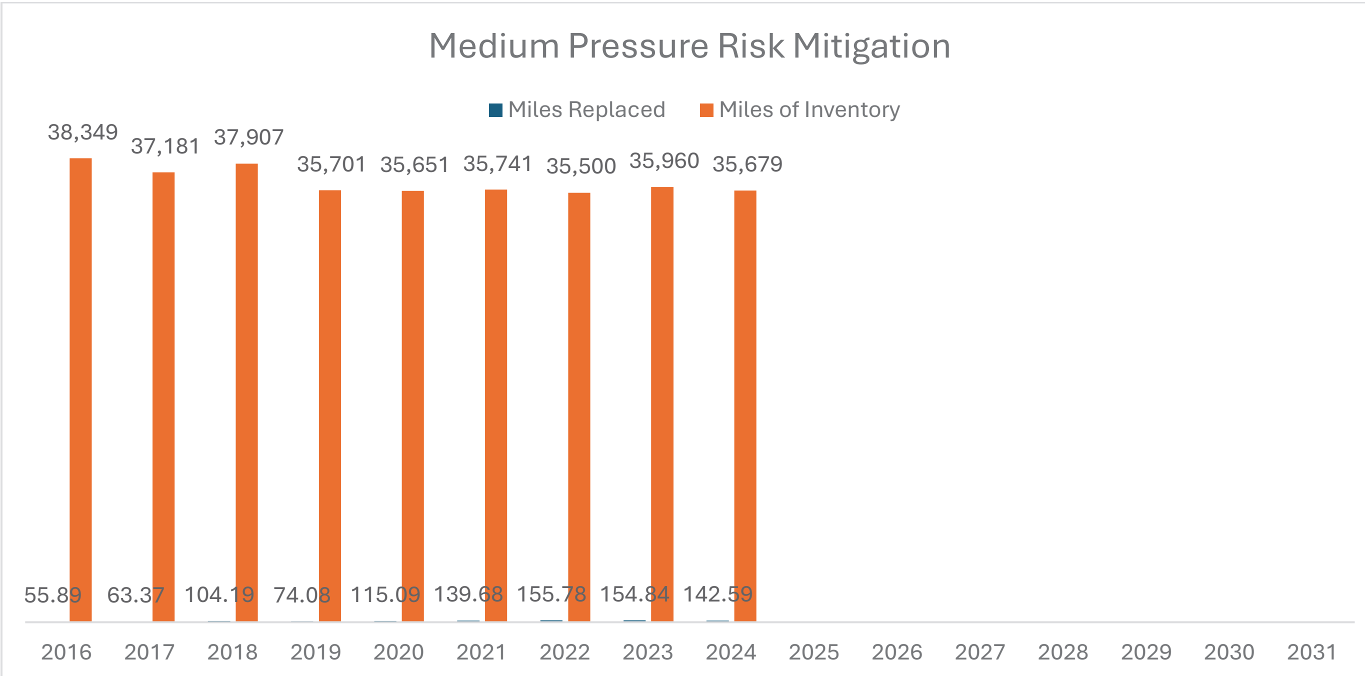
[38] *See* D.24-12-074, 13.1.2.3 SoCalGas DIMP Capital; "For BSRP, the Commission adopts a forecast of $86.578 million, $63.005 million, and $79.737 million for the years 2022, 2023, and 2024, respectively."

Figure 2

Medium Pressure Gas System: Safety Progress 2016-2024



As described in Section III.A, the DREAMS is a risk program developed by SoCalGas to replace NSOTA pipes with SOTA pipes. The recently updated DREAMS model uses a QRA algorithm that integrates various data sources to estimate the safety risks associated with vintage plastic and bare steel pipelines. Prioritizing pipeline replacements using this model, SoCalGas aims to enhance the safety and reliability of the natural gas distribution system.

From 2016 to 2024, SoCalGas successfully completed pipeline replacements, improved data tracking, and advanced risk evaluations through the DREAMS. The scope of DREAMS has evolved over time with improvements made in data tracking and management, as well as the execution of pipeline work across the company. With these efforts, combined with improvements to the DREAMS model, SoCalGas is enhancing the accuracy of risk assessments, allowing for more precise prioritization of pipeline replacement projects based on identified threats and risks.

From 2025 to 2031, SoCalGas plans to continue replacements of vintage plastic and bare steel pipelines to mitigate safety risks.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance drivers which underpin identified controls and mitigations.

ID	Control/Mitigation Name	Compliance Driver
C103	Cathodic Protection Base Activities	49 CFR Subpart I, CPUC GO 112-F
C106	Cathodic Protection-CP10 Activities	49 CFR Subpart I, CPUC GO 112-F
C116	M&R Station and EPM Inspection and Maintenance	49 CFR Subpart M, CPUC GO 112-F
C120	Distribution Riser Inspection Program (DRIP)	49 CFR Subpart P
C121	Gas Infrastructure Protection Program (GIPP)	49 CFR Subpart P
C122	Sewer Lateral Inspection Program (SLIP)	49 CFR Subpart P
C123	Regulator Station Replacement	49 CFR Subpart L
C129	Cathodic Protection System Improvement	49 CFR Subpart P
C130	MSA Inspection and Maintenance	49 CFR Subpart I, CPUC GO 112-F
C134	Pipeline Monitoring	49 CFR § 192
C135	EPM Installations & Replacements	49 CFR § 192, CPUC GO 112-F
C159	Quality Assurance Transmission Assets	49 CFR 192.605
C170	CP Install/Replace Impressed Current Systems	49 CFR Subpart I, CPUC GO 112-F
C174	Service Replacements – Leakage Abnormal Op. Conditions CP Related	49 CFR Subpart L, CPUC GO 112-F
C175	Residential Meter Protection	49 CFR Subpart H
C177	Main Replacements – Leakage Abnormal Op. Conditions CP Related	49 CFR Subpart L
C178	Distribution Leak Survey	49 CFR Subpart M

ID	Control/Mitigation Name	Compliance Driver
C179	Distribution Main & Service Leak Repair	49 CFR Subpart M
C182	Distribution Risk Evaluation & Monitoring System (DREAMS)	49 CFR § 192

ATTACHMENT B

MEDIUM PRESSURE GAS SYSTEM - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[39] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and the description of the data.

Risk Data	**Source Type**	**Source Information**
Likelihood of failure and probability failure results in safety consequence	Internal Model results	Source: Internal DIMP models Description: Integrity Management Department Internal model that uses internal and industry data
Business District Location Type	External Data	Source: Google maps Description: Used to determine if national medium pressure incidents occurred in a business district or not to inform consequence modelling
Population Density	External	Agency: US Census Bureau Link: https://www.census.gov/programs-surveys/decennial-census/decade/2020/2020-census-results.html Description: Used to determine population density in SoCalGas and SDG&E's service territories and locations where national incidents were reported to PHMSA to inform consequence modelling

[39] D.24-05-064, RDF Rows 10 and Row 29.

Risk Data	Source Type	Source Information
National Pipeline Incidents (2010-2024)	External Data	Agency: PHMSA Link: https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data Description: Due to lack of internal data, national data was used to model the number of fatalities and serious injuries from an incident on the medium pressure system.
Meter Outages	Internal Data	Source: GO 112-F quarterly reports and internal database. Description: Historical data for SoCalGas was used to model likelihood and number o9f outages as a result of an incident on the medium pressure system.
National Medium Pressure Incident Cost data	External Data	Agency: PHMSA Link: https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-flagged-files Description: National data was used to estimate costs such as property damage in current year (2024) dollars because internal data was not available
Leak Repair Costs	Internal Data	Source: Distribution Department and SoCalGas SB 1371 filing Link: https://www.socalgas.com/sites/default/files/2022-SoCalGas-SB-1371-Compliance-Plan.pdf Description: Internal data for leak repair on aboveground assets was available however costs associated with main and service repair were not readily available so previous analysis from SB 1371 Filing was used.

Risk Data	**Source Type**	**Source Information**
Average cost of a fatality	External Data	Agency: National Safety Council (NSC) Link: https://injuryfacts.nsc.org/work/costs/work-injury-costs/ Description: Costs include wage losses, medical expenses, administrative expenses and employer costs, which are not included in the PHMSA costs.
Average Cost of a serious injury	External Data	Agency: CDC Link: WISQARS Cost Of Injury Description: Wage loss and medical costs associated with non-fatal injuries that require hospitalization that are not included in PHMSA costs.

ATTACHMENT C

MEDIUM PRESSURE GAS SYSTEM - SUMMARY OF ELEMENTS OF BOW TIE

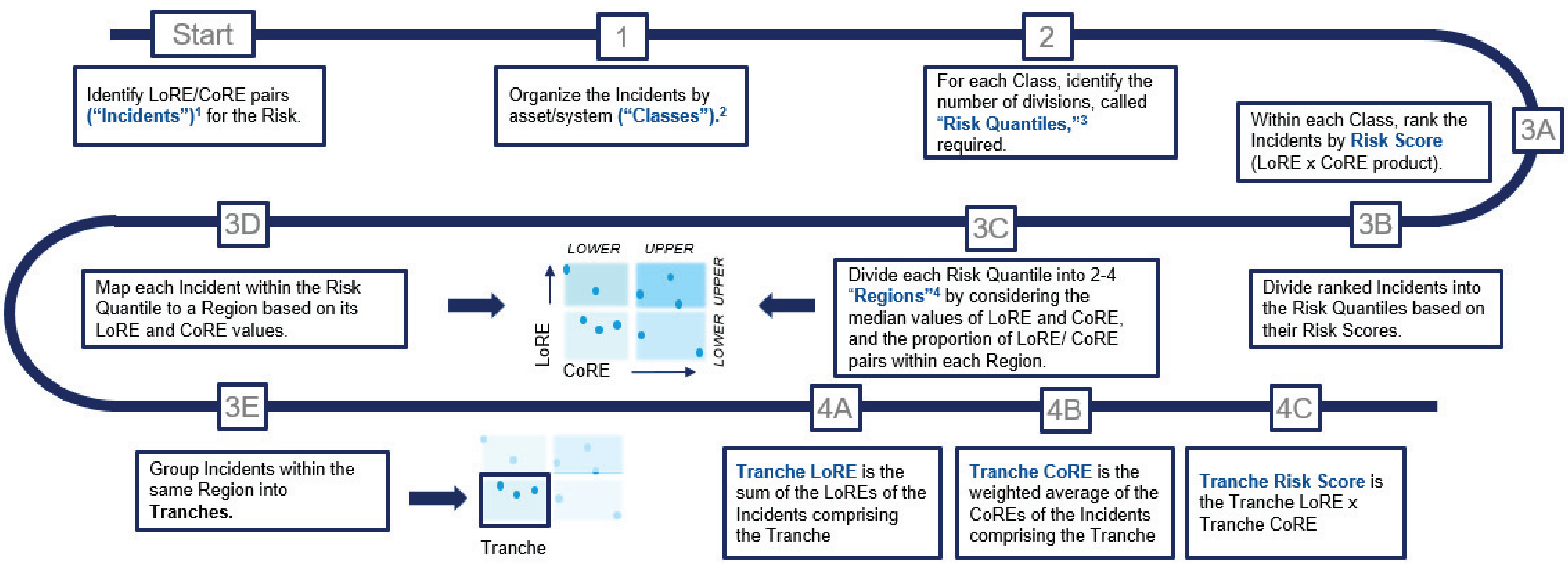
SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C103	Cathodic Protection Base Activities	DT.1	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C106	Cathodic Protection-CP10 Activities	DT.1	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C116	M&R Station and EPM Inspection and Maintenance	DT.1, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C120	Distribution Riser Inspection Program (DRIP)	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C121	Gas Infrastructure Protection Program (GIPP)	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C122	Sewer Lateral Inspection Program (SLIP)	DT.3, DT.6, DT.7	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C123	Regulator Station Replacement	DT.1, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C124	Regulator Station Installation Replacement & Enhancement	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6	PC.1, PC.2, PC.4, PC.5, PC.6, PC.7
C129	Cathodic Protection System Improvement	DT.1, DT.5	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C130	MSA Inspection and Maintenance	DT.1, DT.4, DT.5, DT.6,	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C134	Pipeline Monitoring	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C135	EPM Installations & Replacements	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C159	Quality Assurance Gas Distribution Assets	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C170	CP Install/Replace Impressed Current Systems	DT.1	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C174	Service Replacements – Leakage Abnormal Op. Conditions CP Related	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C175	Residential Meter Protection	DT.2, DT.3	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C177	Main Replacements – Leakage Abnormal Op. Conditions CP Related	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C178	Distribution Leak Survey	DT.1, DT.2, DT.4, DT.5, DT.6	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C179	Distribution Main & Service Leak Repair	DT.1, DT.2, DT.4, DT.5, DT.6,	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C182	Distribution Risk Evaluation & Monitoring System (DREAMS)	DT.1, DT.2, DT.4, DT.6, DT.7	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7

ATTACHMENT D

APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



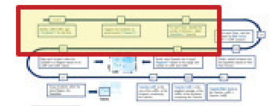
NOTES

[1]For example, ***Incidents (or "Risk Incidents")*** *for Medium Pressure are generally modes of failure of medium pressure assets in various environments such as low or high population densities.*

[2]*For example,* ***Classes (or "Asset Classes")*** *for Medium Pressure include Above-Ground and Below-Ground.*

[3]***Quantiles*** *are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*

[4]*The four* ***Regions*** *are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*



Start

Identify LoRE/CoRE pairs **(“Incidents”)**[1] for the Risk.

1

Organize the Incidents by asset/system **(“Classes”)**.[2]

2

For each Class, identify the number of divisions, called **“Risk Quantiles,”**[3] required.

Class	LORE / CORE PAIRS	TOTAL # PAIRS
Above Ground	Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Corrosion	254
	Riser in ORC Outside Business District in High Population Density Caused by Corrosion	
	…and 252 more pairs	
Below Ground	Non-State-of-the-Art Plastic Main in NOR Outside Business District in Low Density Population	3,073
	State-of-the-Art Plastic Service in PAC in Business District in Low Density Population	
	…and 3,071 more pairs	

$$\min\left(\frac{N}{8}-1, 9\right) < K \le \min\left(\frac{N}{8}, 10\right)$$

Above Ground: 10

Below Ground: 10

Step 3 for *Above Ground*

Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).

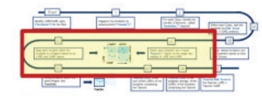
3A

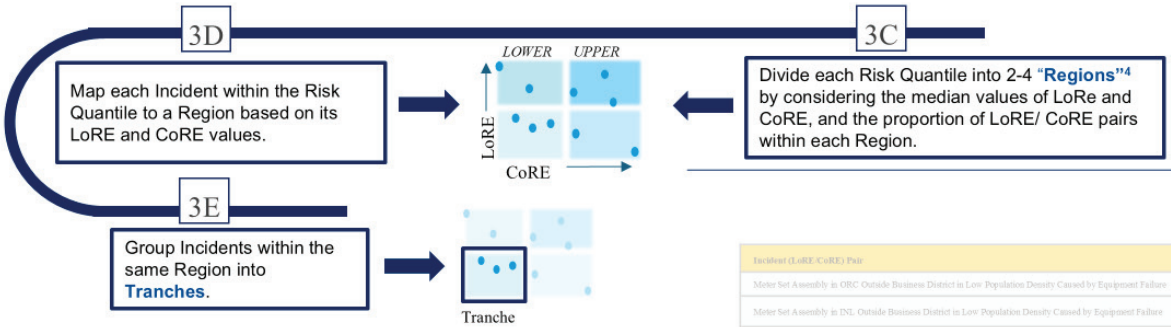
3B

Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.

From Step 2 for *Above Ground*

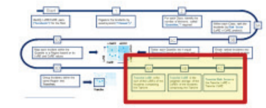
Incident (LoRE/CoRE) Pair	Risk Score	Rank 3A	Quantile 3B
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,904,927	1	#1
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,819,473	2	
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,533,156	3	
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 655,635	4	
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Incorrect Operations	$ 591,969	5	
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Incorrect Operations	$ 591,047	6	
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Incorrect Operations	$ 562,632	7	
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 553,798	8	
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Cause	$ 516,754	9	
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Cause	$ 495,104	10	
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 491,243	11	
Meter Set Assembly in PAC Outside Business District in Low Population Density Caused by Equipment Failure	$ 469,194	12	
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Corrosion	$ 465,075	13	
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Other Cause	$ 419,926	14	
Meter Set Assembly in ORC Inside Business District in Low Population Density Caused by Equipment Failure	$ 405,061	15	
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Corrosion	$ 389,184	16	
Meter Set Assembly in ORC Outside Business District in High Population Density Caused by Equipment Failure	$ 382,087	17	
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Pipe, Weld, or Joint Failure	$ 378,174.8	18	
...	...	19-25	





3A 3B 3C 3D

Incident (LoRE/CoRE) Pair	Risk Score	Rank	Quantile	Region	Tranche
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,904,927	1	#1	UL/UC	Above-1-2
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,819,473	2		UL/UC	Above-1-2
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Equipment Failure	$ 1,533,156	3		UL/LC	Above-1-1
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 655,635	4		LL/UC	Above-1-3
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Incorrect Operations	$ 591,969	5		UL/LC	Above-1-1
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Incorrect Operations	$ 591,047	6		UL/LC	Above-1-1
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Incorrect Operations	$ 562,632	7		UL/LC	Above-1-1
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 553,798	8		LL/UC	Above-1-3
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Cause	$ 516,754	9		UL/LC	Above-1-1
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Cause	$ 495,104	10		UL/LC	Above-1-1
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Other Outside Force Damage	$ 491,243	11		LL/UC	Above-1-3
Meter Set Assembly in PAC Outside Business District in Low Population Density Caused by Equipment Failure	$ 469,194	12		UL/UC	Above-1-2
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Corrosion	$ 465,075	13		UL/UC	Above-1-2
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Other Cause	$ 419,926	14		UL/LC	Above-1-1
Meter Set Assembly in ORC Inside Business District in Low Population Density Caused by Equipment Failure	$ 405,061	15		UL/LC	Above-1-1
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Corrosion	$ 389,184	16		LL/UC	Above-1-3
Meter Set Assembly in ORC Outside Business District in High Population Density Caused by Equipment Failure	$ 382,087	17		UL/LC	Above-1-1
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Pipe, Weld, or Joint Failure	$ 378,174.8	18		UL/LC	Above-1-1
...	...	19-25		...	...



4A **Tranche LoRE** is the sum of the LoREs of the Incidents comprising the Tranche

4B **Tranche CoRE** is the weighted average of the CoREs of the Incidents comprising the Tranche

4C **Tranche Risk Score** is the Tranche LoRE x Tranche CoRE

Incident (LoRE/CoRE) Pair	Tranche	Tranche LoRE (4A)	Tranche CoRE (4B)	Tranche Risk Score (4C)
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Equipment Failure	Above-1-1	15,362.59	382	5,875,911
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Incorrect Operations	Above-1-1			
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Incorrect Operations	Above-1-1			
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Incorrect Operations	Above-1-1			
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Cause	Above-1-1			
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Cause	Above-1-1			
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Other Cause	Above-1-1			
Meter Set Assembly in ORC Inside Business District in Low Population Density Caused by Equipment Failure	Above-1-1			
Meter Set Assembly in ORC Outside Business District in High Population Density Caused by Equipment Failure	Above-1-1			
Meter Set Assembly in PAC Outside Business District in Low Population Density Caused by Pipe, Weld, or Joint Failure	Above-1-1			
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Pipe, Weld, or Joint Failure	Above-1-1			
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Equipment Failure	Above-1-2	11,148.14	418	4,658,668
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Equipment Failure	Above-1-2			
Meter Set Assembly in PAC Outside Business District in Low Population Density Caused by Equipment Failure	Above-1-2			
Meter Set Assembly in ORC Outside Business District in Low Population Density Caused by Corrosion	Above-1-2			
Meter Set Assembly in INL Outside Business District in Low Population Density Caused by Other Outside Force Damage	Above-1-3	6,676.00	676	4,511,205
Meter Set Assembly in NOR Outside Business District in Low Population Density Caused by Other Outside Force Damage	Above-1-3			
...	Above-1-3			
...	...	...	...	...

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-4)

Underground Gas Storage System

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for Underground Gas Storage System risk (Underground Storage Risk). This chapter contains information and analysis for this risk that meets the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (Phase 2 Decision) and D.24-05-064 (Phase 3 Decision). Although this risk does not meet the minimum requirements for mandatory inclusion under the RDF, this risk is included in the 2025 RAMP Report in response to stakeholder input received during and following SoCalGas's Pre-Filing Workshop on December 17, 2024. This risk chapter describes the basis for the selection of Underground Storage Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk-mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed for in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's Underground Storage Risk is defined as "the risk of failure of an underground gas storage well that results in serious injuries, fatalities, and/or damage to the infrastructure." This chapter considers risks associated with the following storage facility components: storage wells and reservoirs, including casing, tubing, and tree/wellhead.

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[1] As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF requirements, such as those from the California Air Resources Board (CARB), the California Geologic Energy Management Division (CalGEM), the United States Department of Transportation's (DOT) Pipeline and Hazardous Materials and Safety Administration PHMSA, including but not limited to subparts of Rule 49 of the Code of Federal Regulation (CFR) and local air quality management districts. A list of compliance requirements applicable to Underground Gas Storage risk is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as enhancement of operations, and/or preparing for future capacity needs (such as driven by electrification, energy resilience, or climate impacts).

2. Risk Overview

Underground gas storage assets are a necessary and critical component of California's reliable energy delivery infrastructure, since approximately 90% of natural gas delivered throughout SoCalGas's service territory is imported. Natural gas moves slowly, at approximately 25 miles per hour, so it is vital to have storage assets locally available to support immediate demand. As a supplement to pipeline gas volumes, underground gas storage supports over 21 million customers and approximately half of the electric generation in SoCalGas's territory. SoCalGas operates four underground gas storage facilities: Aliso Canyon, La Goleta, Honor Rancho, and Playa del Rey, with a combined working capacity of approximately 119.5 Bcf and 177 active wells.[2] Active wells include injection/withdrawal, observation, oil production, injection/disposal, gas migration return, relief, and liquid removal.

- **Aliso Canyon** is in Northern Los Angeles County. It is the largest gas storage field that delivers natural gas into the Los Angeles Basin and has a storage reservoir design capacity of 86 Bcf.[3] The current Aliso Canyon storage working capacity is about 68.6 Bcf.[4] Aliso Canyon has 92 active wells and a current

[2] The volumetric capacity of a natural gas storage field reservoir is measured in units of billion cubic feet (Bcf).

[3] Pipeline and Hazardous Materials Safety Administration (PHMSA), Underground Natural Gas Storage Facility Annual report for Calendar Year 2018 – Supplemental Report (May 20, 2019).

[4] *See* D.20-11-044, Decision Setting the Interim Range of Aliso Canyon Storage Capacity at Zero to 34 Billion Cubic Feet.

maximum withdrawal capability of approximately 1.86 Bcf per day.[5] The facility's surface equipment has a maximum withdrawal design capacity of 1.95 Bcf per day.

- **Honor Rancho** is also in Northern Los Angeles County, about ten miles north of Aliso Canyon, and also delivers natural gas into the Los Angeles Basin. Honor Rancho has a storage reservoir design capacity of 27 Bcf and a working capacity is 27 Bcf. Honor Rancho has 35 active wells and a current maximum withdrawal capability of approximately 1.0 Bcf per day. The facility's surface equipment has a maximum withdrawal design capacity of 1.0 Bcf per day.[6]
- **La Goleta** is in Santa Barbara County and delivers gas into the northern coastal area of SoCalGas's distribution service territory and the Los Angeles Basin. La Goleta has a storage reservoir design capacity of 21.5 Bcf and the current La Goleta working capacity of about 21.5 Bcf. La Goleta has 13 active wells and a maximum withdrawal capability of approximately 0.42 Bcf per day. The facility's surface equipment has a maximum withdrawal design capacity of 0.4 Bcf per day.[7]
- **Playa del Rey**, located in central Los Angeles County and delivers gas into the Los Angeles Basin. Playa del Rey has a design storage reservoir capacity of 2.4 Bcf and a storage working capacity of about 2.4 Bcf. Playa del Rey has 37 active wells and a current maximum withdrawal capability of 0.4 Bcf per day.[8] The facility's surface equipment has a maximum withdrawal design capacity of 0.4 Bcf per day to meet residential, commercial, and industrial loads throughout the western part of Los Angeles, including electric generators and oil refineries.

Underground Storage Risk is evaluated in the context of Federal and State regulations of natural gas storage facilities, including:

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5 Withdrawal capability is dependent on well availability and inventory. Active well count and storage capability is as of March 2025.

6 PHMSA Annual Report, *supra*.

7 *Id.*

8 *Id.*

- PHMSA underground storage regulations, including 49 CFR section 192.12 final rule, which, among other regulations, adopts certain provisions of American Petroleum Industry (API) Recommended Practice 1171 (RP 1171), Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs.
- CalGEM underground gas storage regulations, including 14 California Code of Regulations (CCR) section 1726, which includes requirements for operators to submit project-specific Risk Management Plans, Emergency Response Plans, project data requirements, a Records Management Program, well construction requirements, mechanical integrity testing requirements, and monitoring and reporting requirements.
- CARB's Oil & Gas Rule,[9] which prescribes monitoring requirements for natural gas underground storage facilities. SoCalGas has developed and received approval from CARB and the local air quality management districts for four individual storage field monitoring plans. These include installing continuous air monitoring to measure ambient concentrations of methane and continuous leak screening at each injection/withdrawal wellhead assembly and attached surface piping.

SoCalGas has implemented activities and measures to comply with federal, state, and local regulations and has incorporated additional industry-leading safety enhancements and improvements as part of these efforts. These activities and measures are part of the implementation of SoCalGas's Storage Integrity Management Program (SIMP), discussed further in Section IV. SoCalGas has also introduced a suite of advanced leak-detection technologies and practices that allow for the early detection of leaks and help quickly identify anomalies, such as changes in well pressure. These enhancements include:

- Around-the-clock monitoring of the pressure in all wells from each storage facility's 24-hour operations center;

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[9] Title 17, California Code of Regulations, Division 3. Air Resources, Chapter 1. Air Resources Board, Subchapter 10. Climate Change, Article 4. Regulations to Achieve Greenhouse Gas Emission Reductions, Subarticle 13. Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (17 CCR §§ 95665-95677).

- Continuous ambient air monitoring and meteorological stations at each storage facility;
- Continuous ambient methane monitoring at each storage well's wellhead and adjacent flowline.
- Daily well inspections and/or continuous/real-time wellhead monitoring.

SoCalGas has implemented changes to its standards and practices to incorporate requirements such as those mandated by PHMSA, CARB, and CalGEM. Recently, CARB adopted amendments to its Oil and Gas Rule[10] to shorten leak repair timeframes and include the use of offsite methane sensors such as satellite or aerial equipment. These changes took effect in April of 2024.

The Control and mitigation plan of SoCalGas's Underground Storage Risk is impacted by vendor-related challenges due to the contraction of California's oil and gas industry. SoCalGas is pursuing new vendors who will operate or expand in California. In addition, SoCalGas continues to perform reassessments in compliance with mandated reassessment cycles and extension approvals from CalGEM. SoCalGas meets with CalGEM on a monthly basis to review the Risk Management Plans (RMPs) for its underground storage fields. SoCalGas also continues to monitor and manage information management systems, such as WellView, which is used to track, analyze, and visualize well operations throughout the well lifecycle. Lastly, Subject Matter Experts (SME) knowledge retention and knowledge transfer continue to be a focus of risk management activities.

B. Risk Scope

SoCalGas's Underground Gas Storage Risk analysis considers risk events associated with the failure of an underground gas storage well, which results in serious injuries, fatalities, and/or damage to infrastructure.

C. Data Sources Used to Quantify Risk Estimates[11]

SoCalGas utilized internal data sources to determine an Underground Gas Storage Risk Pre Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which

[10] *Id.*

[11] Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

enable estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate, and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories (*i.e.*, a well failure that leads to an explosion resulting in infrastructure damages, injuries, and/or fatalities). Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of Underground Storage Risk, including a Risk Bow Tie, which delineates Drivers/Triggers and potential Consequences, followed by a description of the Tranches determined for this risk.

A. Risk Selection

Underground Storage Risk was included as a risk in SoCalGas's 2021 RAMP and was included in SoCalGas's 2022, 2023, and 2024 Enterprise Risk Registries (ERR).[12] SoCalGas's ERR evaluation and selection process is summarized in Chapter RAMP-2, Enterprise Risk Management Framework and in Chapter RAMP-3 Risk Quantification Framework.

In accordance with RDF Row 9,[13] SoCalGas assessed the top risks from the Company's 2024 ERR based on the Consequence of a Risk Event (CoRE) Safety attribute. Initially, the Underground Storage Risk was not among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks on December 17, 2024 at a Pre-Filing Workshop, as it did not qualify based on the Safety attribute alone. The Underground Storage Risk was selected after careful consideration and based on the input received from the Commission's Safety Policy Division (SPD) and other interested parties during the Pre-Filing Workshop.

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[12] In the 2021 RAMP Report this risk was called Incident Related to the Storage System. For 2025, the following was added to the risk definition, to further define high-pressure pipeline: "(including non-line pipe, appurtenances, and facilities) that…"

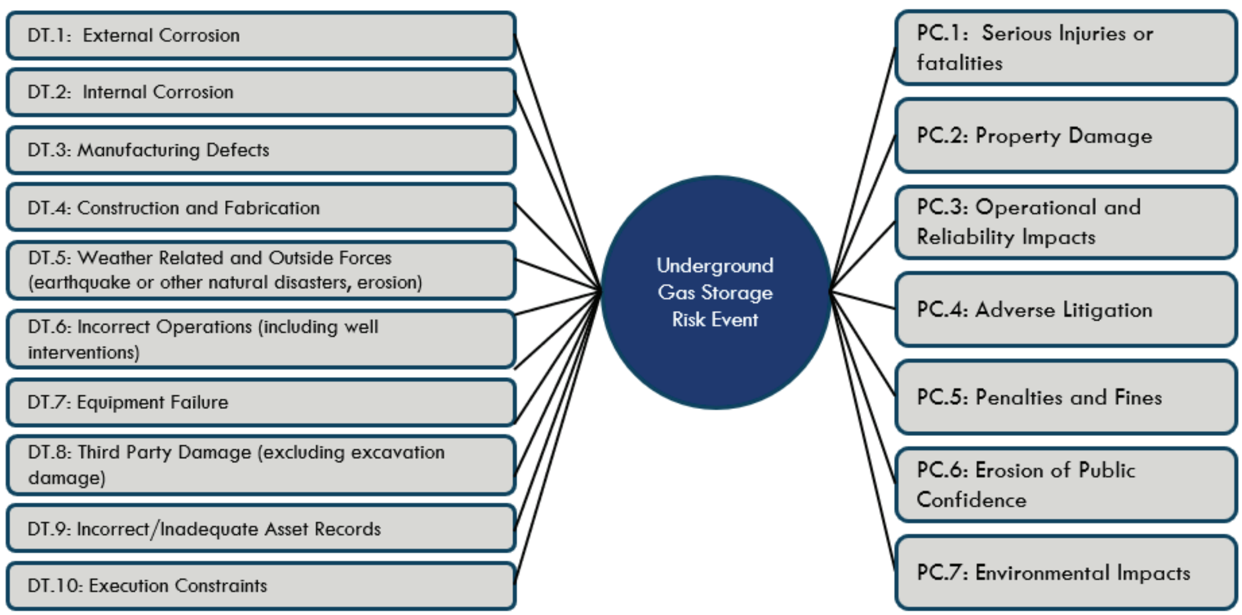
[13] D.24-05-064, RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's ERR comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars."

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, including identified Drivers/Triggers, Potential Consequences, and a mapping of the elements in the Bow Tie to the mitigation(s) that address it.[14] As illustrated in the Risk Bow Tie shown below in Figure 1, the risk event (center of the Bow Tie) is a Underground Storage Risk event that leads to asset failure, the left side of the Bow Tie illustrates Drivers/Triggers that could lead to the Underground Storage Risk event that could cause asset failure, and the right side shows the Potential Consequences of the Underground Storage Risk event. SoCalGas applies this framework to identify and summarize the information in Figure 1. A mapping of each mitigation to the addressed elements of the Risk Bow Tie is provided in Attachment C.

Figure 1

Underground Storage Risk: Risk Bow Tie



C. Potential Risk Event Drivers/Triggers[15]

When performing a risk assessment for Underground Storage Risk, SoCalGas identifies potential leading indicators, referred to as Drivers or Triggers, that reflect current and/or

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14 D.24-05-064, RDF Row 15.

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

forecasted conditions and may include both external actions as well as characteristics inherent to the asset.[16] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 – External Corrosion:** A naturally occurring phenomenon commonly defined as the deterioration of a material (usually a metal) that results from a chemical or electrochemical reaction with its environment.[17] This risk Driver is based on the potential for corrosion on the external surface of such assets as steel tubing, casing, and pipelines exposed to corrosive environments.
- **DT.2 – Internal Corrosion:** Deterioration of the interior of an asset as a result of environmental conditions inside of the pipeline.[18] This risk Driver is based on the potential for erosion/corrosion on the internal surface of such assets as steel tubing, casing, and pipelines. Internal erosion/corrosion may be caused by the corrosive effect of fluid, sand, and/or reactive constituents such as carbon dioxide in the gas withdrawn from the storage formations.
- **DT.3 – Manufacturing Defects:** This risk driver is based on the potential for failure of storage assets due to defects introduced during the manufacturing process. It is attributable to material defects within the pipe, component, or joint due to faulty manufacturing procedures, design defects, or in-service stresses such as vibration, fatigue, and environmental cracking.
- **DT.4 – Construction and Fabrication:** This risk driver is based on the potential for failure of storage assets due to defects introduced during the construction and fabrication process. It is attributable to the construction methodology applied during the installation of pipeline components,

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16 D.24-05-064, RDF Row 10-11.

17 *See* American Society of Mechanical Engineers (ASME) B31.8S.

18 *Id.*

specifically based on the vintage of the construction standards, fabrication techniques (welding, bending, etc.), and governing regulations.

- **DT.5 – Weather Related and Outside Forces (earthquake or other natural disasters, erosion):** This risk driver includes both natural forces and those from external sources that can affect the integrity of the storage facilities. Examples of natural forces include ground movement, landslides, and subsidence from earthquakes.
- **DT.6 – Incorrect Operations (including well interventions):** This risk driver is based on the potential for maintenance or inspection functions to be performed incorrectly by employees or contractors.
- **DT.7 – Equipment Failure:** This risk driver is based on the potential for storage equipment failure not due to manufacturing or construction-related defects. It is attributable to malfunction of components, including but not limited to regulators, valves, meters, flanges, gaskets, collars, couples, etc.
- **DT.8 – Third-Party Damage (excluding excavation damage):** This risk driver is based on the potential for damage to a storage asset by an outside party other than those performing work for SoCalGas.
- **DT.9 – Incorrect/Inadequate Asset Records:** This risk driver is based on the potential for inaccurate or incomplete information that can result in the failure to construct, operate, and maintain SoCalGas's storage assets safely.
- **DT.10 – Execution Constraints:** This risk driver refers to events (excluding those covered by outside force damages) that impact the Company's ability to perform as planned. Examples include, but are not limited to, reduced availability of materials or operational oversight, delays in response and awareness, resource constraints, and/or inefficiencies and reallocation of (human and material) resources, unexpected maintenance, or regulatory requirements.

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this Risk by analyzing internal data sources, where available, industry data, and subject matter expertise (SME).[19] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

- **PC.1: Serious Injuries or Fatalities**
- **PC.2: Property Damage**
- **PC.3: Operational and Reliability Impacts**
- **PC.4: Adverse Litigations**
- **PC.5: Penalties and Fines**
- **PC.6: Erosion of Public Confidence**
- **PC.7: Environmental Impacts**

These Potential Consequences were used by SoCalGas in scoring Underground Storage Risk during the development of SoCalGas's 2024 ERR.

E. Evolution of Risk Drivers and Consequences

In the 2025 RAMP, SoCalGas restructured the Underground Gas Storage System Chapter to better align with its risk assessments. Previously, this chapter included both aboveground and underground gas storage assets and associated activities. Based on SoCalGas's evaluations, certain controls and mitigation activities were separated, focusing this chapter exclusively on underground gas storage controls.

As specified in the Phase 3 Decision,[20] the following changes to the previous ERR and/or the 2021 RAMP include:

- The following control activities have been moved from the Underground Gas Storage System Chapter to the High Pressure Gas System Chapter:

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[19] D.24-05-064, Row 10.

[20] D.24-05-064, RDF Row 8.

- C404: Storage Field Maintenance – Aboveground Facilities (Renamed to C014: Storage HP Field Maintenance – Aboveground Facilities)
- C406: Storage Field Maintenance – Aboveground Piping (Renamed to C016: Storage HP Field Maintenance – Aboveground Piping)
- C412: Storage Upgrade to Purification Equipment (Renamed to C019: Storage HP Retrofits and Upgrades to Purification Equipment)

- The control activities that remain in the Underground Gas Storage System Chapter are:
  - C401: Storage Integrity Management Program (SIMP)
  - C402: Well Abandonment, Replacement, Demo Verification, and Monitoring Practices
  - C408: Storage Field Maintenance – Underground Components
- The following control activity has been removed:
  - C410: Storage Compressor Overhauls

Additional changes include:

1. **Changes to Drivers/Triggers of the Risk Bow Tie**
   - Removed Stress Corrosion Cracking driver, previously included in the 2021 RAMP, since it does not apply to underground gas storage wells.
   - DT.5 – Outside Forces (natural disasters, fire, earthquake) in the 2024 ERR was changed to Weather Related and Outside Forces (earthquake or other natural disasters, erosion) for the 2025 RAMP.
   - DT.6 – Incorrect Operations was changed from the 2024 ERR to Incorrect Operations (including well interventions) for the 2025 RAMP.
   - DT.9 – Third Party Damage in the 2021 RAMP was changed to Third Party Damage (except underground damage) in the 2024 ERR, and Third-Party Damage (excluding excavation damage) for the 2025 RAMP.

2. Changes to Potential Consequences of the Risk Bow Tie

- PC.7 – Added "Environmental Impacts."

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP- 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and the resulting number of Tranches were determined:

Table 1: Underground Gas Storage System Risk Tranche Identification

Class	Number of LoRE-CoRE Pairs	Number of Resulting Tranches
Full UGS	50	12
TOTAL	**50**	**12**

Attachment D illustrates the derivation of the Tranches, as shown Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas as logical groups of assets and systems based on the Company's operations. These classes also align risk treatments with asset risk profiles reflective of SoCalGas's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches is provided in workpapers.

III. Pre Mitigation Risk Value

In accordance with the RDF Row 19, Table 2 below provides the pre-mitigation risk values for the Underground Storage Risk. Further details, including pre-mitigation risk values by Tranche, are provided in workpapers. Explanations of the risk quantification methodology and other higher-level assumptions can are provided in Chapter RAMP-3 Risk Quantification Framework.

Table 2: Underground Gas Storage System Risk
Monetized Risk Values
(Direct, in 2024 $ millions)

LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
	Safety	Reliability	Financial		
3.68	$0.39	$0.07	$14.77	$15.24	$56.08

A. Risk Value Methodology

SoCalGas's risk modeling for the Underground Storage Risk follows RDF guidance[21] for implementing a Cost Benefit Approach, as described below:

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** Storage Risk is quantified in a combined attribute hierarchy as shown in the table above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** The Underground Storage Risk used observable and measurable data in the estimation of CoRE values. SoCalGas utilized a combination of internal and external data to estimate consequences in terms of natural units
3. **Cost Benefit Approach Principle 3-Comparison (RDF Row 4):** The Underground Storage Risk quantification did not include any attributes that are not directly measurable, so proxy data, as described in the RDF, was not necessary.
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** The data sources used for the Underground Storage Risk, as described in the preceding paragraphs, were sufficient to model probability distributions for use in estimating risk values.
5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas and SDG&E used a California-adjusted Department of Transportation

[21] D.24-05-064, RDF Rows 2-7.

monetized equivalent to calculate the Safety CoRE attribute at a monetized equivalent of $16.2 million per fatality, and $4.1 million per serious injury;[22] the Gas Reliability CoRE attribute is valued at a monetized equivalent of $3,868 per gas meter outage; and the Financial CoRE attribute is valued at $1 per dollar.[23]

Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, and technical references are provided in workpapers.

6. Cost Benefit Approach Principle 6-Adjusted Attribute Level (RDF Row 7):

Table 3: Underground Gas Storage System Risk
Risk Scaled vs Unscaled Value by CoRE Attribute
(Direct, in 2024 $ millions)

	Safety	Reliability	Financial	Total
Unscaled Risk Value	$0.6	$0.1	$12.7	$13.3
Scaled Risk Value	$1.4	$0.3	$54.4	$56.1

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for the Underground Storage Risk. The above table depicts the results of an applied societal risk-averse scaling function, reflecting an increasing aversion to progressively larger CoRE outcomes.

Further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply is provided in Chapter RAMP-3.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for Underground Storage Risk and reflects any changes to the portfolio expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan

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22 *See* D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

23 *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place in 2024 and which are expected to be ongoing, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[24] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-009.[25] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test Year (2029, 2030, and 2031).[26]

Table 4: Underground Gas Storage System Risk
2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C401	Storage Integrity Management Program (SIMP)	X	Ongoing
C402	Well Abandonment, Replacement, Demo Verification, and Monitoring Practices	X	Ongoing
C408	Storage Field Maintenance – Underground Components	X	Ongoing

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place"[27] (*i.e.*, the activities in this section were in place as of December 31, 2024. Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

- **C401 – Storage Integrity Management Program (SIMP):** SoCalGas's SIMP was initially modeled after the federally mandated distribution and transmission integrity management programs and the requirements of RP 1171. It was designed to provide a forward-looking, methodical, and structured approach, using state-of-the-art inspection technologies and risk management disciplines to address storage reservoir and well integrity risks. SoCalGas performs integrity

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24 *See* D.24-12-074.

25 *See,* D.21-11-009 at 136, Conclusion of Law 7 (providing a definition for "baselines" and "baseline risk").

26 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

27 D.18-12-014 at 33.

inspections on gas storage wells to assess the pressure containing capability of the well, detect possible leaks, and identify metal loss features in tubing and casing. These regular inspections enhance safety by reducing the risk of well failure during operations. Types of inspections include pressure testing, noise and temperature surveys, magnetic flux leakage (MFL) inspection, and ultrasonic testing (UT) inspection. Pressure testing and wall thickness inspections (MFL or UT) are currently required for each gas storage well at a two-year recurring frequency[28] unless otherwise approved by CalGEM. Based on detailed analyses of previous well inspections and the potential risks and benefits of testing at two-year intervals, SoCalGas has submitted well specific requests to CalGEM to extend the reassessment intervals beyond the mandated 24-month interval. In response, CalGEM has granted reassessment interval extensions for up to seven years. Additionally, SoCalGas also obtained approval from CalGEM to utilize the DarkVision HADES Radius/Thickness tool in its downhole inspection tool suite. This tool provides high-resolution imaging and more precise measurements, allowing for enhanced detection and assessment of internal and external metal loss features in well casings. Temperature and noise surveys are also performed per CalGEM regulations.[29] Remediation activities performed during or as a result of SIMP can reduce the risk of failure during operations. These remediation activities may include replacing the wellhead, replacing valves, replacing the tubing and packer, installing an inner casing string or liner, and installing subsurface safety valves. These activities adhere to regulatory standards and enhance safety and operational reliability. Additionally, SoCalGas continuously monitors tubing and casing annulus pressures as required by CalGEM regulations. If sustained casing pressures are detected, SoCalGas performs diagnostic investigations and remediations if needed to address the

[28] Cal. Code Regs. tit. 14 § 1726.6(a)(3).

[29] *Id.*

integrity of the casing. Remediation activities to address this condition may include casing expansions and/or redrills of the wells.

Well abandonment is also considered for remediation. SoCalGas may abandon a well rather than continue to utilize it for gas storage operations after integrity assessment activities are performed. To abandon a well, SoCalGas isolates the well from the injection and withdrawal operations, removes the wellhead and casing to a certain depth, and fills the wellbore with cement. In addition, SoCalGas has integrated its risk management of Underground Gas Storage Operations into SoCalGas's Integrity Management organization, aligning the underground gas storage integrity management practices with its transmission and distribution management practices. The Integrity Management organization undertakes such responsibilities as developing and implementing processes and procedures to manage storage well integrity and compliance with existing and new underground storage regulations.

Key risk management practices in SIMP include: (1) field-specific Risk Management Plans (RMPs), (2) development of quantitative risk assessment framework for storage wells, (3) well integrity assessments, (4) third party inspections of tubing, (5) abandonments of certain wells, (6) continuous well pressure and methane monitoring, (7) inner string installations, diagnostic logging, and casing expansions, to remediate annular pressure issues, (8) installation of shallow-set SSSVs in certain wells, (9) Cathodic protection for some well casings, (10) well construction and pressure testing requirements (11) inspection, testing, and maintenance of wellhead valves, (12) gas sampling, (13) training, (14) design and operations procedures, (15) emergency response plans, (16) data and records management, and (17) wellsite safety and security.

- **C402 – Well Abandonment, Replacement, Demo Verification, and Monitoring Practices:** SoCalGas performs integrity inspections on storage wells, in addition to activities completed under C401, to verify the well's pressure-containing capability, detect possible leaks, and identify metal loss features in tubing and casing. The various types of wells include observation, oil production, water injection/disposal, gas migration return, relief, and liquid removal. Types of inspections include pressure testing, noise and temperature surveys, magnetic flux leakage, and ultrasonic. Remediation activities performed during integrity testing, verification, and monitoring practices can reduce the risk of failure during operations, enhancing overall safety and reliability. These remediation activities may include replacing the wellhead, replacing valves, replacing the tubing and packer, installing an inner casing string or liner, and installing subsurface safety valves.

Under certain circumstances, SoCalGas may abandon a well rather than continue to utilize it for gas storage operations. The decision to plug and abandon a well is driven by various factors, including, but not limited to, well-specific information, location-specific information, deliverability, operation and maintenance history, and operational needs. To abandon a well, SoCalGas isolates the well from the withdrawal and injection operations, removes the wellhead and casing to a certain depth, and places specifically located cement plugs in the wellbore. Depending on the gas deliverability and injection loss of the abandonments and the resultant effect on the gas transmission system's ability to satisfy customer demand, strategically located new wells may need to be drilled to replace the withdrawal and injection capabilities of the abandoned wells. The distinction between abandonments performed under C401 and C402 is that under C401, it is done shortly after assessment activity, and under C402, it is done not directly following an assessment but after having monitored the well or having the well listed previously for possible abandonment. This activity addresses abandonments of all well types other than gas injection/withdrawal type, such as observation, oil production, and water injection/disposal.

- **C408 – Storage Field Maintenance – Underground Components:** SoCalGas uses its storage assets to withdraw or inject gas to meet gas balancing requirements on its transmission pipeline and distribution system. To satisfy these needs, Gas Control determines injection into storage or withdrawal from storage based on transmission and distribution system balancing requirements. Fluctuating demands may require storage operations to perform gas injection or withdrawal functions at any hour of the day, 365 days per year. This operational flexibility allows SoCalGas to meet varying demands efficiently. Storage fields are continually staffed with operating crews and on-call personnel to support these critical 24/7 operations, allowing SoCalGas to respond to fluctuating demands and maintain a stable supply of natural gas.

Storage is critical to maintaining a reliable energy supply in Southern California, particularly during extreme weather conditions occurring locally or out of state, unforeseen pipeline maintenance, or the temporary reduction of interstate supplies for other reasons. Continuous maintenance activities and ongoing investments are necessary to operate a storage system that can supply during such periods.

Underground operation and maintenance activities include well testing, and materials for repairs. Other costs include administrative salaries and engineering costs associated with the operation of the underground storage fields, studies in connection with reservoir operations, and wells necessary to maintain the integrity of the storage system. Safety, technical training, operator qualifications, and quality assurance functions are other critical components included in these expenses. Other activity costs are those associated with maintaining documentation of wells and creating and maintaining maps related to underground zone rights, as well as fees to government agencies to operate storage fields.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls discussed above, as reflected in Table 4, through the 2025-2031 period without significant changes.

C. Mitigation Programs

SoCalGas does not currently foresee implementing new mitigations not described above during the 2025-2031 period.

D. Climate Change Adaptation

Pursuant to Commission decisions in the Climate Adaptation OIR (R.18-04-019),[30] SoCalGas performed a Climate Adaptation Vulnerability Assessment (CAVA) focused on years

[30] D.19-10-054; D.20-08-046.

2030, 2050, and 2070, with the aim of identifying asset and operational vulnerabilities to climate hazards across the SoCalGas system. SoCalGas recognizes the need to address climate vulnerabilities to promote the safety and reliability of its services and mitigate the increasing climate-related hazards through innovative and community-centric approaches. Some of the climate hazards that will have short- and long-term ramifications in the Southern California region include extreme temperatures, wildfire, inland flooding, coastal flooding and erosion, and landslides. Climate change is recognized as a factor that can drive, trigger, or exacerbate multiple RAMP risks. Implementing climate change adaptation measures and integrating climate vulnerability considerations into RAMP controls and mitigations can enhance system infrastructure longevity and reduce the severity of long-term negative climate impacts. The controls and mitigations described in further detail in this chapter, as shown below, align with the goal of increasing SoCalGas's physical and operational resilience to the increasing frequency and intensity of climate hazards. Additional information on the CAVA and a list of climate-relevant controls and mitigations included in RAMP, are provided in Chapter RAMP-5: Climate Change Adaptation.

Table 5: Underground Gas Storage System Risk
Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C401	Storage Integrity Management Program (SIMP)	Inland Flooding, Landslides, and Wildfires
C402	Well Abandonment, Replacement Demo Verification, and Monitoring Practices	Inland and Coastal Flooding, Coastal Erosion, and Landslides
C408	Storage Field Maintenance - Underground Components	Inland Flooding, Landslides, and Wildfires

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[31]

This risk chapter does not include any foundational programs.

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[31] D.24-05-064, Appendix A at A-4.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for Underground Gas Storage Risk, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[32] for each enterprise risk, SoCalGas uses actual results and industry data and when that is not available, supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates is provided in Attachment B.

Table 6: Underground Gas Storage System Risk Control and Mitigation Plan – Recorded and Forecast Costs Summary (Direct, in 2024 $ thousands)

ID	Control/Mitigation Name	Recorded Costs		Forecast Costs			
		2024 Capital	2024 O&M	2028 O&M	2025-2028 Capital	PTY Capital	PTY O&M
C401	Storage Integrity Management Program (SIMP)	35,882	16,646	19,752	207,008	202,169	60,552
C402	Well Abandonment/Replacement/Demo Verification and Monitoring Practices	60,322	0	0	284,533	186,744	0
C408	Storage Field Maintenance - Underground Components	0	3,483	3,857	0	0	11,571
Total		**96,204**	**20,129**	**23,609**	**491,541**	**388,913**	**72,123**

[32] D.24-05-064, RDF Row 10.

Table 7: Underground Gas Storage System Risk Control & Mitigation Plan – Units Summary

Control/Mitigation			Recorded Units		Forecast Units			
ID	**Name**	**Units of measure**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C401	Storage Integrity Management Program (SIMP)[33]	Wells	21	0	0	102	96	0
C402	Well Abandonment/Replacement/Demo Verification and Monitoring Practices	Wells	11	0	0	84	69	0
C408	Storage Field Maintenance - Underground Components	Storage Field	0	4	4	0	0	12

In the table below, CBRs are presented in summary at the mitigation or control level for the TY 2028 GRC cycle. CBRs are calculated based on scaled, expected values unless otherwise noted, and are calculated for each of the three required discount rates[34] in each year of the GRC cycle and for the Post-Test Years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

33 SIMP O&M is driven by capital activities. Therefore, units for 2025-2031 O&M cannot be forecasted.

34 See Chapter RAMP-3: for definitions of discount rates, as ordered in the Phase 3 Decision.

Table 8: Underground Gas Storage System Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C401	**Storage Integrity Management Program (SIMP)**	$269.5	$80.3	1.80	0.75	0.74
C402	**Well Abandonment/ Replacement/Demo Verification and Monitor**	$261.6	$0	4.00	1.65	1.64
C408	**Storage Field Maintenance – Underground Components**	$0	$15.4	10.27	10.38	10.35

Bold *indicates this control/mitigation includes mandated programs/activities.*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025, D.16-08-018, and D.18-12-014,[35] SoCalGas considered two alternatives to the risk mitigation plan for the Underground Storage Risk. Typically, analysis of alternatives occurs when implementing activities to obtain the best result or product for the cost. The alternatives analysis for this plan considers changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan and constraints, such as budget and resources.

[35] *See, e.g.,* D.18-12-014 at 33-35.

**Table 9: Underground Gas Storage System Risk
Alternative Mitigation Plan –Forecast Costs Summary
(Direct, in 2024 $ millions)**

ID	Alternative Mitigation Name	Forecast Costs			
		2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A401 [36]	SIMP With Well Abandonments In Lieu of Inner String Installations	205,299	200,632	0	0
A402	SIMP With Installation of Metal Skin Liners in lieu of Inner String Installations	192,718	189,308	79,726	61,914
Total		**398,017**	**389,940**	**79,726**	**61,914**

**Table 10: Underground Gas Storage System
Risk Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ millions)**

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A401	SIMP With Well Abandonments In Lieu of Inner String Installations	66,833	0	1.80	0.74	0.73
A402	SIMP With Installation of Metal Skin Liners in Lieu of Inner String installations	63,059	20,206	0.99	0.53	0.52

A. Alternative 1: SIMP With Well Abandonments In Lieu of Inner String Installations

SoCalGas is required to conduct mechanical integrity assessments of well casings to comply with CalGEM's regulatory requirements. The production casings of gas storage wells serve as a secondary integrity barrier, which must contain 115% of the maximum allowable operating pressure (MAOP) should a primary barrier (tubing, for example) fail to maintain

[36] For A401, no O&M cost is shown because applying the alternative does not change the O&M forecast in C401.

integrity. Based on the integrity assessment results, if the casing wall thickness is found to have insufficient integrity due to corrosion or other issues, inner strings are installed as a remediation measure to return the well to service. If inner string installation is not a viable option, the well may be abandoned, and a new replacement well may be drilled if required to maintain storage field deliverability and meet customer demand. The decision to install inner strings in a gas storage well considers the anticipated well deliverability post-repair, subsequent maintenance and inspection costs, and the probability that the proposed repair will be successful. Inner strings are new casing strings installed and cemented inside the compromised production casing and can extend the life of storage wells up to 30+ years. Inner string installations enable gas storage wells to be returned to service quickly and at a lower cost than well abandonment and drilling a new well. An alternative mitigation presented herein to an inner string installation is well abandonment (without drilling a new well to replace the abandoned well). When a gas storage well is abandoned, it is permanently removed from service in accordance with CalGEM regulations. Consequently, the deliverability associated with the well is no longer available, reducing field deliverability. Although SoCalGas may choose to abandon a well, instead of installing an inner string to remediate casing wall thickness concerns, abandonment of all such wells will result in a significant decrease in the overall field deliverability, which is why SoCalGas is not currently considering this alternative. In contrast, SoCalGas installs new inner strings to repair production casing enabling SoCalGas to return the wells to service quickly and maintain field deliverability.

B. Alternative 2: SIMP With Installation of Metal Skin Liners In Lieu of Inner String Installations

Metalskin liners (MSL) are engineered to enhance well integrity by adding a protective layer to compromised production casing. MSLs are installed across areas of casing that do not pass the 115% MAOP calculations of the respective storage field. The installation of the MSL can potentially return a well to service. MSLs are widely used in the oil and gas sector.

CalGEM regulations require periodic inspections of gas storage wells to determine the remaining wall thickness of the active second barrier (production casing). When MSLs are installed, downhole inspection tools are no longer able to accurately measure the remaining wall thickness of host casing. Consequently, MSLs must be removed from the casing whenever a SIMP inspection is performed. Removal of MSLs can be a time intensive process that often requires milling the MSL, and if not done carefully, can inadvertently mill the host casing, causing additional wall loss and damage. Further, removal of the MSL lengthens the duration of workovers and increases well entry risk. Lengthy workovers can also damage the reservoir due to extended exposure to workover fluids.

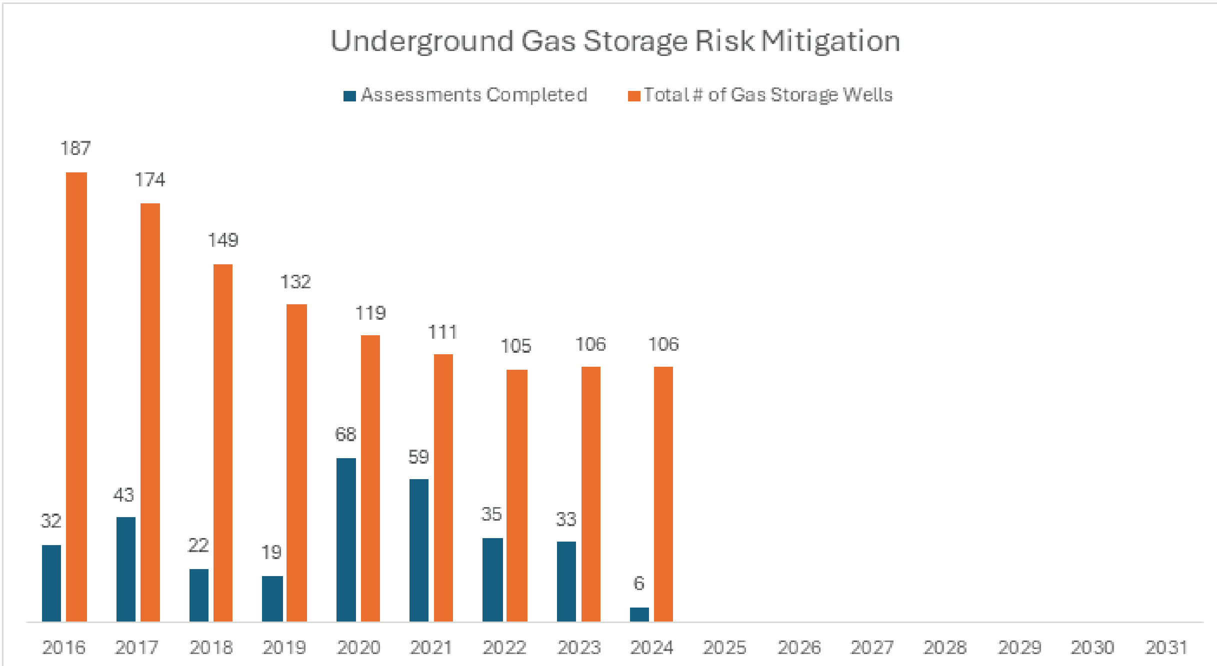
In contrast to this alternative mitigation, SoCalGas installs new inner strings for production casing repair. Inner strings are less complicated than MSL for integrity evaluation and require less well maintenance activity. CalGEM has previously approved seven-year inspection intervals for wells with new inner strings. Compared with MSL, inner string installations reduce well entry risk and enhance well integrity, which is why SoCalGas is not currently considering this mitigation. A well with a new inner string can be expected to remain in service for as long as a new gas storage well.

VI. HISTORICAL GRAPHICS

As directed by the Commission in the Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a key metric that aligns with Company safety goals to illustrate trends in historical progress and identify the remaining tasks necessary to continue mitigating risks.

Figure 2

Underground Storage Risk: Safety Progress 2016-2024



Safety work activities completed through SIMP from 2016-2024 include temperature and noise logs, casing wall thickness inspections, and pressure testing of well production casings.

As previously discussed, CalGEM regulations require mechanical integrity inspections on well casings at two years intervals, unless the inspection interval for a specific well is extended. Based on the results of inspections, well remediations may be performed, which can include well abandonments. SoCalGas completed its baseline inspections and initiated reassessments of existing storage wells in 2019 and 2020. In 2022, baseline assessments were conducted for newly drilled replacement wells, and reassessments continued for existing wells.

As discussed earlier, based on detailed analyses of previous well inspections and the potential risks and benefits of testing at two-year intervals, SoCalGas has submitted well-specific requests to CalGEM pursuant to 14 CCR 1726.6(a)(2) to extend the reassessment intervals beyond the mandated 24-month interval. In response, CalGEM has granted reassessment interval extensions for up to seven years The number of wells also initially declined due to well abandonments that were performed based on findings (for example, internal corrosion) identified from the baseline inspections that were performed earlier in the program.

The safety work that remains to be performed is addressed in the controls/mitigations detailed above in Section III. 2024-2031 Control & Mitigation Plan.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance Drivers that underpin identified controls and mitigations.

ID	Control/Mitigation Name	Compliance Driver
C401	Storage Integrity Management Program (SIMP)	CPUC, Storage Integrity Management Program Balancing Account (SIMPBA), CalGEM (California Code of Regulations, Title 14, Division 2, Chapter 4, Subchapter 1, Article 4, Section 1726), PHMSA (49 CFR Part §192, Subpart A, 192.12, Underground Natural Gas Storage Facilities)
C402	Well Abandonment, Replacement, Demo Verification, and Monitoring Practices	CalGEM (CCR, Title 14, Division 2, Chapter 4, Subchapter 1, Article 4, Section 1726, PHMSA Regulations (49 CFR Part §192, Subpart A, 192.12, Underground Natural Gas Storage Facilities)
C408	Storage Field Maintenance – Underground Components	CalGEM (CCR, Title 14, Division 2, Chapter 4, Subchapter 1, Article 4, Section 1726, PHMSA Regulations (49 CFR Part §192, Subpart A, 192.12, Underground Natural Gas Storage Facilities)

ATTACHMENT B

UNDERGROUND GAS STORAGE SYSTEM - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[37] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and a description of the data.

Risk Data	Source Type	Source Information
Likelihood of failure and probability failure results in safety consequence	Internal Model Results	Source: Internal SIMP model Description: Integrity Management Department Internal model that uses internal and industry data
Storage Incident Cost data	External Data	Agency: PHMSA Link: Pipeline Incident Flagged Files | PHMSA Description: Due to insufficient internal data, financial consequences were modelled using national incident data as a function of release volume.
Meter Outages	Internal Data	Source: SME judgment and GIS data Description: SME expertise was used to determine scenarios that could result in a significant reliability impact and GIS data was used to determine the number of meters downstream that would be impacted.

[37] D.24-05-064, RDF Row 10 and Row 29.

ATTACHMENT C

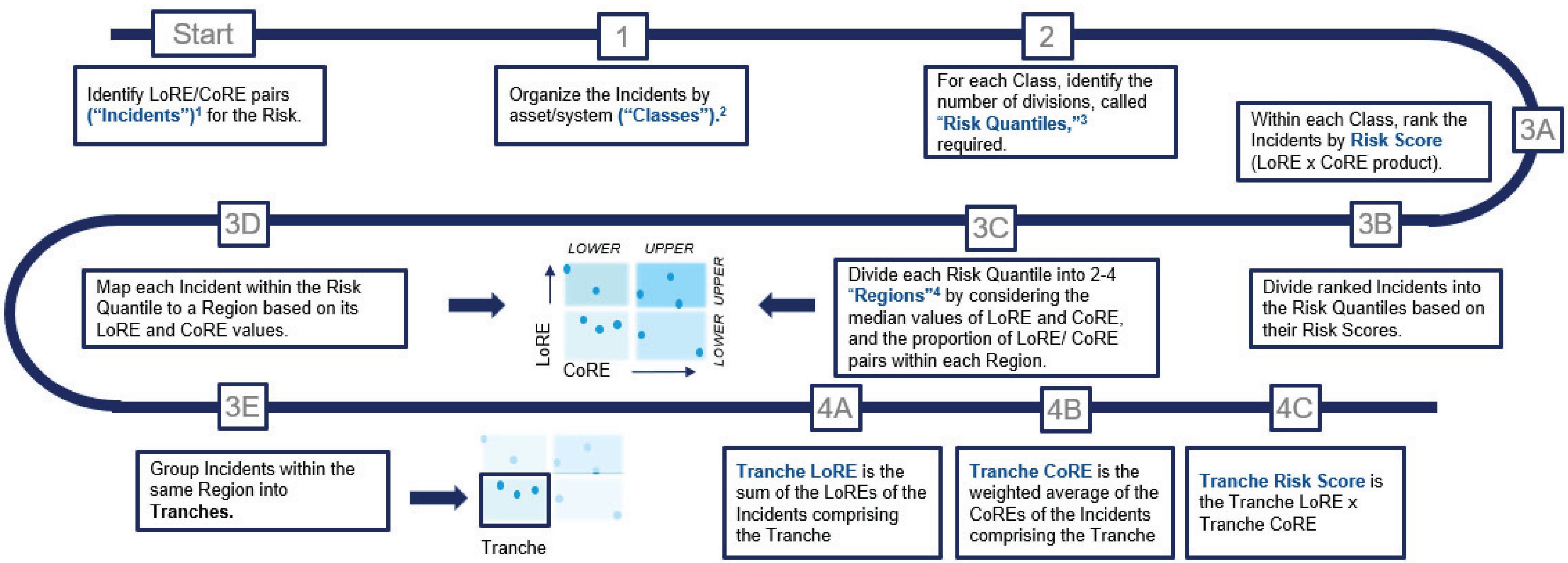
**UNDERGROUND GAS STORAGE SYSTEM –
SUMMARY OF ELEMENTS OF BOW TIE**

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C401	Storage Integrity Management Program (SIMP)	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7, DT.8, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C402	Well Abandonment, Replacement, Demo Verification, and Monitoring Practices	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7, DT.8, DT.9, DT.10	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7
C408	Storage Field Maintenance – Underground Components	DT.1, DT.2, DT.3, DT.4, DT.5, DT.6, DT.7, DT.8, DT.9	PC.1, PC.2, PC.3, PC.4, PC.5, PC.6, PC.7

ATTACHMENT D

UNDERGROUND GAS STORAGE - APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



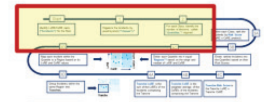
NOTES

[1]For example, ***Incidents (or "Risk Incidents")*** for Gas Storage are generally comprised of release or damage

[2]For example, ***Classes (or "Asset Classes")*** for UGS the only class present is Underground Storage.

[3]***Quantiles*** are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.

[4]The four ***Regions*** are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).



Start

Identify LoRE/CoRE pairs **("Incidents")**[1] for the Risk.

1

Organize the Incidents by asset/system **("Classes")**.[2]

2

For each Class, identify the number of divisions, called **"Risk Quantiles,"**[3] required.

Class	LORE / CORE PAIRS	TOTAL # PAIRS
UGS	Normal Operations in Aliso Canyon - 20 to 50 MMSCFD	50
	Well Interventions in Aliso Canyon - 100+ MMSCFD	
	Well Interventions in La Goleta - 10 to 20 MMSCFD	
	…and 47 more pairs	

$$\min\left(\frac{N}{8}-1, 9\right) < K \leq \min\left(\frac{N}{8}, 10\right)$$

6

Step 3 for *UGS*

UGS	Normal Operations in Aliso Canyon - 20 to 50 MMSCFD Well Interventions in Aliso Canyon - 100+ MMSCFD Well Interventions in La Goleta - 10 to 20 MMSCFD *...and 47 more pairs*	50

$$\min\left(\frac{N}{8}-1, 9\right) < K \le \min\left(\frac{N}{8}, 10\right)$$

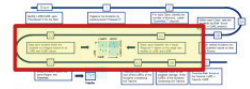
6

From Step 2 for *UGS*

3A Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).

3B Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.

Incident (LoRE/CoRE) Pair	Risk Score	Rank (3A)	Quantile (3B)
Normal Operations in Aliso Canyon - 50 to 100 MMSCFD	26,760,998	1	#1
Normal Operations in Aliso Canyon - 20 to 50 MMSCFD	20,016,118	2	
Normal Operations in Honor Rancho - 50 to 100 MMSCFD	4,078,158	3	
Well Interventions in Aliso Canyon - 100+ MMSCFD	1,004,449	4	
Normal Operations in Honor Rancho - 20 to 50 MMSCFD	965,067	5	
Well Interventions in Aliso Canyon - 20 to 50 MMSCFD	798,993	6	
Well Interventions in Honor Rancho - 100+ MMSCFD	715,126	7	
Well Interventions in Honor Rancho - 20 to 50 MMSCFD	397,461	8	
Normal Operations in La Goleta - 20 to 50 MMSCFD	243,814	9	#2
Well Interventions in Aliso Canyon - 10 to 20 MMSCFD	143,988	10	
Normal Operations in Aliso Canyon - 1 to 5 MMSCFD	140,302	11	
Well Interventions in La Goleta - 100+ MMSCFD	121,310	12	
Well Interventions in Aliso Canyon - 50 to 100 MMSCFD	98,949	13	
Well Interventions in La Goleta - 10 to 20 MMSCFD	89,045	14	
Well Interventions in Playa Del Rey - 10 to 20 MMSCFD	85,787	15	
Well Interventions in Playa Del Rey - 20 to 50 MMSCFD	70,346	16	
Well Interventions in La Goleta - 20 to 50 MMSCFD	62,996	17	
...	...	18-50	...

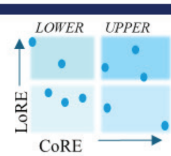


3D

Map each Incident within the Risk Quantile to a Region based on its LoRE and CoRE values.

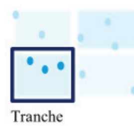
3C

Divide each Risk Quantile into 2-4 **"Regions"**[4] by considering the median values of LoRe and CoRE, and the proportion of LoRE/ CoRE pairs within each Region.

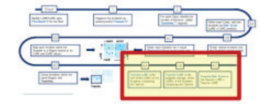


3E

Group Incidents within the same Region into **Tranches**.



Incident (LoRE/CoRE) Pair	Risk Score	Rank (3A)	Quantile (3B)	Region (3C)	Tranche (3D)
Normal Operations in Aliso Canyon - 50 to 100 MMSCFD	26,760,998	1	#1	UL/LC	UGS-1-1
Normal Operations in Aliso Canyon - 20 to 50 MMSCFD	20,016,118	2		UL/LC	UGS-1-1
Normal Operations in Honor Rancho - 50 to 100 MMSCFD	4,078,158	3		UL/LC	UGS-1-1
Well Interventions in Aliso Canyon - 100+ MMSCFD	1,004,449	4		LL/UC	UGS-1-2
Normal Operations in Honor Rancho - 20 to 50 MMSCFD	965,067	5		UL/LC	UGS-1-1
Well Interventions in Aliso Canyon - 20 to 50 MMSCFD	798,993	6		LL/UC	UGS-1-2
Well Interventions in Honor Rancho - 100+ MMSCFD	715,126	7		LL/UC	UGS-1-2
Well Interventions in Honor Rancho - 20 to 50 MMSCFD	397,461	8		LL/UC	UGS-1-2
Normal Operations in La Goleta - 20 to 50 MMSCFD	243,814	9	#2	LL/UC	UGS-2-3
Well Interventions in Aliso Canyon - 10 to 20 MMSCFD	143,988	10		UL/LC	UGS-2-4
Normal Operations in Aliso Canyon - 1 to 5 MMSCFD	140,302	11		UL/LC	UGS-2-4
Well Interventions in La Goleta - 100+ MMSCFD	121,310	12		LL/UC	UGS-2-3
Well Interventions in Aliso Canyon - 50 to 100 MMSCFD	98,949	13		LL/UC	UGS-2-3
Well Interventions in La Goleta - 10 to 20 MMSCFD	89,045	14		UL/LC	UGS-2-4
Well Interventions in Playa Del Rey - 10 to 20 MMSCFD	85,787	15		UL/LC	UGS-2-4
Well Interventions in Playa Del Rey - 20 to 50 MMSCFD	70,346	16		LL/UC	UGS-2-3
Well Interventions in La Goleta - 20 to 50 MMSCFD	62,996	17		LL/UC	UGS-2-3



4A

Tranche LoRE is the sum of the LoREs of the Incidents comprising the Tranche

4B

Tranche CoRE is the weighted average of the CoREs of the Incidents comprising the Tranche

4C

Tranche Risk Score is the Tranche LoRE x Tranche CoRE

Incident (LoRE/CoRE) Pair	Tranche	Tranche Lore (4A)	Tranche Core (4B)	Tranche Risk Score (4C)
Normal Operations in Aliso Canyon - 50 to 100 MMSCFD	UGS-1-1	0.369	$140,349,682	$51,820,341
Normal Operations in Aliso Canyon - 20 to 50 MMSCFD	UGS-1-1			
Normal Operations in Honor Rancho - 50 to 100 MMSCFD	UGS-1-1			
Normal Operations in Honor Rancho - 20 to 50 MMSCFD	UGS-1-1			
Well Interventions in Aliso Canyon - 100+ MMSCFD	UGS-1-2	0.005	$588,390,706	$2,916,028
Well Interventions in Aliso Canyon - 20 to 50 MMSCFD	UGS-1-2			
Well Interventions in Honor Rancho - 100+ MMSCFD	UGS-1-2			
Well Interventions in Honor Rancho - 20 to 50 MMSCFD	UGS-1-2			
Normal Operations in La Goleta - 20 to 50 MMSCFD	UGS-2-3	0.002	$381,403,774	$597,415
Well Interventions in La Goleta - 100+ MMSCFD	UGS-2-3			
Well Interventions in Aliso Canyon - 50 to 100 MMSCFD	UGS-2-3			
Well Interventions in Playa Del Rey - 20 to 50 MMSCFD	UGS-2-3			
Well Interventions in La Goleta - 20 to 50 MMSCFD	UGS-2-3			
Well Interventions in Aliso Canyon - 10 to 20 MMSCFD	UGS-2-4	2.155	$213,039	$459,122
Normal Operations in Aliso Canyon - 1 to 5 MMSCFD	UGS-2-4			
Well Interventions in La Goleta - 10 to 20 MMSCFD	UGS-2-4			
Well Interventions in Playa Del Rey - 10 to 20 MMSCFD	UGS-2-4			

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-5)

Employee Safety

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for the Employee Safety Risk. This chapter contains information and analysis for this risk that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (the Phase 2 Decision) and D.24-05-064 (the Phase 3 Decision). The Employee Safety Risk is included in the 2025 RAMP Report based on a safety risk assessment, further informed by its reliability and financial consequence attributes, consistent with RDF guidance. This risk chapter describes the basis for selection of the Employee Safety Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation, consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's Employee Safety Risk is defined as "the risk of a condition, practice or event that threatens the safety of a SoCalGas employee." The risk definition encompasses risk events caused by the injured employees themselves and/or other employees or non-employees, including the processes and systems around employees that may contribute to an incident, and could also result in an impact to infrastructure, contractors, and/or the public.

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[1] As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

SoCalGas defines safety as the presence of controls for known hazards, actions to anticipate and guard against unknown hazards, and the commitment to continuously improve its ability to recognize and mitigate hazards. Safety requires strong, ongoing leadership commitment, and active engagement and ownership from all employees.

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF requirements, such as those from state and federal Occupational Safety and Health Administrations (OSHA, Cal/OSHA),[2] the CPUC (including General Order 112-F), Pipeline and Hazardous Material Safety Administration (PHMSA) (including but not limited to subparts of Rule 49 Code of Federal Regulations), and American Petroleum Institute Recommended Practice (API RP)1173. A list of compliance requirements applicable to Employee Safety Risk is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as enhancing operations, and promoting public trust and confidence in the communities SoCalGas serves.

2. Risk Overview

SoCalGas defines safety as the presence of controls for known hazards, actions to anticipate and guard against unknown hazards, and the commitment to continuously improve its ability to recognize and mitigate hazards. Safety requires strong, ongoing leadership commitment, and active engagement and ownership from all employees.

To promote these principles and safety values throughout, and to foster a culture of continuous safety improvement, SoCalGas strives for a work environment where employees at all levels can raise concerns about pipeline infrastructure safety,[3] public safety,[4] contractor safety,[5] and employee safety[6] and offer suggestions for improvement.

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2 Cal/OSHA is commonly used to describe the California Occupational Safety and Health Program and the agency that enforces it.

3 Safety systems and processes associated with the design, construction, operation, inspection, and maintenance of SoCalGas's infrastructure.

4 Safety systems and processes focused on protection of our customers and the public (i.e., Emergency Management, Environmental Safety, Customer Data Privacy, Accessibility, and protection of the public from harm caused by our operations or our assets, and the safety of vulnerable populations).

5 Safety systems and processes focused on the safety and protection of our contractors and subcontractors who provide services to support SoCalGas assets and operations

6 Safety systems and processes focused on the health and safety of our employees. This includes safety policies, programs, and training.

B. Risk Scope

SoCalGas's Employee Safety Risk analysis considers the risk of an employee safety incident that causes minor[7] or serious injury/illness[8] or fatality while on duty. This risk applies to the entire SoCalGas employee population, which was an annual average of 8,900 employees in 2024.

C. Data Sources Used to Quantify Risk Estimates[9]

SoCalGas utilized internal data sources to determine an Employee Safety Risk Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate, and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas service territory. Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of the Employee Safety Risk, including a risk Bow Tie, which delineates potential Drivers/Triggers and Potential Consequences, followed by a description of the Tranches determined for this risk.

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7 Minor injury or illness is one that does not meet the criteria for a serious injury as defined by Cal/OSHA.

8 Cal/OSHA defines a serious injury or illness as "any injury or illness occurring in a place of employment or in connection with any employment that requires inpatient hospitalization for other than medical observation or diagnostic testing, or in which an employee suffers an amputation, the loss of an eye, or any serious degree of permanent disfigurement, but does not include any injury or illness or death caused by an accident on a public street or highway, unless the accident occurred in a construction zone." 8 C.C.R. § 330(h).

9 Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

A. Risk Selection

Employee Safety Risk was included as a risk in SoCalGas's 2021 RAMP and was included in SoCalGas's 2022, 2023, and 2024 Enterprise Risk Registries (ERR).[10] SoCalGas's ERR evaluation and selection process is summarized in Chapter RAMP-2: Enterprise Risk Management Framework and in Chapter RAMP-3: Risk Quantification Framework.

SoCalGas selected this risk in accordance with RDF Row 9.[11] Specifically, SoCalGas assessed the top risks from the Company's 2024 ERR based on the Consequence of a Risk Event (CoRE) Safety attribute. Employee Safety Risk was among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks on December 17, 2024 at a pre-filing workshop. Employee Safety Risk was selected based on the qualification of its Safety risk attribute, as required under the RDF. At the pre-filing workshop, no party expressed opposition to inclusion of this risk in SoCalGas's 2025 RAMP Report.

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, possible Drivers, Potential Consequences, and a mapping of the elements in the Bow Tie to the mitigations that addresses them.[12] As illustrated in the risk Bow Tie shown below in Figure 1, the Risk Event (center of the Bow Tie) is the Employee Safety Risk that leads to a safety-related event, the left side of the Bow Tie illustrates Drivers/Triggers that could lead to the Employee Safety Risk, and the right side shows the Potential Consequences of the Employee Safety Risk. SoCalGas applies this framework to identify and summarize the information provided in Figure 1. A mapping of each mitigation to the addressed elements of the risk Bow Tie is provided in Attachment C.

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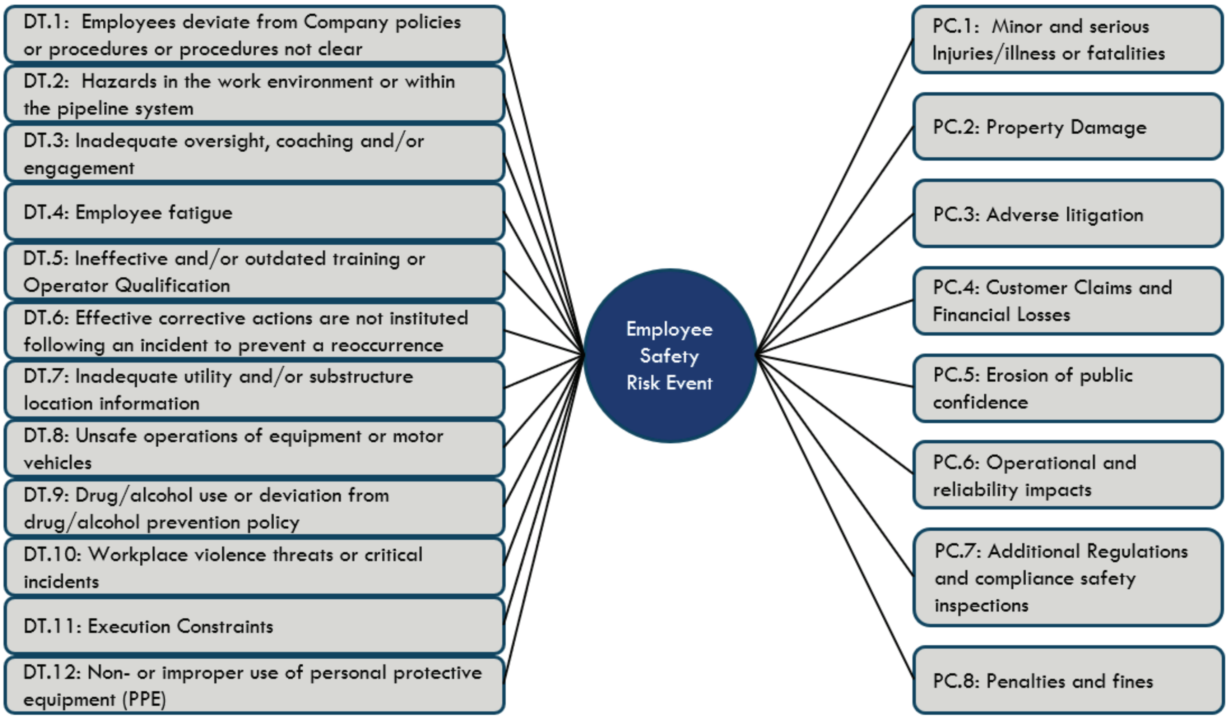
[10] In the 2021 RAMP Report, Chapter SCG-Risk-5, this risk was called Incident Involving an Employee (IIE). The risk definition for Employee Safety Risk in this RAMP was changed from the IIE risk in the 2021 RAMP Report to remove limiting, causal language regard "non-adherence to Company policies, procedures, and programs, or by external factors". The elements of Employee Safety Risk have been expanded to be more comprehensive and to align with the Contractor Safety risk chapter.

[11] D.24-05-064, RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's ERR comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars".

[12] D.24-05-064, RDF Row 15.

Figure 1
Employee Safety Risk: Risk Bow Tie



C. Potential Risk Event Drivers/Triggers[13]

When performing a risk assessment for the Employee Safety Risk, SoCalGas identifies potential leading indicators, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset.[14] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 – Deviation from Company standards, policies or procedures or procedures not clear:** SoCalGas maintains standards, policies and procedures, including but not limited to Gas Standard procedures, general safety rules in a Safety Manual for Employees, and an Illness and Injury Prevention Program (IIPP) standard. Failure to adhere to SoCalGas safety standards, policies or procedures or an unclear procedure could result in a safety-related event.

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

14 D.24-05-064, RDF Rows 10-11.

- **DT.2 – Hazards in the work environment or within the pipeline system:** Unsafe work environments, including work locations, roadways and parking places, customer premises, gas equipment condition, lead from paint, asbestos, or fumigation chemicals, for example, can lead to a safety event. Also, factors such as heat, night work, high-risk work locations (*e.g.*, busy roadways), may make working conditions more difficult and could increase the likelihood of a safety-related event.
- **DT.3 – Inadequate oversight, coaching and/or engagement**: Inadequate oversight, coaching, and/or engagement can lead to departures from safe work practices that could result in a safety-related event.
- **DT.4 – Employee fatigue:** Employees working excessive hours can create unsafe work environments by reducing their level of awareness to hazards or ability to perform work effectively which could lead to a safety-related event.
- **DT.5 – Ineffective and/or outdated training or Operator Qualification:** Ineffective and or outdated training or Operator Qualifications ("Op-qual"), or inexperienced employees could result in an employee performing work without appropriate knowledge, competency, training, and or qualification, which could result in a safety-related event.
- **DT.6 – Effective corrective actions are not instituted following an incident to prevent a reoccurrence:** Lessons learned, and the appropriate follow-up actions or training, can help prevent future safety events from occurring. The failure to report near misses or share lessons learned and implement corrective actions following a safety-related event could lead to the recurrence of safety-related events.
- **DT.7 – Inadequate utility and/or substructure location information:** Proper information about the assets, systems, or infrastructure that are part of the SoCalGas facilities and the auxiliary substructures in the vicinity of work activities is an important component of performing work safely. Inadequate or inaccurate utility and/or substructure information could result in an employee safety-related event.

- **DT.8 – Unsafe operations of equipment or motor vehicles:** Non-adherence to motor vehicle laws or not utilizing equipment according to safety standards could lead to a safety-related event.
- **DT.9 – Drug/alcohol use or deviation from drug/alcohol prevention policy:** Medication/drug/alcohol use while on the job may impede the ability to perform work safely, which could lead to a safety-related event.
- **DT.10 – Workplace violence threats or incidents:** Workplace violence incidents (*e.g.*., an active shooters, hostile customers) could increase the likelihood of a safety-related event.
- **DT.11 – Execution constraints:** Events (excluding those covered by outside force damages) that negatively impact SoCalGas's ability to perform as anticipated, such as ineffective materials, permitting constraints, or operational oversight, delays in response and awareness, resource constraints, and/or inefficiencies or reallocation of (human and material) resources, or unexpected maintenance needs could increase the likelihood of a safety-related event.
- **DT.12 – Non- or improper use of personal protective equipment (PPE):** Safety equipment serves to protect employees from avoidable injuries. Failure to wear personal protection and safety equipment could lead to a safety-related event

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this risk by analyzing internal data sources, where available, industry data,[15] and subject matter expertise (SME).[16] These Bow Tie Consequences inform the CoRE component of the risk score. If one or more of the Drivers listed above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

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[15] Industry data includes data found in SoCalGas's annual Safety Performance Metrics Report (SPMR) and Centers for Disease Control and Prevention (CDC), *Web-based Injury Statistics Query and Reporting System (WISQARS) Cost of Injury*, *available at:* https://wisqars.cdc.gov/cost/?y=2023&o=MORT&i=0&m=20810&g=00&s=0&u=TOTAL&u=AVG.

[16] D.24-05-064, RDF Row 10.

- **PC.1 – Minor or serious injuries/illness[17] or fatalities**
- **PC.2 – Property damage**
- **PC.3 – Adverse litigation**
- **PC.4 – Customer claims and financial losses**
- **PC.5 – Erosion of public confidence**
- **PC.6 – Operational and reliability impacts**
- **PC.7 – Additional regulations and compliance safety inspections**
- **PC.8 – Penalties and fines**

These Potential Consequences were used by SoCalGas in the scoring of the Employee Safety Risk during the development of its 2024 ERR.

E. Evolution of Risk Drivers and Consequences

As specified in the Phase 3 Decision,[18] the following changes to the previous ERR and/or the 2021 RAMP include:

1. Changes to Drivers/Triggers of the Risk Bow Tie

SoCalGas implemented several changes to the possible Drivers and Triggers to promote clarity and alignment. These changes include efforts to promote consistency and advance an aligned and integrated approach to personnel and occupational safety issues for SoCalGas employees and contractors by aligning the possible Drivers and Triggers within the Contractor and Employee Safety Risks. In addition, SoCalGas clarified and added language to the Triggers, Drivers, and associated definitions to more clearly identify and explain the possible Driver/Trigger.

2. Changes to Potential Consequences of the Risk Bow Tie

- PC.1 – Minor and serious Injuries/illness or fatalities: Renamed to include minor injuries and illnesses.

[17] Cal. Code Regs. Tit. 8, 330(h).

[18] D.24-05-064, RDF Row 8.

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP-3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined:[19]

Table 1: Employee Safety Risk
Tranche Identification

Class	Number of LoRE-CoRE Pairs	Number of Resulting Tranches
OSHA Recordable	2	2
Vehicle Incident	3	2
Workplace Violence	2	2
TOTAL	**7**	**6**

Attachment D illustrates the derivation of the Tranches, as shown in Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas as logical groups of events that can lead to the Employee Safety Risk. These classes also align risk treatments with event risk profiles reflective of SoCalGas's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches, is provided in workpapers.

III. PRE-MITIGATION RISK VALUE

In accordance with the RDF Row 19, the table below provides the pre-mitigation risk values for the Employee Safety Risk. Further details, including pre-mitigation risk values by Tranche, are provided in workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3: Risk Quantification Framework.

[19] Note that the Employee Safety Risk, as a human-based safety risk, does not feature the natural segmentation characteristics that asset-based risks do, which limits the number of viable Tranches.

Table 2: Employee Safety Risk
Monetized Risk Values
(Direct, in 2024 $millions)

LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
	Safety	Reliability	Financial		
581.9	$0.036	$0.00	$0.0084	$0.045	$26.01

A. Risk Value Methodology

SoCalGas's risk modeling for the Employee Safety Risk follows RDF guidance[20] for implementing a Cost Benefit Approach, as described below:

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** The Employee Safety Risk is quantified in a combined attribute hierarchy as shown in Table 2 above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** The Employee Safety risk used observable and measurable data in the estimation of CoRE values. SoCalGas utilized internal incident data to represent natural units for employee injuries. These injuries were classified as either Minor, Serious, or Unsurvivable and assigned the corresponding FAA fractional VSL value.
3. **Cost Benefit Approach Principle 3 - Comparison (RDF Row 4):** The Employee Safety Risk utilized proxy data as provided by various sources including, but not limited to, the Federal Bureau of Investigation (for workplace violence), the United States Bureau of Labor Statistics (to determine a proration of SoCalGas employee base versus the national working population), the Centers for Disease Control and Prevention (to determine financial impacts associated with injuries), and National Safety Council (to estimate costs associated with vehicle incidents).
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** Data distributions were not applicable for the risk events modeled for the OSHA,

20 D.24-05-064, RDF Rows 2-7.

Workplace Violence, and Vehicular Incident components of this risk. For those components, probabilities of future events were derived based on internal recorded data from past years or supplemented with national data where applicable (to estimate likelihood of workplace violence incident). Please refer to Attachment B for specific details regarding these sources.

5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas used a California-adjusted Department of Transportation monetized equivalent to calculate the Safety CoRE attribute at a monetized equivalent of $16.2 million per fatality, $49 thousand per minor injury, and $4.1 million per serious injury;[21] and the Financial CoRE attribute is valued at $1 per dollar.[22] Reliability is quantified at $0 due to the lack of empirical and proxy data supporting reliability consequences occurring from employee safety incidents.

Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, and technical references, are provided in workpapers.

6. **Cost Benefit Approach Principle 6-Risk Adjusted Attribute Level (RDF Row 7):**

Table 3: Employee Safety Risk
Risk Scaled vs Unscaled Value by CoRE Attributes
(Direct, in 2024 $ millions)

	Safety	Reliability	Financial	Total
Unscaled Risk Value	$18.73	$0	$4.89	$23.61
Scaled Risk Value	$21.12	$0	$4.90	$26.01

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for the Employee Safety Risk. The Employee Safety Risk does not feature a significant risk aversion scaling impact because a relatively small proportion of the observed events rise to the level at which scaling is

[21] *See* D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

[22] S*ee* Chapter RAMP-3: Risk Quantification Framework, Section II.

applicable, and the magnitudes of the consequences are not as high (*e.g.*, multiple-fatality event) as can occur with other risks.

Further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter-RAMP-3.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations included in this RAMP Report for the Employee Safety Risk and reflects changes expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place in 2024 and which are expected to be on-going, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[23] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-009.[24] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test year (PTY) (2029, 2030, and 2031).[25]

Table 4: Employee Safety Risk
2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C343	**Employee Safety Strategy**	X	Ongoing
C345	**Safety & Health – Operations**	X	Ongoing
C346	**Safety & Health – Programs**	X	Ongoing
C347	**Event Learning & Continuous Improvement**	X	Ongoing
C342	**Safety Technology & Analytics**	X	Ongoing
C312	**Drug and Alcohol Testing Programs**	X	Ongoing

23 *See* D.24-12-074.

24 *See* D.21-11-009 at 136 (Conclusion of Law (COL) 7) (providing a definition for “baselines” and “baseline risk”).

25 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

C326	**Workplace Violence Prevention Programs[26] (Facilities Hardening)**	X	Ongoing

***Bold** indicates this control/mitigation includes mandated programs/activities.*

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place"[27] *(i.e.*, activities in this section were in place as of December 31, 2024). Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

1. C343: Employee Safety Strategy

The Employee Safety Strategy team at SoCalGas is part of the safety organization and dedicated to promoting safety excellence and achieving an incident-free environment. The Employee Safety Strategy team is a trusted business partner that provides health and safety guidance and expertise to meet or exceed business objectives. This is achieved through a passion for safety, teamwork, and client service. Key responsibilities include providing strategic direction and oversight over the following:

- Safety Manual for Employees
- Injury & Illness Prevention Program (IIPP)
- Environmental and Safety Compliance Management Program (ESCMP)[28]
- Safety strategy in support of emergency response and preparedness activities.
- Safety leadership training and support to frontline supervisors
- Safety Information Management System (SIMS)
- Benchmarking safety practices against other companies and recommending improvements
- Additional health & safety programs to comply with local, state, and federal rules and regulations (*e.g*., California Division of Occupational Safety and Health Administration (Cal/OSHA) and other risk management practices.

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26 This control may be listed as C326 Workplace Violence Prevention Programs or C326 Workplace Violence Prevention Programs (Facilities Hardening).

27 D.18-12-014 at 33.

28 SoCalGas's ESCMP tracks and documents completion of the safety training courses, as well as compliance requirements, goals, monitoring, and verification related to applicable environmental, health and safety laws, rules and regulations, and Company standards.

The Employee Safety Strategy team provides directional guidance to the other two branches of the safety organization, which ultimately impacts the entire organization. The other two branches are: (a) Safety & Health – Operations (C345), which includes a team of Field Safety Advisors and Occupational Health Nurses; and (b) Safety & Health – Programs (C346), which includes a team of Industrial Hygienists and Ergonomists.

2. C345: Safety & Health – Operations

The Safety & Health – Operations branch of the safety organization, which includes SoCalGas's Field Safety Advisors and Occupational Health Nurses, plays a crucial role in maintaining safety at SoCalGas. SoCalGas's Field Safety Advisors review incidents, share lessons learned, and participate in incident analysis, reporting, and facility inspections. They also manage and lead various aspects of the Company's occupational health and safety programs. Some of the safety programs that Field Safety Advisors manage include lockout/tagout,[29] Fall Protection Program,[30] hot work,[31] incident evaluation, job safety observation and coaching, personal protective equipment, safe driving, Serious Injury or Fatality Prevention (SIF), and a seven-step injury prevention program referred to as The Winning 7.[32]

SoCalGas Occupational Health Nurses respond to employee reports of discomfort, injuries, and illnesses, aiming to provide early intervention and treatment under first aid care and administrative control measures. Occupational Health Nurses also provide industrial hygiene program support for the Respirator and Hearing Conservation Program. In addition to these responsibilities, the Safety & Health – Operations team also executes on the following activities:

- Field Safety Advisors' rollout of the Injury & Illness Prevention Program (IIPP) and other health & safety programs to comply with local, state and federal rules and regulations (*e.g.*, Cal/OSHA).
- Administering ESCMP.

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29 A lockout/tagout procedure is a safety protocol to check for the safety of workers during maintenance or repair.

30 SoCalGas's Fall Protection Plan seeks to prevent employee injuries due to falls from hazardous walking and working surfaces and working aloft.

31 Hot work consists of work that generates flames, sparks, or slag (i.e. welding, soldering/brazing, grinding).

32 SoCalGas's The Winning 7 program launched in 2023 by communicating seven safety habits is aimed at preventing employee injuries while working.

- Supporting emergency response and preparedness activities in the field.
- Educating and training SoCalGas personnel on safety topics, safety best practices, and how to maintain an incident-free workplace.
- Monitoring health and safety trends and providing technical support and regulatory guidance.
- Performing management of change activities to include communication and training for new safety programs focused on safety-related risk reduction for employees.
- Providing safety leadership training and support to frontline supervisors.
- Utilizing and training on the Company's Safety Information Management System (SIMS).

SoCalGas currently has 11 Field Safety Advisors to support a workforce of approximately 8,700 employees, with over 5,000 employees in front-line positions performing construction, operations, and maintenance resulting in a ratio of 1 Field Safety Advisor for every 800 employees or 1 Field Safety Advisor for every 450 field employees. The National Association of Safety Professionals and the Health and Safety Institute publish staffing models to help determine adequate occupational safety staffing levels based on the risks present in the organization, including the nature of the workplace, number of employees, exposure to hazards, and the overall safety culture of the organization. Based upon these models, SoCalGas believes it could reinforce and increase the effectiveness of its safety operations, by adding additional Field Safety Advisors to focus on employee work groups that are most prone to injury.

While employees with the Safety & Health - Operations control implement and execute regulatory changes, employees within Safety & Health – Programs are responsible for monitoring regulatory changes and verifying compliance, as discussed below.

3. C346: Safety & Health – Programs

The Safety & Health – Programs branch of the safety organization at SoCalGas manages comprehensive industrial hygiene and ergonomics programs in compliance with Cal/OSHA regulations[33] and industry best practices. The department confirms that safety standards are in place to promote safe work activities and processes and conducts regular reviews to maintain

[33] *See, e.g.,* Cal. Code Regs. Tit. 8, §§ 5097, 5110-5120, 5144, 5132, 5157, 5191, 5194.

compliance and improve safety practices. The Safety & Health – Programs team is responsible for the execution of the following:

- Monitoring Regulatory Changes: Industrial Hygienists track updates in safety and health regulations. This includes the IIPP and other health & safety programs to comply with local, state, and federal rules and regulations (*e.g.*, Cal/OSHA, U.S. Department of Transportation (DOT), PHMSA) and other risk management practices.
- Developing Safety Programs: Industrial Hygienists create and administer safety programs to guide employees in working safely and preventing injuries.
- Implementing Safety Programs: Industrial Hygienists and Ergonomists oversee companywide implementation of programs such as hazard communications, Respirator and Hearing Conservation Program, field and office ergonomics and management of mold, asbestos, and lead exposure.
- Monitoring adherence to and changes to ESCMP.
- Educating and training SoCalGas personnel on industrial hygiene and ergonomic topics, safety best practices, and how to maintain an incident-free workplace.
- Supporting emergency response and preparedness activities focused on industrial hygiene and ergonomics perspective.
- Developing internal policies to promote compliance, perform management of change activities such as training and communicating new regulations and requirements.

In 2024, Cal OSHA issued new extensive regulations. These new regulations are Workplace Violence Prevention Program;[34] Heat Illness Prevention;[35] and Lead in Construction.[36] To comply with these mandated programs, SoCalGas plans to expand its Industrial Hygiene program. Expansion of this program will improve development, implementation, training of employees, and compliance monitoring of these program guidelines.

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[34] Senate Bill (SB) 553 (Cortese, 2023), codified at CCP § 527.8 and Cal. Lab. Code § 6401.7 and § 6401.9.

[35] Cal. Code Regs. Tit. 8, §§ 3395-3396.

[36] Cal. Code Regs. Tit. 8, § 1532.1.

4. C347: Event Learning & Continuous Improvement

The Event Learning & Continuous Improvement processes include evaluation of incidents, facilitation of learning teams, and tracking of corrective actions in compliance with federal and state pipeline safety regulations. The core activities of Event Learning & Continuous Improvement are the Event Learning Process, the Learning Team Program, and the Continuous Improvement Process.

The Event Learning & Continuous Improvement program is responsible for performing root cause analysis on events impacting the safety, integrity, or reliability of the natural gas pipeline system, aiming to identify corrective actions that may lead to enterprise-wide process improvements. The Event Learning Process includes evaluation of pipeline accidents and failures to identify causes and mitigations to prevent recurrence, per Code of Federal Regulation § 192.617. SoCalGas also monitors the National Transportation Safety Board (NTSB) for pipeline safety actions and circulates materials to enhance Company pipeline safety operations. This includes conducting gap analyses from NTSB investigations lessons learned to prevent similar incidents, in line with the American Petroleum Institute Recommended Practice (API RP) 1173 Pipeline Safety Management System.

Additionally, SoCalGas has instituted a Learning Team Program, which promotes deeper organizational learning through broad stakeholder participation and exploration of complex human and organizational factors. The Learning Team Program identifies potential system deficiencies or unknown underlying conditions, shifting from a “who failed” to a “what failed” perspective to improve safety, and aims to enhance the safety of the Company’s operations. The Learning Team Program focuses on continuous improvement and stakeholder participation in helping to identify potential system deficiencies and implement improvements.

SoCalGas conducted six pilot Learning Teams, which spanned topics including employee safety, infrastructure safety, public safety, and contractor safety. The purpose of the pilot was to gather feedback, seek information from, and provide a forum for front-line employees to improve safety practices in the field. The findings from the pilot Learning Teams demonstrated the effectiveness of the Learning Team Program in identifying and addressing safety concerns, such as heat illness prevention, vehicle safety, and mental health awareness. As a result, the Learning Team Program was expanded companywide.

Furthermore, the Event Learning & Continuous Improvement process applies controls to mitigate risks through SoCalGas's Continuous Improvement Process which is integral to the Safety Management System. The Continuous Improvement Process includes tracking of incident-related feedback from employees, contractors, and regulatory agencies. Additionally, this activity includes identifying areas for improvement by using data analysis, trends, and benchmarking to measure performance. Information is tracked and received from various sources, including the Advisory Safety Council[37], Executive Safety Council[38], Emergency Management After-Action-Reports, Gas Safety Observation Reporting, and an Online Safety Suggestion Box. These activities help identify safety improvement opportunities to act on as part of SoCalGas's efforts to maintain a high level of safety performance and culture.

In addition, the Continuous Improvement Process includes tracking corrective actions related to inspection reports issued by the CPUC Safety Enforcement Division (SED). These reports include audit findings such as notices of violation, notices of probable violations, concerns and recommendations. The Continuous Improvement Process includes following up and working with stakeholders on corrective actions stemming from SED compliance audits, incident investigations, field constructions, self-reported instances of non-compliance, and directives until these actions are completed. The Continuous Improvement Process also includes effectiveness reviews on completed corrective actions to confirm they are executed as planned, verified, complete, and effective, and identify other opportunities for continuous improvement. Finally, there is necessary collaboration with the operational departments to learn from safety related events and use those learnings to continuously improve.

SoCalGas continues to experience an increase in the number of both Learning Teams and Event Learnings Processes. Since its inception, SoCalGas has completed 30 Learning Teams and as of April 2025 it has approved another 10 Learning Teams for the remainder of the year. In addition, SoCalGas conducts 8 to 10 Event Learning Processes a year. Given the rise in the

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[37] SoCalGas's Advisory Safety Council is comprised of independent members with safety expertise and experience. They include former senior leaders from various industries and leading thinkers in academia.

[38] SoCalGas's Executive Safety Council is a roundtable with Company leaders to advance the Company's safety culture, address enterprise-wide safety strategy, and give employees an opportunity to share their safety experiences with Company leadership.

number of both these efforts, and the realized benefit, SoCalGas plans to grow the Continuous Improvement Process team to support the Learning Teams and the Event Learning Process.

5. C342: Safety Technology & Analytics:

The Technology & Analytics Group plays a crucial role in supporting the safety organization by leveraging data and technology to enhance safety measures. Their primary focus is to identify key performance indicators and associated risk factors from various data sources to maintain, promote, and enhance the efficiency and effectiveness of safety programs and initiatives. This function oversees or contributes to numerous safety-related reports and programs, including SoCalGas's Annual ESCMP Year-End Certification activities, the Safety Performance Metrics Report, Board of Director Reports, the Corporate Responsibility Report, and the AGA Peer Review Benchmarking Analysis. They also administer the Safety Information Management System (SIMS), Safety Training Courses (defensive driving and workplace violence), Management of Change System, and the Emergency Management System used to generate emergency message reports. This includes, but is not limited to, vendor management, access controls, contract management, system training, reports, and analytics for all of the above-mentioned systems. Additionally, the team facilitates the Records & Information Management Program for OSHA and related compliance reporting.

Furthermore, the Technology and Analytics team develops and maintains dashboards and analytics tools that support decision-making in training and safety strategy. By leveraging these tools and approaches, the Technology & Analytics Group enables data and risk informed activity that can minimize safety risks and enhance overall safety performance. The team is dedicated to using data-driven approaches to proactively address safety concerns and improve safety outcomes within the organization. SoCalGas plans to expand its capacity on this team to better facilitate data analytics and enhance the safety of the Company.

6. C312: Drug & Alcohol Testing Programs

SoCalGas has implemented an employee drug and alcohol testing program in accordance with state and federal regulations. SoCalGas's Drug & Alcohol-Free Workplace Policy (DAFWP) prohibits the use and/or possession of illegal drugs and/or alcohol during working hours or reporting to work with alcohol, illegal drugs,[39] or impairing prescribed controlled substances in the system. All employees are responsible for knowing and complying with this policy. Violations are cause for disciplinary action up to and including termination of employment.

Because alcohol and drug abuse pose a threat to the health and safety of SoCalGas employees, the public, and to the security of SoCalGas's equipment and facilities, SoCalGas is committed to providing a drug and alcohol-free workplace. Employees in non-safety-sensitive and safety-sensitive positions are subject to SoCalGas's DAFWP. Testing under this policy is limited to pre-employment and reasonable cause, return-to-duty, and follow-up testing (when applicable). Under DAFWP, SoCalGas tests for additional (*e.g.* generally prescribed) impairing drugs not tested for under the DOT testing program. The policy also requires employees to disclose their use of impairing medications that may affect their ability to safely perform safety-sensitive duties.

SoCalGas also complies with the DOT drug and alcohol program requirements,[40] including requirements for PHMSA[41] and FMCSA,[42] and has implemented a Drug & Alcohol Misuse Prevention Plan (DAMPP) for employees in safety-sensitive positions subject to these regulations and testing requirements. The purpose of the DAMPP is to reduce accidents and injuries that may result from the use of illegal drugs, impairing prescribed controlled substances, and misuse of alcohol, thereby reducing fatalities, injuries, and property damage, and to comply with federal and state regulations.

SoCalGas's current drug and alcohol testing software must be replaced, as its existing software is in the process of being phased out by the company supporting the software, and

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39 Please note, although marijuana is legal for recreational use in California, it remains illegal at the federal level. The SoCalGas Drug and Alcohol-Free Workplace policy prohibits the possession of marijuana on company premises and in company vehicles. The policy also prohibits impairment while working.

40 *See generally* 49 C.F.R. Part 40, 199, and 382.

41 PHMSA-covered employees are those employees who perform operations, maintenance, or emergency response functions associated with gas pipeline or liquified natural gas facilities and are regulated by 49 C.F.R Part 192, 193, and 195, while PHMSA-ER-covered employees only perform emergency response functions.

42 FMCSA-covered employees are commercial motor vehicle drivers required to hold a commercial Class A, Class B, or commercial C driver's license. See DOT, *Random Testing Rates, available at:* https://www.transportation.gov/odapc/random-testing-rates.

expert customer support for the software is largely unavailable. Further, in 2025, PHMSA increased annual random testing rate requirements due to the rise in the national positive rate.[43] As a result, SoCalGas will need to conduct 25% more federally-mandated drug and alcohol tests in 2025 than in 2024, and there is the potential for this increase to continue beyond 2025. Accordingly, additional resources are necessary to account for the increased testing requirements for compliance with 49 CFR Part 40 and Part 199.

All the above-described activities help mitigate safety risk to the Company's employees, as well as reduce the risk of non-compliance with applicable state and federal regulatory requirements.

7. C326: Workplace Violence Prevention Programs (Facilities Hardening)

SoCalGas defines workplace violence as a violent incident related to the workplace, resulting in emotional or physical harm to an employee or third party. SoCalGas's workplace violence prevention program addresses physical security through training, inspections, emergency response, physical security guards, and security measures at facilities (*e.g.*, facilities hardening). As part of this RAMP chapter, SoCalGas solely includes discrete costs related to facilities hardening.

i Facilities Hardening[44]

For the purposes of this Employee Safety Risk, SoCalGas identifies facility hardening measures, such as surveillance systems, physical barriers, and controlled access to facilities. These measures act to reduce the likelihood of a workplace violence event by increasing protective measures at SoCalGas facilities with employees. In addition to protecting employees while at work, these security measures also enhance the security of SoCalGas facilities by protecting assets and infrastructure from damage and promoting infrastructure and public

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[43] PHMSA, *Pipeline Safety: Random Drug Testing Rate; Multi-Factor Authentication; and Operator and Contractor Management Information System Reporting* (November 20, 2024), *available at:* https://www.federalregister.gov/documents/2024/11/20/2024-26737/pipeline-safety-random-drug-testing-rate-multi-factor-authentication-and-operator-and-contractor.

[44] This control may be referred to as C326 Workplace Violence Prevention Programs or C326 Workplace Violence Prevention Programs (Facilities Hardening).

safety.[45]

Security surveillance systems include hardware and software designed to deter, delay, detect, assess, communicate, and respond to potential physical threats. Types of technology and equipment include Closed Circuit Television (CCTV) systems, video analytics, perimeter intrusion detection systems and bi-directional speakers. CCTV is a self-contained surveillance system comprising of cameras, recorders, control equipment, and displays for monitoring activities in real time. The function of the CCTV system is intended to be an overt deterrent, used to assess real time security events, and as forensic tool for investigations following an incident.

Access control systems limit or detect access to facilities and are commonly integrated across all security layers. They provide separation between common areas and higher security areas or critical assets. Access controls are typically found in the form of electronic control systems (proximity card readers or electronic keys) and mechanical locks/keys.

Physical barriers are structures that physically and psychologically deter and delay adversaries, and channel traffic through specified entry/exit points. Types of barriers include berms, fences, walls, gates, vehicle anti-ramming measures (bollards, engineered planters and benches, landscaping boulders, etc.) window barriers, ravines, drainage ditches, security doors, etc.

Other workplace violence prevention measures include contract security guards at critical facilities and other work locations, as well as Corporate Security planning, awareness, risk management, and incident management to prevent, mitigate, or respond to security incidents. The services provided by Corporate Security include proactive inspections of all facilities so that they meet minimum workplace violence standards (OSHA Workplace Violence Inspections). Inspections were first conducted when the Workplace Violence Prevention Program was established in 2024 and are conducted when new hazards are identified. Additionally, SoCalGas employees receive annual training on workplace violence risks and prevention measures. Prevention of workplace violence has many benefits including the advancement of a culture of

[45] While facilities hardening provides valuable benefits in protecting assets and infrastructure from damage and promoting infrastructure and public safety, this chapter only considers the employee safety benefits, consistent with the focus of this chapter.

workplace safety for employees, deterrence of criminal activity, and enhanced security reputation.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls discussed above and reflected in Table 4 through the 2025-2031 period without any significant changes.

C. Mitigation Programs

SoCalGas does not currently foresee implementing new mitigations not described above for the Employee Safety Risk during the 2025-2031 period.

D. Climate Change Adaptation

Pursuant to Commission decisions[46] in the Climate Adaptation OIR (R.18-04-019), SoCalGas performed a Climate Adaptation Vulnerability Assessment (CAVA) focused on years 2030, 2050, and 2070, with the aim of identifying asset and operational vulnerabilities to climate hazards across the SoCalGas system. SoCalGas recognizes the need to address climate vulnerabilities to promote safety and reliability of its services and mitigate the increasing climate-related hazards through innovative and community-centric approaches. Some of the climate hazards that will have short- and long-term ramifications in the Southern California region include extreme temperatures, wildfire, inland flooding, coastal flooding and erosion, and landslides. Climate change is recognized as a factor that can drive, trigger, or exacerbate multiple RAMP risks. Implementing climate change adaptation measures and integrating climate vulnerability considerations into RAMP controls and mitigations can enhance system infrastructure longevity and reduce the severity of long-term negative climate impacts. The controls and mitigations described in further detail in this chapter, as shown below, align with the goal of increasing SoCalGas's physical and operational resilience to the increasing frequency and intensity of climate hazards. Additional information on the CAVA and a list of climate-relevant controls and mitigations included in RAMP are provided in Chapter RAMP-5: Climate Change Adaptation.

[46] D.19-10-054; D.20-08-046.

Table 5: Employee Safety Risk
Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

Relevant ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C343	Employee Safety Strategy	Extreme Temperatures
C345	Safety & Health - Operations	Extreme Temperatures
C346	Safety & Health - Programs	Extreme Temperatures

E. Foundational Programs

Foundational Programs are "[i]initiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[47] There are no Foundational Programs applicable to the Employee Safety Risk and the associated control and mitigation programs.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for the Employee Safety Risk, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[48] for each enterprise risk, SoCalGas uses actual results and industry data, and when that is not available, supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates are provided in Attachment B.

47 D.24-05-064, Appendix A at A-4.

48 D.24-05-064, RDF Row 10.

Table 6: Employee Safety Risk
Control and Mitigation Plan – Recorded and Forecast Costs Summary
(Direct, in 2024 $ thousands)

Control/Mitigation		**Adjusted Recorded**		**Forecast**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C312	**Drug and Alcohol Testing Programs**	0	410	536	0	0	1,611
C326	**Workplace Violence Prevention Programs (Facilities Hardening)**	12,240	0	0	47,631	36,552	0
C342	**Safety Technology & Analytics**	0	1,316	1,436	0	0	4,308
C343	**Safety Strategy**	0	357	357	0	0	1,071
C345	**Safety & Health - Operations**	0	2,534	3,121	0	0	9,363
C346	**Safety & Health - Programs**	0	945	1,196	0	0	3,588
C347	**Event Learning & Continuous Improvement**	0	854	1,081	0	0	3,243
Total		**12,240**	**6,416**	**7,727**	**47,631**	**36,552**	**23,184**

Bold *indicates this control/mitigation includes mandated programs/activities.*

Table 7: Employee Safety Risk
Control & Mitigation Plan – Units Summary

Control/Mitigation		Recorded Units			Forecast Units			
ID	**Name**	**Unit of Measure**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C312	**Drug and Alcohol Testing Programs**	Tests Administered	0	2,127	4,254	0	0	12,762
C326	**Workplace Violence Prevention Programs (Facilities Hardening)**	Projects	26	0	0	60	41	0
C342	**Safety Technology & Analytics**	FTEs	0	6	7	0	0	21
C343	**Safety Strategy**	FTEs	0	2	2	0	0	6
C345	**Safety & Health - Operations**	FTEs	0	11	16	0	0	48
C346	**Safety & Health - Programs**	FTEs	0	3	5	0	0	15
C347	**Event Learning & Continuous Improvement**	FTEs	0	5	7	0	0	21

Bold *indicates this control/mitigation includes mandated programs/activities.*

In Table 8 below, CBRs are presented in summary at the mitigation or control level for the TY 2028 GRC cycle. CBRs are calculated based on scaled, expected values, unless otherwise noted, and are calculated for each of the three required discount rates[49] in each year of the GRC cycle and for the post-test years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

[49] *See* Chapter RAMP-3 for definitions of discount rates, as ordered in the Phase 3 Decision.

Table 8: Employee Safety Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C343	**Employee Safety Strategy**	$0	$1.4	0.95	1.01	0.95
C345	**Safety & Health – Operations**	$0	$12.5	1.05	1.11	1.05
C346	**Safety & Health – Programs**	$0	$4.8	0.79	0.83	0.79
C347	**Event Learning & Continuous Improvement**	$0	$4.3	0.97	1.03	0.97
C342	**Safety Technology & Analytics**	$0	$5.7	0.99	1.05	0.99
C312	**Drug & Alcohol Testing Programs**	$0	$2.1	0.43	0.46	0.43
C326	**Workplace Violence Prevention Programs (Facilities Hardening)**	$48.8	$0	0.04	0.03	0.03

***Bold** indicates this control/mitigation includes mandated programs/activities.*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025, D.16-08-018, and D.18-12-014,[50] SoCalGas considered two alternatives to the Risk Mitigation Plan for the Employee Safety Risk. The alternatives analysis for this plan considered changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan, and constraints, such as budget and resources.

[50] *See, e.g.,* D.18-12-014 at 33-35.

Table 9: Employee Safety Risk
Alternative Mitigation Plan – Forecast Costs Summary
(Direct, in 2024 $ thousands)

Alternative Mitigation		**Forecast Costs**			
ID	**Name**	**2025-2028 Capital**	**PTY Capital**	**2025-2028 O&M**	**PTY O&M**
A392	Enhanced Safety Validation Program	0	0	2,140	1,596
A393	Industrial Athlete Program (A)	0	0	3,280	2,460
Total		**0**	**0**	**5,420**	**4,056**

Table 10: Employee Safety Risk
Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ thousands)

ID	**Alternative Mitigation Name**	**Capital TY 2028**	**O&M TY 2028**	**CBR (Societal)**	**CBR (Hybrid)**	**CBR (WACC)**
A392	Enhanced Safety Validation Program	$0	$532	0.06	0.06	0.06
A393	Industrial Athlete Program	$0	$820	3.89	4.14	3.90

A. A392: Enhanced Safety Validation Program Mitigation

This alternative mitigation includes expanded and revised assessment, training, and verification processes beyond the current compliance and regulatory requirements covered by SoCalGas's ESCMP, which addresses compliance requirements, awareness, goals, monitoring and verification related to environmental, health and safety laws, rules and regulations, and Company standards (*see* C343). Currently, SoCalGas leverages ESCMP to verify compliance with necessary safety requirements. As part of this process, SoCalGas has an annual ESCMP Certification process, which involves submittal of information into the Safety Information Management System (SIMS), the system of record database used to collect and record employee and facility safety compliance. In January of each year, ESCMP information is submitted for year-end approval and certification for the prior calendar year. ESCMP has been refined, improved and matured over the years and is still in place at SoCalGas.

SoCalGas is considering investing in expanded ESCMP capabilities and hiring additional personnel to support new safety validation activities. These activities include verifying that corrective actions from ESCMP safety inspections, self-assessments, and incidents evaluations have been completed by reviewing a select percentage of corrective actions for validation. Based on the CBR analysis, SoCalGas plans to continue monitoring the effectiveness of the ESCMP process to see if expansion is superior to the existing program at a reasonable cost.

B. A393: Industrial Athlete Program Mitigation

SoCalGas considered strengthening its approach to safety by providing internal client organizations with enhanced ergonomic assessments and safety observations supported by a trained Industrial Athlete trainer. Specifically, an Industrial Athletes Program would support employee physical and mental well-being as well as injury reduction efforts by providing one-on-one on-site trainers to encourage the workforce to follow proper body positioning, warm-up, and stretching techniques. This activity would be incremental to the current occupational safety mitigation activities and would complement SoCalGas's existing Employee Safety controls, which are integral to maintaining the safety of its employees.

SoCalGas data indicates that approximately 60% of the employee injuries and lost time events are due to sprains and strains. An Industrial Athlete Program would help identify potential musculoskeletal injury trends and early intervention through professional ergonomics Athlete Trainers. The Program would help promote participant physical activity to boost energy levels, improve concentration, and enhance overall work performance and alertness to environmental conditions. Additionally, the Program aims to foster teamwork and camaraderie among employees by encouraging them to address physical conditioning as a team, leading to better collaboration about physical job requirements and communication about physical requirements in the workplace, thereby enhancing psychological safety.

SoCalGas is not including this activity as part of Employee Safety Risk's mitigation plan because SoCalGas plans to first monitor the effectiveness of its Winning 7 Program. The Winning 7 Program is part of the Health & Safety—Operations (C2) control and is a seven-step injury prevention program. SoCalGas plans to later reassess pursuing additional and/or alternative approaches to injury prevention.

VI. HISTORICAL GRAPHICS

As directed by the Commission in the Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a key metric that aligns with Company safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating risks.

Figure 2
Employee Safety: Safety Progress 2016-2024

Figure 2 above shows the Employee Days Away, Restricted and Transfer (DART) Rate[51] from 2016-2024. DART Rate is calculated based on the number of OSHA-recordable injuries resulting in Days Away from work and/or Days on Restricted Duty or Job Transfer, and hours worked. (DART Rate = DART Cases times 200,000 divided by employee hours worked.) The historical safety work activities completed using the DART Rate from 2016-2024 include:

- 2016: Updates to Hazard Communication Program;
- 2016 – 2019: Safety Loan Worker Pilot;
- 2016 – 2025: Updates to Lead in Construction Compliance Program;
- 2016, 2018, 2021: National Safety Council (NSC) Safety Culture Barometer Survey;
- 2018: Transitioned from its previous defensive driving program to a new, modern online training platform to enhance driver safety training effectiveness;
- 2019: Upgraded Nomex Coveralls and Fresh Air Equipment, and implemented new regulations for Protection from Wildfire Smoke;

[51] Employee DART Rate is Metric No. 14 in SoCalGas's 2024 Safety Performance Metrics Report, filed on April 1, 2025.

- 2020: Confined Space Air Monitoring System Upgrade;
- 2021: OSHA 10- and 30- Hour Construction Training; and Expand "Situation City" and Skills Training;
- 2021-ongoing: Proactive Monitoring of Indoor Air Quality (IAQ) and Chemicals of Concern; and Industrial Hygiene Program Refresh & Expansion;
- 2023: Telematics System In Vehicles;
- 2023 – 2025 Occupational Health Nurse Service Expansion;
- 2024: Workplace Violence Prevention Program and Indoor Heat Illness Prevention Program;
- 2025: Employee Fatigue Alerts; and
- 2025-2031: Industrial Hygiene and Field Safety Team Expansion,

The safety work that remains to be done is described above in Section IV. 2024-2031 Control and Mitigation Plan.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance drivers that underpin identified controls and mitigations.

ID	Control/Mitigation Name	Compliance Driver
C343	Employee Safety Strategy	Cal/OSHA Title 8, DOT, PHMSA, CPUC, LA County Department of Public Health (LACDPH), Certified Unified Program Agency (CUPA)
C345	Safety & Health – Operations	Cal/OSHA Title 8, DOT, PHMSA, CPUC, LA County LACDPH, CUPA
C346	Safety & Health – Programs	Cal/OSHA Title 8, DOT, PHMSA, CPUC, LA County Department of Public Health (LACDPH), Certified Unified Program Agency (CUPA)
C347	Event Learning & Continuous Improvement	PHMSA 49 CFR Parts 191 and 192, CPUC GO 112-F
C342	Safety Technology & Analytics	Cal/OSHA Title 8, OSHA, Cal-OES, CPUC reporting including but not limited to Safety Performance Metrics Report and Safety Enforcement Division (SED) Quarterly Report, Underground Safety Board (USB), Chemical Safety Board (CSB), LACDPH, CUPA
C312	Drug and Alcohol Testing Programs	PHMSA 49 CFR Part 40 and 199

ATTACHMENT B

EMPLOYEE SAFETY - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[52] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and a description of the data.

Risk Data	Source Type	Source Information
SoCalGas Employee SIFs and non-SIFs	Internal Data	Source: Internal SAP systems Description: Internal data used to determine likelihood of OSHA SIF and non-SIF event
SoCalGas CMVIs	Internal Data	Source: Internal SAP systems Description: Internal data used to determine likelihood of a controllable vehicle incident
Active Shooter Incidents in the United States 2023	External Data	Agency: Federal Bureau of Investigation (FBI) Link: https://www.fbi.gov/file-repository/2023-active-shooter-report-062124.pdf/view Description: FBI national data is used to provide a larger sample size of workplace violence incidents to determine the likelihood of an incident

52 D.24-05-064, RDF Row 10 and Row 29.

Injury and Illness Prevention Programs White Paper	External Data	Agency: Occupational Safety and Health Administration (OSHA) Link: https://www.osha.gov/sites/default/files/OSHAwhite-paper-january2012sm.pdf Description: OSHA study was used to estimate effectiveness of implementing an injury and illness prevention program, noting a 15%-35% reduction in injuries compared to employers without a safety and health program.
SoCalGas Employee OSHA Rate	Internal Data	Source: Internal SAP systems Description: Internal data used to estimate reduction in OSHA non-SIF rate year over year
SoCalGas Employee CMVI Rate	Internal Data	Source: Internal SAP systems Description: Internal data used to estimate reduction in vehicle incident rate year over year
Treatment of the Values of Life and Injury in Economic Analysis	External Data	Agency: Federal Aviation Administration (FAA) Link: https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/benefit_cost/econ-value-section-2-tx-values.pdf Description: Abbreviated Injury Scale (AIS) used to determine magnitude of Serious Injuries and Minor Injuries compared to Value of a Statistical Life (VSL)
Work Injury Costs and Time Lost	External Data	Agency: National Safety Council (NSC) Link: https://injuryfacts.nsc.org/work/costs/work-injury-costs/ Description: National data used estimate the financial impact of a potential work-related fatality

Number of Injuries and Associated Costs	External Data	Agency: Centers for Disease Control and Prevention (CDC) Link: https://wisqars.cdc.gov/cost/ Description: National data used to estimate the financial impact of serious injuries and minor injuries
Statistics on Drug-Related Accidents, Injuries and Deaths	External Data	Agency: National Council on Alcoholism and Drug Dependence (via Black Bear Lodge) Link: https://blackbearrehab.com/drug-addiction-dangers/statistics/ Description: National data used to estimate the effect of drug and alcohol impairment, as related to increased OSHA injuries
How just a couple drinks make your odds of a car crash skyrocket	External Data	Agency: National Health Traffic Safety Administration (via Washington Post) Link: https://www.washingtonpost.com/news/wonk/wp/2015/02/09/how-just-a-couple-drinks-make-your-odds-of-a-car-crash-skyrocket/ Description: National data used to estimate the effect of drug and alcohol impairment, as related to increased vehicle incident injuries
Workplace Violence Risk and Mitigation Effectiveness	SME Input	Sempra Corporate Security forecasts the rise of potential Workplace Violence events based on national trends, as well as the expected effectiveness of selected risk mitigation activities in reducing the likelihood of these events.

ATTACHMENT C

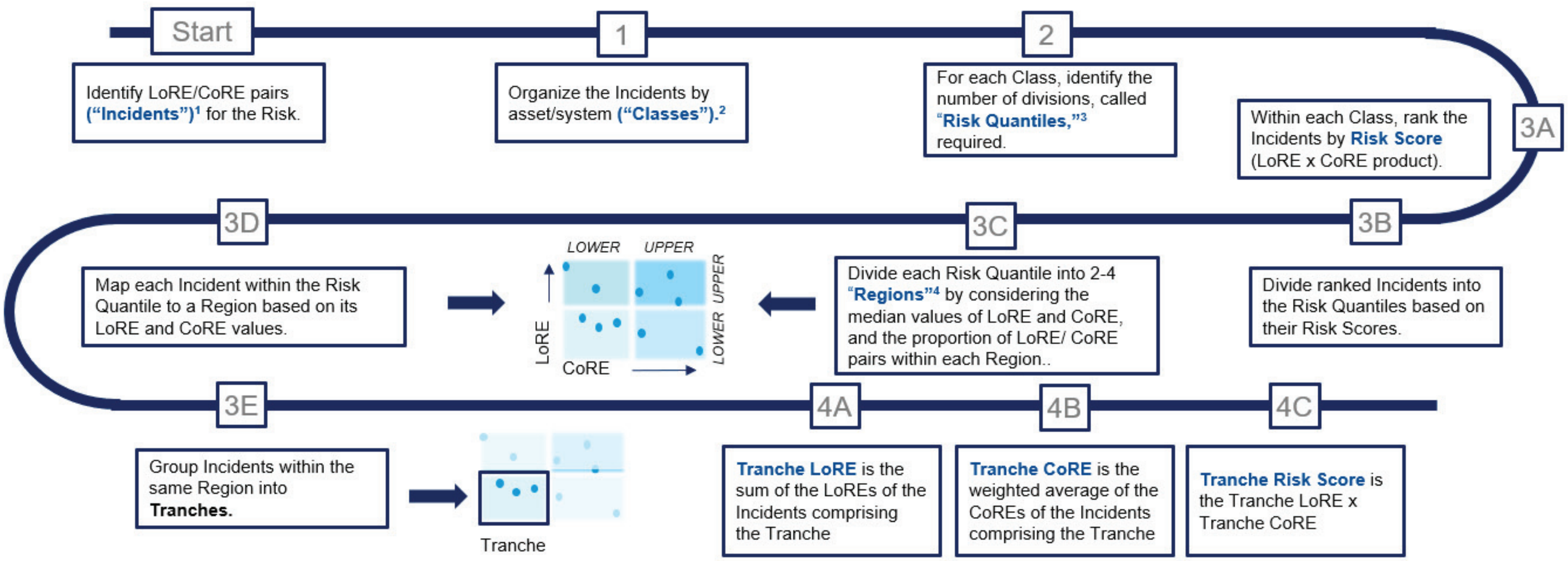
EMPLOYEE SAFETY - SUMMARY OF ELEMENTS OF BOW TIE

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C343	Employee Safety Strategy	DT.1 – DT.12	PC.1 – PC.8
C345	Safety & Health – Operations	DT.1 – DT.12	PC.1 – PC.8
C346	Safety & Health – Programs	DT.1 – DT.12	PC.1 – PC.8
C347	Event Learning & Continuous Improvement	DT.1 – DT.12	PC.1 – PC.8
C342	Safety Technology & Analytics	DT.1 – DT.12	PC.1 – PC.8
C312	Drug and Alcohol Testing Programs	DT.9	PC.1 – PC.8
C326	Workplace Violence Prevention Programs (Facilities Hardening)	DT.10	PC.1 – PC.8

ATTACHMENT D

APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



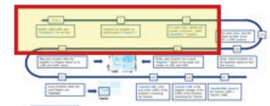
NOTES

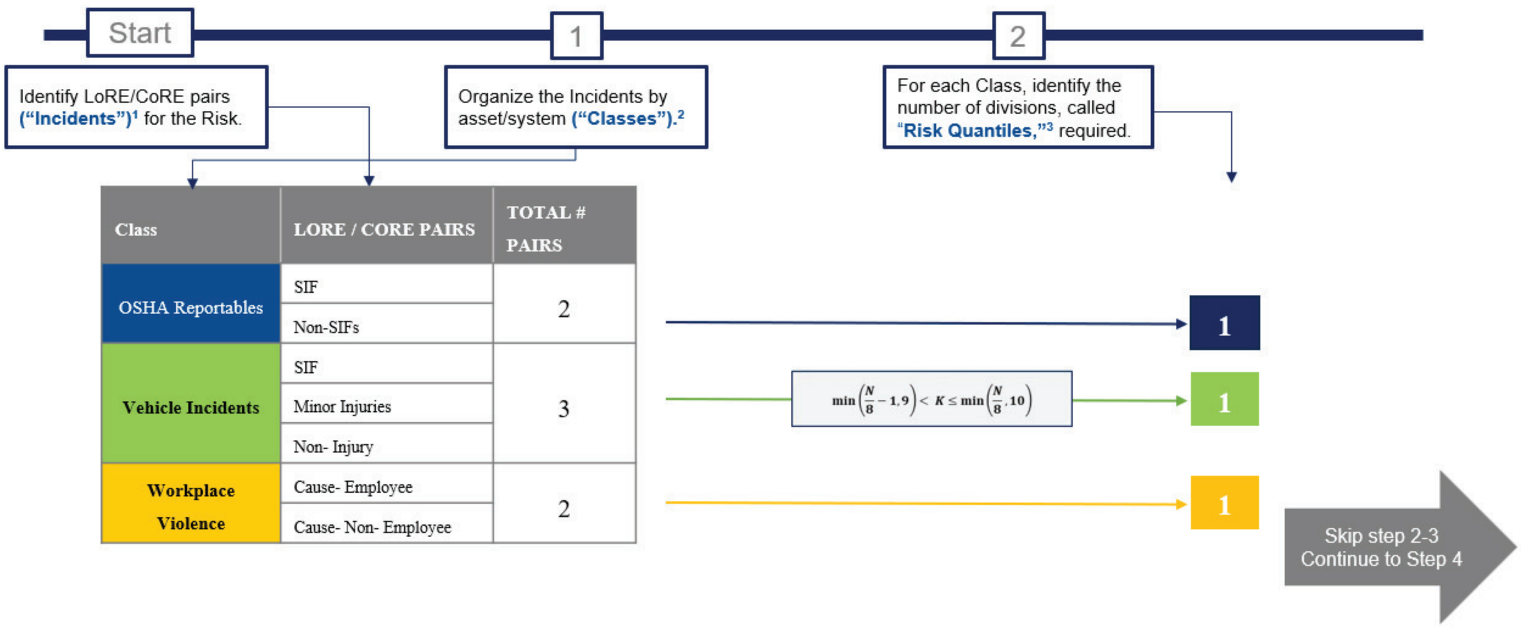
[1]For example, ***Incidents (or "Risk Incidents")*** *for Employee Safety refer to incidents which threaten an employee's safety.*

[2]For example, ***Classes (or "Asset Classes")*** *for Employee Safety include OSHA Reportables, Vehicle Incidents, and Workplace Violence.*

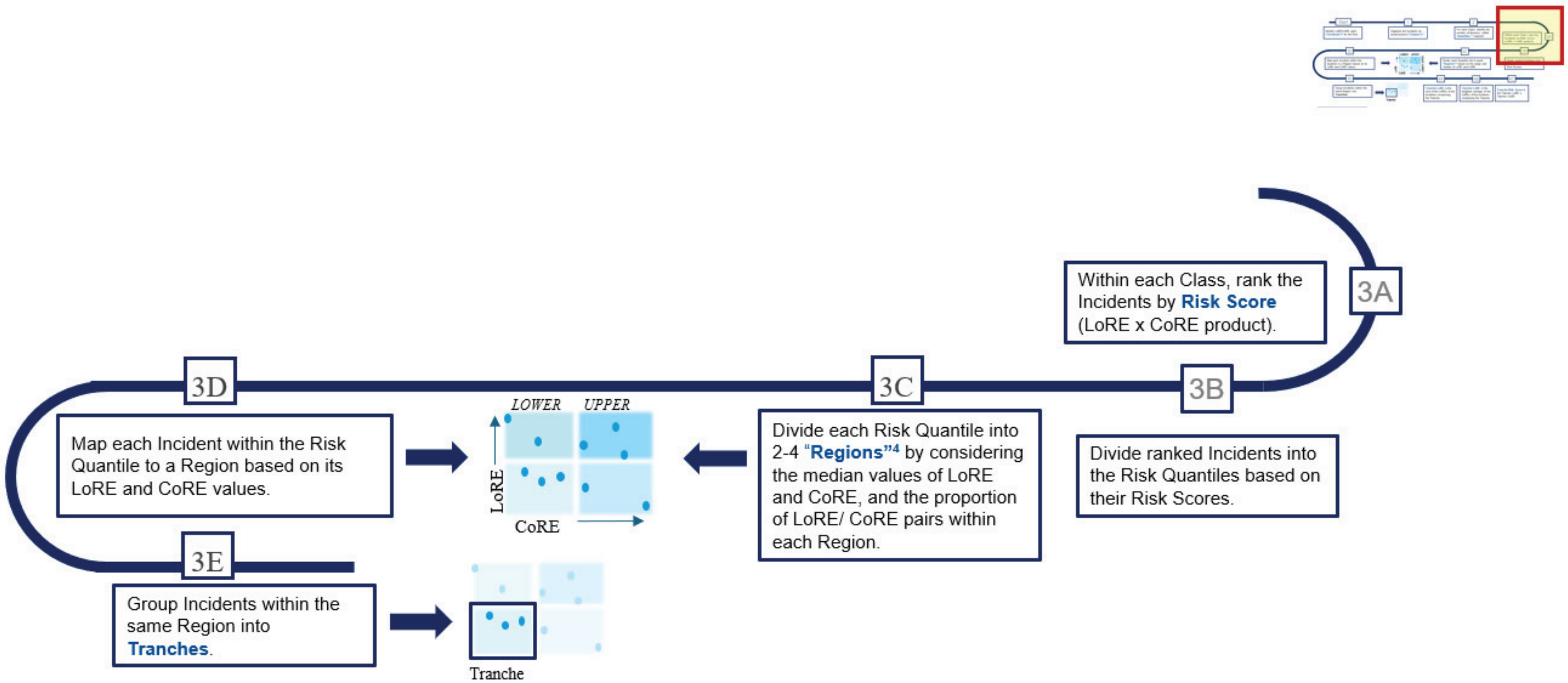
[3]***Quantiles*** *are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*

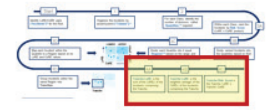
[4]*The four* ***Regions*** *are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*





Class	LORE / CORE PAIRS	TOTAL # PAIRS
OSHA Reportables	SIF	2
	Non-SIFs	
Vehicle Incidents	SIF	3
	Minor Injuries	
	Non- Injury	
Workplace Violence	Cause- Employee	2
	Cause- Non- Employee	


3A
Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).
3B
Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.
3C
Divide each Risk Quantile into 2-4 **"Regions"**[4] by considering the median values of LoRE and CoRE, and the proportion of LoRE/ CoRE pairs within each Region.
LOWER
UPPER
LoRE
CoRE
3D
Map each Incident within the Risk Quantile to a Region based on its LoRE and CoRE values.
3E
Group Incidents within the same Region into **Tranches**.
Tranche



4A

Tranche LoRE is the sum of the LoREs of the Incidents comprising the Tranche

4B

Tranche CoRE is the weighted average of the CoREs of the Incidents comprising the Tranche

4C

Tranche Risk Score is the Tranche LoRE x Tranche CoRE

Class	Risk Quantile	Incident (LoRE/CoRE) Pair	Risk Quantile Region	Tranche	Tranche LoRE (4A)	Tranche CoRE (4B)	Tranche Risk Score (4C)
OSHA Reportables	1	Non-SIFs	UL / UC	OSHA Reportables-1	229.5	49,296	11,313,086
		SIF	LL / UC	OSHA Reportables-2	1.33	5,012,747	6,690,726
Vehicle Incidents	1	Minor Injuries / Non - Injury	UL / LC	Vehicle-1	350.9	9,753	3.422.407
		SIF	UL / UC	Vehicle-2	0.1	5,057,898	445,031
Workplace Violence	1	Cause- Non- Employee	UL / UC	WPV-1	0.015	140,915,841	2,133,744
		Cause- Employee	LL / UC	WPV-2	0.014	140,915,841	2,009,477

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-6)

Contractor Safety

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company's (SoCalGas or Company) risk control and mitigation plan for the Contractor Safety Risk. This chapter contains information and analysis for this risk that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[1] including the requirements adopted in Decision (D.) 22-12-027 (Phase 2 Decision) and D.24-05-064 (Phase 3 Decision). The Contractor Safety Risk is included in the 2025 RAMP Report based on a safety risk assessment, further informed by its reliability and financial consequence attributes, consistent with RDF guidance. This risk chapter describes the basis for selection of the Contractor Safety Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's Contractor Safety Risk is defined as the risk of a condition, practice, or event that threatens the safety of a SoCalGas contractor. The risk definition captures an incident caused by the injured contractors themselves and/or other contractors and includes the processes and systems around contractors that could contribute to an incident, and which may also result in harm to SoCalGas infrastructure, employees and/or the public.

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[1] As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

Certain controls and mitigations presented in this chapter are subject to compliance mandates and standards beyond RDF requirements, such as those from state and federal Occupational Safety and Health Administrations (OSHA), the Pipeline and Hazardous Materials Safety Administration (PHMSA) of the Department of Transportation (DOT), American Petroleum Institute Recommended Practice (API RP) 1173, and the CPUC. A list of compliance requirements applicable to Contractor Safety Risk is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as enhancement of operations and promoting public trust and confidence in the communities SoCalGas serves.

2. Risk Overview

SoCalGas relies on support from its contractors to perform a significant amount of construction related work on its gas infrastructure assets located throughout its service territory, which encompasses parts of Central and Southern California. Such work is frequently performed in public space and exposed to external factors, such as vehicular traffic in populated areas. Contractors support SoCalGas during normal operating conditions as well as during emergency situations resulting from events, such as wildfires, mudslides, and earthquakes. SoCalGas has many safety-related policies and procedures for contractors to follow.

B. Risk Scope

SoCalGas's analysis of Contractor Safety Risk considers the risk of a work-related safety incident, involving a Class 1 contractor, while conducting work on behalf of SoCalGas, which causes minor[2] or serious injury/illness,[3] or fatality.

SoCalGas defines Class 1 Contractors as a Contractor engaged by the Company to perform work that can reasonably be anticipated to expose the Contractor's employees, subcontractors, SoCalGas employees, or the general public to one or more hazards that, if not

[2] Minor injury or illness is one that does not meet the criteria for a serious injury as defined by Cal/OSHA.

[3] Cal/OSHA defines a serious injury or illness as "any injury or illness occurring in a place of employment or in connection with any employment that requires inpatient hospitalization for other than medical observation or diagnostic testing, or in which an employee suffers an amputation, the loss of an eye, or any serious degree of permanent disfigurement, but does not include any injury or illness or death caused by an accident on a public street or highway, unless the accident occurred in a construction zone." Cal. Code Regs. Tit. 8, § 330(h).

properly mitigated, have the potential to result in Serious Safety Incident.[4] Examples of Class 1 Contractors include contractors that perform construction, repair, or maintenance work on SoCalGas's natural gas pipeline system and appurtenances, including gas distribution, transmission, or storage systems, or building construction, repair, or maintenance work involving elevated work surfaces, confined space, energized equipment, hazardous chemicals, or other similar hazards.

C. Data Sources Used to Quantify Risk Estimates[5]

SoCalGas utilized internal data sources to determine the Contractor Safety Risk Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate, and adjusted to account for the risk characteristics associated with the Company's specific operating locations and service territory. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories. Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of the Contractor Safety Risk, including a risk Bow Tie, which delineates potential Drivers/Triggers and Potential Consequences, followed by a description of the Tranches determined for this risk.

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4 SoCalGas' Class 1 Contractor Safety Manual defines a "Serious Safety Incident" as a work-connected injury or illness occurring in a place of employment or in connection with any employment that requires inpatient hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers a loss of any member of the body or suffers any serious degree of permanent disfigurement.

5 Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

A. Risk Selection

The Contractor Safety Risk was included as a risk in SoCalGas's 2021 RAMP and was included in the 2022, 2023 and 2024 Enterprise Risk Registries (ERR).[6] SoCalGas's evaluation and selection process is summarized in Chapter RAMP-2: Enterprise Risk Management Framework and in Chapter RAMP-3: Risk Quantification Framework.

SoCalGas selected this risk in accordance with RDF Row 9.[7] Specifically, SoCalGas assessed the top risks from the Company's 2024 ERR based on the Consequence of a Risk Event (CoRE) Safety attribute. Contractor Safety Risk was among the risks presented in SoCalGas's list of Preliminary 2025 RAMP Risks at a pre-filing workshop. Contractor Safety Risk was selected based on the qualification of its Safety risk attribute, as required under the RDF. At the pre-filing workshop, no party expressed opposition to inclusion of this risk in SoCalGas's 2025 RAMP Report.

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, possible Drivers, Potential Consequences, and a mapping of the elements in the Bow Tie to the mitigations that addresses them.[8] As illustrated in the risk Bow Tie shown below in Figure 1, the Risk Event (center of the Bow Tie) is a Contractor Safety Risk that could lead to a safety-related event, the left side of the Bow Tie illustrates Drivers/Triggers that could cause the Contractor Safety Risk, and the right side shows the Potential Consequences of the Contractor Safety Risk. SoCalGas applies this framework to identify and summarize the information provided in Figure 1. A mapping of each mitigation to the addressed elements of the risk Bow Tie is provided in Attachment C.

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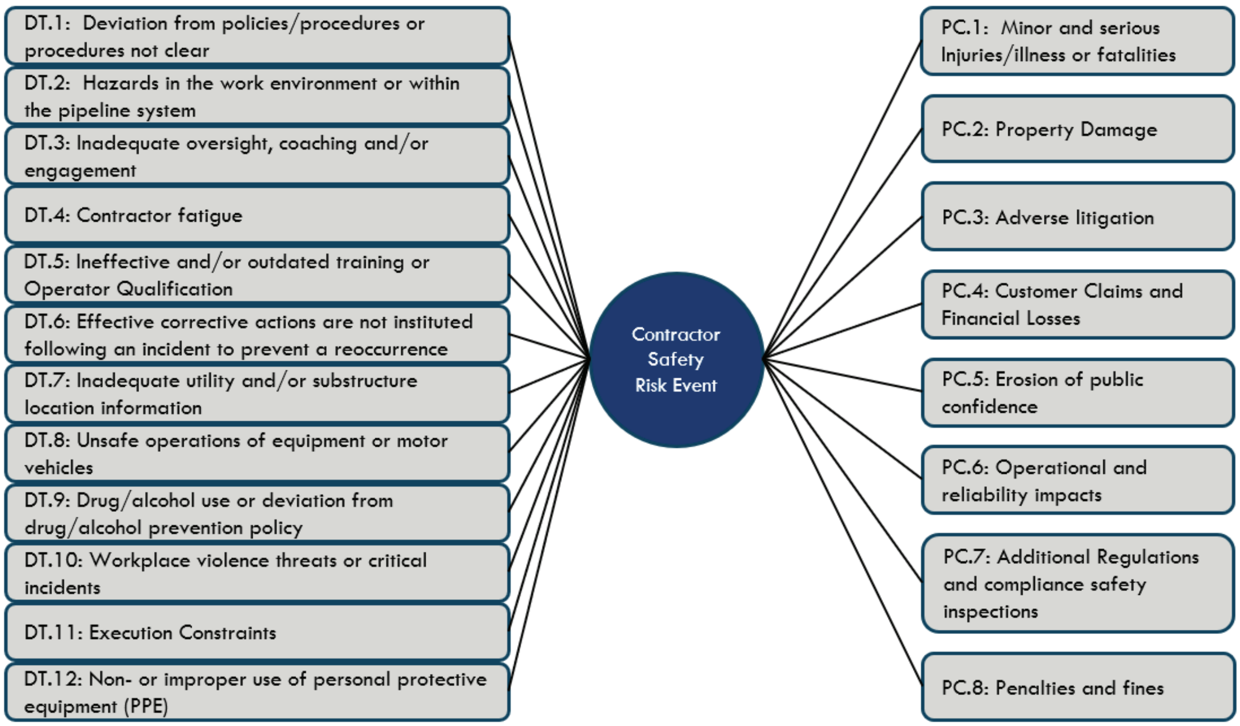
6 In the 2021 RAMP Report, Chapter SCG-Risk-7, this risk was called Incident Involving a Contractor. The risk definition was changed to remove limiting, causal language regard "non-adherence" to "policies, procedures, and programs, or by external factors".

7 D.24-05-064, RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's ERR comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars".

8 D.24-05-064, RDF Row 15.

Figure 1
Contractor Safety: Risk Bow Tie



C. Potential Risk Event Drivers/Triggers[9]

When performing a risk assessment for the Contractor Safety Risk, SoCalGas identifies potential leading causes, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the risk.[10] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1 – Deviation from policies or procedures or procedures not clear:** SoCalGas maintains comprehensive, safety-related policies and procedures for contractors to follow, including a Safety Manual for Contractors. Failure to adhere to a SoCalGas safety policy or procedure or an unclear procedure could result in a safety-related event.

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

10 D.24-05-064, RDF Row 10-11.

- **DT.2 – Hazards in the work environment or within the pipeline system:** Unsafe work environments, including work locations, roadways and parking places, customer premises, gas equipment condition, lead from paint, asbestos, or fumigation chemicals, for example, can lead to a safety-related event. Also, factors such as heat, night work, and high-risk work locations (*e.g.*, busy roadways), may make working conditions more difficult and could increase the likelihood of a safety-related event.
- **DT.3 – Inadequate oversight, coaching and/or engagement:** Inadequate oversight, coaching, and/or engagement could lead to departures from safe work practices that could result in a safety-related event. Contractors are required to provide appropriate supervision in addition to SoCalGas oversight.
- **DT.4 – Contractor fatigue:** Contractors working excessive hours may create unsafe work environments by reducing the level of awareness to hazards or ability to perform work effectively, which could lead to a safety-related event.
- **DT.5 – Ineffective and/or outdated training or Operator Qualification:** Ineffective and/or outdated training or operator qualifications ("Op-qual"), or inexperience could result in a contractor performing work without appropriate knowledge, competency, training, and or qualification, which could result in a safety-related event.
- **DT.6 – Effective corrective actions are not instituted following an incident to prevent a reoccurrence:** Lessons learned, and the appropriate follow-up actions or training, can help prevent future safety events from occurring. The failure to report near misses or share lessons learned and implement corrective actions following an event could lead to the recurrence of safety-related events.
- **DT.7 – Inadequate utility and/or substructure location information:** Proper information about the assets, systems, or infrastructure that are part of the SoCalGas facilities they are contracted to work on and the auxiliary substructures in the vicinity of their work activities is important for contractor safety. Inadequate or inaccurate utility and/or substructure information could lead to a safety-related event.

- **DT.8 – Unsafe operations of equipment or motor vehicles:** Non-adherence to motor vehicle laws or not utilizing equipment according to safety standards could lead to a safety-related event.
- **DT.9 – Drug/alcohol use or deviation from drug/alcohol prevention policy:** Medication/drug/alcohol use while on the job can impede the ability of contractors to perform work safely, which could lead to a safety-related event.
- **DT.10 – Workplace violence threats or incidents:** Workplace violence incidents (*e.g.*, an active shooter, hostile customers) could increase the likelihood of a safety-related event.
- **DT.11 – Execution Constraints:** Events (excluding those covered by outside force damages) that negatively impact SoCalGas's ability to perform as anticipated, such as ineffective materials, permitting constraints, or operational oversight, delays in response or awareness, resource constraints, and/or inefficiencies or reallocation of (human and material) resources, or unexpected maintenance need could increase the likelihood of a safety-related event.
- **DT.12 – Non- or improper use of personal protective equipment (PPE):** Safety equipment serves to protect employees and contractors from avoidable injuries. Failure to wear personal protection and safety equipment could lead to a safety-related event

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas identifies the Potential Consequences of this risk by analyzing internal data sources, where available, industry data,[11] and subject matter expertise (SME).[12] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed above were to

[11] Industry data includes data from SoCalGas' annual Safety Performance Metrics Report (SPMR) and Centers for Disease Control and Prevention (CDC), *Web-based Injury Statistics Query and Reporting System (WISQARS) Cost of Injury*, *available at:* https://wisqars.cdc.gov/cost/?y=2023&o=MORT&i=0&m=20810&g=00&s=0&u=TOTAL&u=AVG&t=COMBO&t=MED&t=VPSL&a=5Yr&g1=0&g2=199&a1=0&a2=199&r1=MECH&r2=INTENT&r3=NONE&r4=NONE.

[12] D.24-05-064, RDF Row 10.

result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

- **PC.1 – Minor and serious injuries/illness or fatalities**
- **PC.2 - Property damage**
- **PC.3 - Adverse litigation**
- **PC.4 - Customer claims and financial losses**
- **PC.5 - Erosion of public confidence**
- **PC.6 - Operational and reliability impacts**
- **PC.7 - Additional regulations and compliance safety inspections**
- **PC.8 - Penalties and fines**

These Potential Consequences were used by SoCalGas in the scoring of the Contractor Safety Risk during the development of its 2024 ERR.

E. Evolution of Risk Drivers and Consequences

As specified in the Phase 3 Decision,[13] the following changes to the previous ERR and/or the 2021 RAMP include:

1. Changes to Drivers/Triggers of the Risk Bow Tie

SoCalGas implemented several changes to the possible Drivers and Triggers to promote clarity and alignment. These changes include efforts to promote consistency and advance an aligned and integrated approach to personnel and occupational safety issues faced by people doing work for SoCalGas by aligning the possible Drivers and Triggers within the Contractor and Employee Safety Risks. In addition, SoCalGas clarified and added language to the Triggers, Drivers, and associated definitions to more clearly identify and explain the possible Driver/Trigger.

2. Changes to Potential Consequences of the Risk Bow Tie

- PC.1 – Minor and serious injuries/illness or fatalities: Revised to include minor injuries and illnesses.

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas applied the Homogeneous Tranching

[13] D.24-05-064, RDF Row 8.

Methodology (HTM) as outlined in Chapter RAMP - 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined.[14]

Table 1: Contractor Safety Risk
Tranche Identification

Class	Number of LoRE-CoRE Pairs	Number of Resulting Tranches
OSHA Recordables	2	2
Vehicle Incident	3	2
Workplace Violence	1	1
TOTAL	6	**5**

Attachment D illustrates the derivation of the Tranches, as shown in Table 1 above, in accordance with the HTM. The classes were identified by SoCalGas as logical groups of events that can lead to the Contractor Safety Risk. These classes also align risk treatments with event risk profiles reflective of SoCalGas's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches, is provided in workpapers.

III. PRE-MITIGATION RISK VALUE

In accordance with RDF Row 19, Table 2 below provides pre-mitigation risk values for the Contractor Safety Risk. Further details, including pre-mitigation risk values by Tranche, are provided in workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3: Risk Quantification Framework.

Table 2: Contractor Safety Risk
Monetized Risk Values
(Direct, in 2024 $millions)

LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
	Safety	Reliability	Financial		
179.9	$0.067	$0.00	$0.010	$0.077	$13.86

[14] Note, the Contractor Safety Risk, as a human-based safety risk, does not feature the natural segmentation characteristics that asset-based risks do, which limits the number of viable Tranches.

A. Risk Value Methodology

SoCalGas's risk modeling for the Contractor Safety Risk follows RDF guidance[15] for implementing a Cost Benefit Approach, as described below:

1. **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** The Contractor Safety Risk is quantified in a combined attribute hierarchy as shown in the table above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
2. **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** The Contractor Safety Risk used observable and measurable data in the estimation of CoRE values. SoCalGas utilized internal incident data to represent natural units for contractor injuries. These injuries were classified as either Minor, Serious, or Unsurvivable and assigned the corresponding fractional VSL value.
3. **Cost Benefit Approach Principle 3-Comparison (RDF Row 4):** The Contractor Safety Risk utilized proxy data from various sources including, but not limited to, the Federal Bureau of Investigation (for workplace violence), Bureau of Labor Statistics (to determine a proration of SoCalGas's employee base versus the national working population), the Centers for Disease Control and Prevention (to determine financial impacts associated with injuries), and National Safety Council (to estimate costs associated with motor vehicle incidents). Please refer to Attachment B for specific details regarding these sources.
4. **Cost Benefit Approach Principle 4-Risk Assessment (RDF Row 5):** Data distributions were not applicable for the risk events modeled for the OSHA, Workplace Violence, and Vehicle Incident components of this risk. For those components, probabilities of future events were derived based on internal recorded data from past years, or supplemented with national data where applicable (to estimate likelihood of workplace violence incident).
5. **Cost Benefit Approach Principle 5-Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6, SoCalGas used a California-adjusted Department of Transportation monetized

15 D.24-05-064, RDF Rows 2-7.

equivalent to calculate the Safety CoRE attribute of $16.2 million per fatality, $49 thousand per minor injury, and $4.1 million per serious injury;[16] and the Financial CoRE attribute is valued at $1 per dollar.[17] Reliability is quantified at $0 due to the lack of empirical and proxy data supporting these Consequences occurring from Contractor Safety incidents.

Further information regarding SoCalGas's quantitative risk analyses, including raw data, calculations, and technical references, are provided in workpapers.

6. Cost Benefit Approach Principle 6-Adjusted Attribute Level (RDF Row 7):

Table 3: Contractor Safety Risk
Scaled vs Unscaled Value by CoRE Attributes
(Direct, in 2024 $ millions)

	Safety	**Reliability**	**Financial**	**Total**
Unscaled Risk Value	$10.96	$0	$1.76	$12.73
Scaled Risk Value	$12.10	$0	$1.77	$13.86

The values in the table above are the result of SoCalGas applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for the Contractor Safety Risk. The Contractor Safety Risk does not feature a significant risk aversion scaling impact because a relatively small proportion of the observed events rise to the level at which scaling is applicable, and the magnitudes of the consequences are not as high (*e.g.*, multiple-fatality event) as can occur with other risks.

Further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter RAMP-3.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for the Contractor Safety Risk and reflects changes expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC

[16] D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

[17] *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a control and/or a mitigation. Table 4 below shows which control activities are in place in 2024 and which are expected to be on-going, completed, or new during the 2025-2031 time periods. Because the TY 2024 GRC proceeding established rates through 2027,[18] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-009.[19] For the TY 2028 GRC, SoCalGas calculated CBRs beginning with TY 2028 and for each Post-Test Year (PTY) (2029, 2030, and 2031).[20]

Table 4: Contractor Safety Risk
2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C349	**Contractor Safety Program**	X	Ongoing

Bold *indicates this control/mitigation includes mandated programs/activities.*

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place"[21] (*i.e.*, activities in this section were in place as of December 31, 2024). Controls that will continue as part of the risk mitigation plan are identified in Table 4 above.

- **C349: Contractor Safety Program**: The Contractor Safety Program is comprised of activities managed by the Safety and Infrastructure Project Delivery organizations. These activities include Contractor Safety Management, Contractor Performance Management, and Contractor Engagement.

1. Contractor Safety Management

SoCalGas's Contractor Safety Management includes oversight of the following:

- Pre-qualification of contractors;

18 *See* D.24-12-074.

19 D.21-11-009 at 136 (Conclusion of Law (COL) 7) (providing a definition for "baselines" and "baseline risk").

20 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

21 D.18-12-014 at 33.

- Internal contractor safety standard;[22]
- Contractor Safety Manual for Class 1 Contractors;[23]
- Stop-the-Job, Near-Miss, and Good Catch reporting;
- Internal awareness and coordination; and
- Third-party audits.

The purpose of these contractor management activities is to enhance the safety of contractors. These activities also enhance the safety of employees and the public on SoCalGas construction projects from inception to completion. Among other things, the Contractor Safety Manual provides Class 1 contractors with a comprehensive overview of SoCalGas's requirements and expectations for performing work safely on behalf of SoCalGas.

As noted above, SoCalGas Contractor Safety Management also includes Stop-the-Job, Near Miss and Good Catch reporting. SoCalGas requires all of its Class 1 contractors to develop and implement a Stop-the-Job policy on SoCalGas projects. Stop the Job is a critical process and gives authority to everyone onsite to stop a job or task if an unsafe work condition, behavior, or activity is identified. All work must immediately cease in the area of concern once the Stop-the-Job is declared until SoCalGas site supervision and the involved contractor(s) have done an investigation, the identified situation is abated, controlled, or otherwise determined to be safe, and the situation and outcome are explained to affected personnel. SoCalGas also encourages its contractors to report Near Miss and Good Catch incidents so that everyone can learn from these incidents and prevent injuries and/or reduce/eliminate safety risks on the job and risks to the pipeline delivery system. Contractors submit these incidents using the Near Miss/Good Catch form in ISNetworld® as described below. These incidents are shared with contractors so that SoCalGas and contractors can learn from one another.

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22 The internal contractor safety standard applies to SoCalGas employees and third-party agents of SoCalGas who oversee Class 1 contractors and Class 1 subcontractors. The standard establishes the standard, scope, and approach used by SoCalGas to manage contractor safety, requirements for pre-qualification of contractors, roles and responsibilities for various employees who work with contractors, and expectations on contractor oversight, periodic safety inspections, and investigations of contractor safety incidents.

23 The Contractor Safety Manual for Class 1 Contractors is a consolidated document of safety requirements and expectations SoCalGas has established for contractors working for SoCalGas.

Additionally, SoCalGas utilizes two third-party tools to manage various aspects of its contractor safety. The following third-party tools enable SoCalGas to monitor contractor activities:

ISNetworld®: The purpose of the ISNetworld® platform (created and managed by ISN) is to pre-qualify, vet, and monitor Class 1 contractors for safety. ISNetworld® is an online contractor and supplier management platform of data-driven products and services that help manage risk through data collected across contractors' operations nationally. ISNetworld® helps reduce unnecessary duplication associated with traditional qualification processes. It streamlines the contractor pre-qualification process and is intended to improve workplace safety. Each Class 1 contractor currently performing or seeking to perform work for SoCalGas must have an ISN account. Before performing any work for SoCalGas, Class 1 contractors must upload the information specified in the SoCalGas Pre-Qualification Criteria to ISN. ISN's Review and Verification Services (RAVS) Team reviews self-reported information against regulatory requirements. ISN safety experts also review Contractor Safety compliance programs and validate accuracy and completeness. ISN uses a "Compliant, "Conditional," and "Non-Compliant" grading system to measure contractors' safety performance against criteria established by SoCalGas. Contractors who receive a "Compliant" grade and continue to maintain a "Compliant" grade, are deemed qualified and are approved to work for SoCalGas. Contractors who receive a "Conditional" or "Non-Compliant" grade, and those whose grade changes from a "Compliant" to "Conditional" or "Non-Compliant," must be approved through SoCalGas's Variance Request Process. Variances are approved at the director and officer levels. This process promotes the use of safe contractors by SoCalGas to reduce the risk of safety incidents on SoCalGas projects.

Veriforce®: SoCalGas utilizes Veriforce® to centrally track records for covered task qualifications, along with related certifications and training. SoCalGas also utilizes Veriforce® to monitor contractors' compliance with the Pipeline and Hazardous Materials Safety Administration/Department of Transportation (PHMSA/DOT) Drug and Alcohol (D&A) program requirements. Veriforce® delivers a comprehensive platform for D&A compliance, combining software with audit services to help streamline management of the contractor D&A compliance program and drive improvements that mitigate contractor risk. The Veriforce® platform is a comprehensive solution for DOT/PHMSA Operator Qualification (OQ) Rule compliance for Class 1 contractors who work on safety sensitive tasks.

As part of Contractor Safety Management, additional resources are needed to support SoCalGas's Environmental Services, Facilities, Gas Distribution, Storage, and Transmission departments in their programs and projects that utilize Class 1 contractors, as described below. Each department within SoCalGas has the responsibility of monitoring its contractors for safe work performance. These departments rely on the Contractor Safety Program to provide them with guidance and support, and the team plans to increase opportunities for training and educatation, to further support these business departments in their contractor safety responsibility. The addition of personnel to the Contractor Safety Management team could improve contractor oversight of compliance with policies, standards, and procedures for the approximate 550 Class 1 contractors performing work for the various SoCalGas departments. Additional resources could assist with the following activities:

- Educate department personnel working and managing contractors on how to vet and monitor contractors on ISNetworld®.
- Coach personnel in these departments on how to perform job safety observations thoroughly and regularly with the appropriate follow-up.
- Assist departments in evaluating contractor safety-related events for timely evaluation, resolution, and sharing of any best practices.
- Encourage and analyze Near Miss and Good Catch data submitted by contractors for these departments.
- Oversee contractor safety incident investigations, and share corrective actions and lessons learned from incidents within SoCalGas and other contractors to minimize the likelihood of similar incidents.
- Provide support and guidelines for conducting regular meetings with contractor executive leadership to review safety performance and safety management plans.
- Facilitate meetings to communicate program requirements, and provide a forum for contractors to share questions, concerns, and/or ideas regarding contractor safety to aid in assessing the effectiveness and potential deficiencies of

SoCalGas's contractor safety program and support consistent application and compliance with its contractor safety processes and procedures by all Class 1 contractors.

- Support engagement efforts with Class 1 contractors performing work across various business units.

2. Contractor Performance Management

SoCalGas conducts documented jobsite inspections of pipeline construction contractors working at a facility, property, or worksite owned, operated, or managed by SoCalGas (including leased premises and rights-of-ways) at a frequency of twice per week per contractor. The following inspections are conducted as part of SoCalGas's Contractor Performance Management:

- When there are multiple crews for a specific contractor working on similar projects, one inspection per contractor per week meets this requirement. The Construction Inspection Report, Company Form 2848, built in ISNetworld®, is used for documenting such inspections.
- SoCalGas conducts weekly documented jobsite safety observations of each contractor working at a facility, property, or worksite owned, operated, or managed by SoCalGas. Company Form 4211, built in ISNetworld®, is used to document these safety observations.
- SoCalGas also tracks completion of a post-job safety evaluation of Class 1 contractors at the completion of every project or annually, whichever is earlier, including a final evaluation at the end of the term for Master Services Agreements and multi-year contracts. Company Form Number 6350, Report of Contractor's Performance, built in ISNetworld®, is used to appraise and document the annual or post-project safety performance of contractors performing work for SoCalGas.
- Finally, certain large projects have dedicated, full-time, on-site safety personnel provided by SoCalGas as well as the contractor(s) to oversee the safety of the

project throughout its implementation and completion (*e.g.*, Honor Rancho Compressor Station modernization project).[24]

These inspections, evaluations, and on-site monitoring provide important oversight and valuable feedback on contractors' overall safety performance on SoCalGas projects.

Contractor safety and performance is also furthered by SoCalGas's requirement that all new and existing contracts and Master Service Agreements between SoCalGas and a primary contractor include Contractor Safety Program related requirements such as following the Class 1 Contractor Safety Manual, as part of the contract terms and conditions. Moreover, contractors are made aware of the Class 1 contractor safety requirements during the Request for Proposal (RFP) bid process. Additionally, SoCalGas utilizes mechanisms to monitor and evaluate safety requirements for Class 1 contractors, including conducting formal safety audits, requiring contractors to conduct their own evaluations, submission of their Safety Management System (SMS)[25] plans, and imposing corrective actions in response to safety issues identified through oversight activities. SoCalGas has implemented a Contractor Performance Response Team (CPRT) to address enforcement actions when contractors are found to not meet SoCalGas's safety standards. The intention of the CPRT is to inform and receive input from stakeholders who use a particular contractor for awareness and consistency in applying enforcement actions. For example, if SoCalGas observes a safety-related event associated with a Class 1 contractor, SoCalGas may utilize several measures to address the risk of a potential serious injury or fatality. This includes stopping the job, putting the contractor on probation, conducting an audit of its safety program, asking the contractor to evaluate its safety culture, and following up on all the corrective actions resulting from this effort to emphasize the importance of safety on SoCalGas projects.

When safety-related incidents with contractors result in a contractor suspension, SoCalGas may request that a safety culture evaluation by a third-party vendor specializing in safety analysis be conducted. SoCalGas would then require results to be shared, and

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24 For the purposes of this RAMP Report, SoCalGas only includes the O&M portion of the Contractor Safety Program. The Contractor Safety Program includes contractor safety oversight, performance management, and engagement efforts related to large capital projects, but those costs are captured as part of those capital project forecasts.

25 Refer to API RP 1173, *see* API, *Pipeline Safety Management Systems* (July 2015), *available at:* https://pipelinesms.org/rp-1173/.

improvements to be completed for the contractor to be cleared to continue to work for SoCalGas. The results of these outside assessments help contractors gain awareness of potential gaps and areas of improvement in their internal operations, including the facilitation of systematic advances of safety processes, and development of their own internal comprehensive safety management systems.

Further, when new multi-year contracts are issued, contractors are required to perform a safety culture assessment at their expense. The benefits of this requirement has led SoCalGas to requiring all contractors with multi-year contracts to arrange and pay for these assessments at the onset and mid-point of their contracts, further supporting contractor commitment to continuous safety improvement.

SoCalGas's Contractor Performance Management team also expects to expand Advisor roles in the following areas:

- Provide safety subject matter expertise. This includes maintaining safety policy documentation, and supervising contractor full-time on-site safety personnel and performing routine onsite inspections. Contractor Performance Management is engaged early in the planning process to advance compliance with occupational health and safety regulations throughout the duration of a project to align their safety programs and processes with the Contractor Safety Manual.
- Improve high-pressure contractor risk assessment, oversight, and support to other departments utilizing contractors performing these tasks. Currently, Contractor Performance Management supports Construction Operations, Transmission Technical Services, Pipeline Integrity, CNG/LNG projects and has recently expanded support to Storage, High-Pressure Construction Distribution, and Control Center Modernization.

3. Contractor Engagement

SoCalGas aims to reinforce its strong safety culture by engaging contractors in a variety of ways, including hosting an annual Contractor Safety Congress for all Class 1 contractors and three Quarterly Meetings for Class 1 pipeline construction contractors.

SoCalGas's annual Contractor Safety Congress was initiated in 2015 to share safety best practices and learn from one another's experiences. The event is expected to continue to further strengthen SoCalGas and contractors' collective safety culture and provide a foundation for safety improvement. Attendees include representatives from a wide variety of contractors, including diverse business enterprises, and select representatives from SoCalGas who oversee contractors. The forum provides an opportunity for SoCalGas executives and others to share their safety vision and expectations with contractors and offers an opportunity for contractors to showcase their safety successes and challenges, as well as share safety incidents and lessons learned so others can benefit from their experience and improve their own safety performance.

The Quarterly Meetings focus on approved pipeline construction contractors who perform the vast majority of pipeline construction work for the Company. These meetings are established as a focused forum to give pipeline construction contractors the opportunity to collaborate with SoCalGas on safety, share issues and challenges faced by contractors on SoCalGas projects, communicate new requirements, and foster the safety culture for contractors and the Company.

B. Changes from 2024 Controls

SoCalGas plans to continue each of the existing controls discussed above, and reflected in Table 4, through the 2025-2031 period without any significant changes.

C. Mitigation Programs

Because the controls above are ongoing, SoCalGas considers them mitigations to the Contractor Safety Risk. SoCalGas does not currently foresee implementing new mitigations not described above during the 2025-2031 period.

D. Climate Change Adaptation

Pursuant to Commission decisions[26] in the Climate Adaptation OIR (R.18-04-019), SoCalGas performed a Climate Adaptation Vulnerability Assessment (CAVA) focused on years 2030, 2050, and 2070, with the aim of identifying asset and operational vulnerabilities to climate hazards across the SoCalGas system. SoCalGas recognizes the need to address climate vulnerabilities to promote safety and reliability of its services and mitigate the increasing climate-related hazards through innovative and community-centric approaches. Some of the climate hazards that will have short- and long-term ramifications in the Southern California region include extreme temperatures, wildfire, inland flooding, coastal flooding and erosion, and landslides. Climate change is recognized as a factor that can drive, trigger, or exacerbate

[26] D.19-10-054; D.20-08-046.

multiple RAMP risks. Implementing climate change adaptation measures and integrating climate vulnerability considerations into RAMP controls and mitigations can enhance system infrastructure longevity and reduce the severity of long-term negative climate impacts. The controls and mitigations described in further detail in this chapter, as shown below, align with the goal of increasing SoCalGas's physical and operational resilience to the increasing frequency and intensity of climate hazards. Additional information on the CAVA and a list of climate-relevant controls and mitigations included in RAMP are provided in Chapter RAMP-5: Climate Change Adaptation.

Table 5: Contractor Safety Risk
Controls and Mitigations that Align with Increasing Resilience to Climate Hazards

Relevant ID	Relevant Control/Mitigation	Potential Climate Hazard(s)
C349	Contractor Safety Program	Extreme Temperatures

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events."[27] There are no Foundational Programs that are applicable to the Contractor Safety Risk and the mitigation activities that are supported.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for Contractor Safety Risk, including the associated costs, units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[28] for each enterprise risk, SoCalGas uses actual results and industry data and when that is not available, supplements the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates are provided in Attachment B.

[27] D.24-05-064, Appendix A at A-4.

[28] D.24-05-064, RDF Row 10.

Table 6: Contractor Safety Risk
Control and Mitigation Plan Recorded and Forecast Costs Summary
(Direct, in 2024 $ thousands)

Control/Mitigation		**Adjusted Recorded**		**Forecast Costs**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C349	**Contractor Safety Program**	0	839	1,516	0	0	4,500
Total		**0**	**839**	**1,516**	**0**	**0**	**4,500**

Bold *indicates this control/mitigation includes mandated programs/activities.*

Table 7: Contractor Safety Risk
Control & Mitigation Plan – Units Summary

Control/Mitigation		**Recorded Units**			**Forecast Units**			
ID	**Name**	**Unit of Measure**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**Capital 2025-2028**	**PTY Capital**	**PTY O&M**
C349	**Contractor Safety Program**	FTEs	0	5	10	0	0	30

Bold *indicates this control/mitigation includes mandated programs/activities.*

In the table below, CBRs are presented in summary at the mitigation or control level for the TY 2028 GRC cycle. CBRs are calculated based on scaled, expected values, unless otherwise noted, and are calculated for each of the three required discount rates[29] in each year of the GRC cycle and for the post-test years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

29 *See* Chapter RAMP-3 for definitions of discount rates, as ordered in the Phase 3 Decision.

Table 8: Contractor Safety Risk
Cost Benefit Ratio Results Summary (2028-2031)
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C349	**Contractor Safety Program**	$0	$6.0	1.69	1.80	1.69

***Bold** indicates this control/mitigation includes mandated programs/activities.*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025, D.16-08-018 and D.18-12-014[30] SoCalGas considered two alternatives to the Risk Mitigation Plan for the Contractor Safety Risk. The alternatives analysis for this plan considered changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan, and constraints, such as budget and resources.

Table 9: Contractor Safety Risk
Alternative Mitigation Forecast Costs Summary
(Direct, in 2024 $ thousands)

	Alternative Mitigation Name	Forecast Costs			
		2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A397	Additional External Contractor Safety Oversight Advisors	0	0	8,316	6,225
A398	No Expansion of Contractor Safety Oversight	0	0	3,356	2,517
Total		**0**	**0**	**11,672**	**8,742**

30 *See, e.g.,* D.18-12-014 at 33-35.

Table 10: Contractor Safety Risk
Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ thousands)

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A397	Additional External Contractor Safety Oversight Advisors	$0	$2,075	1.24	1.32	1.24
A398	No Expansion of Contractor Safety Oversight	$0	$839	1.54	1.63	1.54

A. Alternative A397: Additional External Contractor Safety Oversight Advisors[31]

SoCalGas considered hiring additional SoCalGas employees and further expanding this capability by hiring third-party resources to observe and oversee the safety performance of SoCalGas's contractors. SoCalGas considered this alternative because third party resources observing SoCalGas's contractors could provide an outside perspective and assist in augmenting resource needs for emergent programs and/or projects. Accordingly, SoCalGas believes it is a better use of resources to add internal safety advisors as opposed to third-party resources to advance these important efforts. At this stage, investing in additional internal expertise and oversight is an important incremental next step for contractor safety management. This helps expand SoCalGas's internal capabilities and builds SoCalGas's internal capacity. In the future, SoCalGas plans to continue exploring and engaging more targeted expertise from external consultants.

B. Alternative A398: No Expansion of Contractor Safety Oversight

As part of analyzing the proposed expansions to contractor safety oversight, SoCalGas considered continuing with the existing resources of the Contractor Safety Program. This would mean that SoCalGas would not be engaging additional, centralized personnel to support SoCalGas's Environmental Services, Facilities, Gas Distribution, Storage and Transmission departments in their programs and projects that utilize Class 1 contractors. This would reduce costs but would also limit SoCalGas's ability to provide contractor oversight of compliance with

[31] SoCalGas uses the terms "Contractor Safety Oversight Advisors", "Safety Advisors", and "Advisors" interchangeably in workpapers and herein.

standards and procedures, coach SoCalGas personnel on how job safety observations are conducted, evaluate contractor safety-related events, encourage and analyze contractor reporting and data, and support engagement activities.

Based on the analysis, the proposed change of further investing in dedicated full-time Advisors is reasonable to support consistent application and compliance with SoCalGas's contractor safety processes and procedures by all Class 1 contractors.

VI. HISTORICAL GRAPHICS

As directed by the Commission in Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. A bar chart graphic is employed to depict historical progress. This graphic uses a key metric that aligns with Company safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating risks.

Figure 2:
Contractor Safety: Safety Progress 2016-2024

Figure 2 above shows the Contractor Days Away, Restricted and Transfer (DART) Rate[32] from 2016-2024. SoCalGas began tracking DART Rate for Class 1 Contractors in 2018. DART Rate is calculated based on the number of OSHA-recordable injuries resulting in Days Away from work and/or Days on Restricted Duty or Job Transfer, and hours worked. (DART Rate = DART Cases times 200,000 divided by contractor hours worked.) The historical safety work activities completed using the DART Rate from 2016-2024 include:

- 2017: Issued Contractor Safety Manual for Class 1 Contractors;
- 2018: Contractor Safety in Pipeline Construction Quarterly meetings; internal contractor safety standard published, contractor pre-qualification process in ISNetworld®; and close-call, near-miss, lessons learned program;
- 2019: Expanded Pre-qualification process to subcontractors;
- 2020: Contractor Safety Oversight adds focus on Construction Operations; and
- 2021: Field Safety Observations Form released expanding field audits of contractor; and Contractor Performance Response Policy created establishing the Contractor and Performance Response Team (CPRT).

The contractor safety oversight work that remains to be performed is addressed in the controls/mitigations detailed above.

[32] Contractor DART Rate is Metric No. 19 in SoCalGas's 2024 Safety Performance Metrics Report, filed on April 1, 2025.

ATTACHMENTS

ATTACHMENT A

CONTRACTOR SAFETY - CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates the compliance Drivers which underpin identified controls and mitigations.

ID	Control/Mitigation Name	Compliance Driver
C349	Contractor Safety Program	OSHA, DOT / PHMSA, CalGEM

ATTACHMENT B

CONTRACTOR SAFETY – REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision at RDF Row 10 and Row 29 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[33] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and a description of the data.

Risk Data	**Source Type**	**Source Information**
SoCalGas Contractor SIFs and non-SIFs	Internal Data	Source: ISNetworld® (ISN) Description: Internal data used to determine likelihood of OSHA SIF and non-SIF event
Active Shooter Incidents in the United States 2023	External Data	Agency: Federal Bureau of Investigation (FBI) Link: https://www.fbi.gov/file-repository/2023-active-shooter-report-062124.pdf/view Description: FBI national data is used to provide a larger sample size of workplace violence incidents to determine the likelihood of an incident
Injury and Illness Prevention Programs White Paper	External Data	Agency: Occupational Safety and Health Administration (OSHA) Link: https://www.osha.gov/sites/default/files/OSHAwhite-paper-january2012sm.pdf Description: OSHA study was used to estimate effectiveness of implementing an injury and illness prevention program, noting a 15%-35% reduction in injuries compared to employers without a safety and health program.
SoCalGas Contractor TRIR and DART Rate	Internal Data	Source: ISNetworld® (ISN) Description: Internal data used to estimate reduction in OSHA non-SIF, vehicle incident minor injury and no injury rates year over year

[33] D.24-05-064, RDF Row 10 and Row 29.

Risk Data	Source Type	Source Information
Treatment of the Values of Life and Injury in Economic Analysis	External Data	Agency: Federal Aviation Administration (FAA) Link: https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/benefit_cost/econ-value-section-2-tx-values.pdf Description: Abbreviated Injury Scale (AIS) used to determine magnitude of Serious Injuries and Minor Injuries compared to Value of a Statistical Life (VSL)
Work Injury Costs and Time Lost	External data	Agency: National Safety Council (NSC) Link: https://injuryfacts.nsc.org/work/costs/work-injury-costs/ Description: National data used estimate the financial impact of a potential work-related fatality
Number of Injuries and Associated Costs	External data	Agency: Centers for Disease Control and Prevention (CDC) Link: https://wisqars.cdc.gov/cost/ Description: National data used to estimate the financial impact of serious injuries and minor injuries
Workplace Violence Risk and Mitigation Effectiveness	SME Input	Sempra Corporate Security forecasts the rise of potential Workplace Violence events based on national trends, as well as the expected effectiveness of selected risk mitigation activities in reducing the likelihood of these events.

ATTACHMENT C

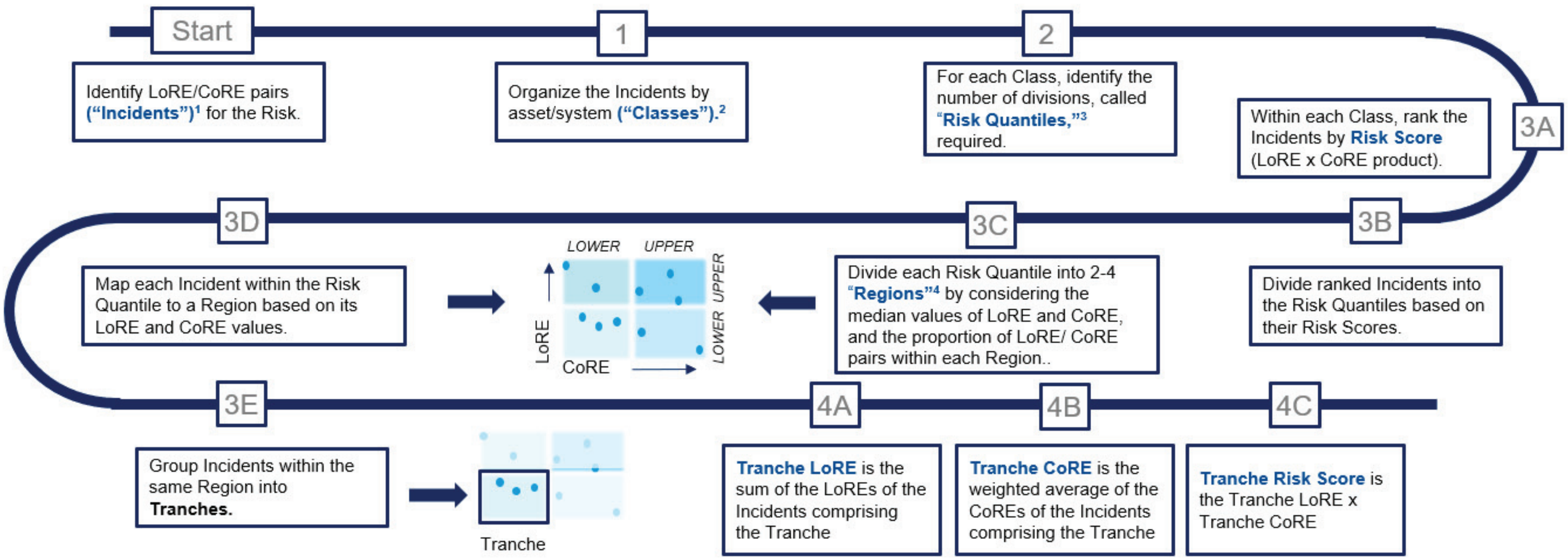
CONTRACTOR SAFETY - SUMMARY OF ELEMENTS OF BOW TIE

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C349	Contractor Safety Program	DT.1 – DT.12	PC.1 – PC.8

ATTACHMENT D

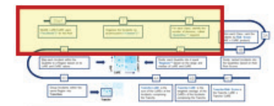
CONTRACTOR SAFETY - APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk Quantification Framework is provided.



NOTES

[1]*For example, **Incidents (or "Risk Incidents")** for Contractor Safety refer to incidents which threaten a contractor's safety.*
[2]*For example, **Classes (or "Asset Classes")** for Contractor Safety include OSHA Reportables, Vehicle Incidents, and Workplace Violence.*
[3]***Quantiles** are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*
[4]*The four **Regions** are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*



Start

Identify LoRE/CoRE pairs **("Incidents")**[1] for the Risk.

1

Organize the Incidents by asset/system **("Classes")**.[2]

2

For each Class, identify the number of divisions, called **"Risk Quantiles,"**[3] required.

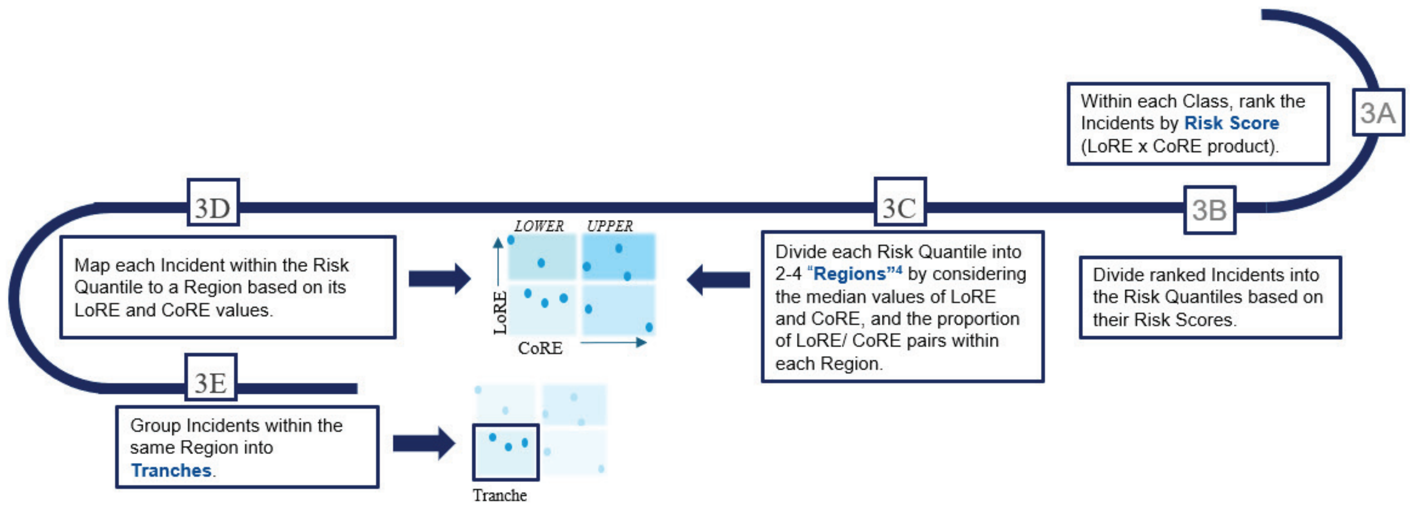
Class	LORE / CORE PAIRS	TOTAL # PAIRS
OSHA Reportables	SIF	2
	Non-SIFs	
Vehicle Incidents	SIF	3
	Minor Injuries	
	Non- Injury	
Workplace Violence	Workplace Violence	1

OSHA Reportables → 1

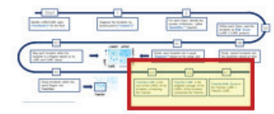
Vehicle Incidents → $\min\left(\frac{N}{8}-1, 9\right) < K \leq \min\left(\frac{N}{8}, 10\right)$ → 1

Workplace Violence → 1

Skip step 2-3
Continue to Step 4



3A
Within each Class, rank the Incidents by **Risk Score** (LoRE x CoRE product).
3B
Divide ranked Incidents into the Risk Quantiles based on their Risk Scores.
3C
Divide each Risk Quantile into 2-4 **"Regions"**[4] by considering the median values of LoRE and CoRE, and the proportion of LoRE/ CoRE pairs within each Region.
LOWER
UPPER
LoRE
CoRE
3D
Map each Incident within the Risk Quantile to a Region based on its LoRE and CoRE values.
3E
Group Incidents within the same Region into **Tranches**.
Tranche



4A

Tranche LoRE is the sum of the LoREs of the Incidents comprising the Tranche

4B

Tranche CoRE is the weighted average of the CoREs of the Incidents comprising the Tranche

4C

Tranche Risk Score is the Tranche LoRE x Tranche CoRE

Class	Risk Quantile	Incident (LoRE/CoRE) Pair	Risk Quantile Region	Tranche	Tranche LoRE (4A)	Tranche CoRE (4B)	Tranche Risk Score (4C)
OSHA Reportables	1	SIF	LL / UC	OSHA Reportables-1	1.72	5,294,280	9,118,224
		Non-SIFs	UL / LC	OSHA Reportables-2	17.8	50,856	905,080
Vehicle Incidents	1	Minor Injuries / Non - Injury	UL / LC	Vehicle-1	160.2	7,942	1,272,354
		SIF	LL / UC	Vehicle-2	0.11	5,338,596	606,113
Workplace Violence	1	Cause- Employee	None	WPV-1	0.014	140,915,841	1,962,713

2025 Risk Assessment Mitigation Phase

(Chapter SCG-Risk-8/SDG&E-Risk-8)
Cybersecurity

May 15, 2025

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this chapter is to present Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company's (SDG&E) (collectively, the Companies) risk control and mitigation plan for the Cybersecurity Risk.[1] This chapter contains information and analysis for this risk that meet the requirements of the California Public Utilities Commission's (Commission or CPUC) Risk-Based Decision-Making Framework (RDF),[2] including the requirements adopted in Decision (D.) 22-12-027 (Phase 2 Decision) and D.24-05-064 (Phase 3 Decision). Although the Cybersecurity Risk does not meet the minimum requirements for mandatory inclusion under the RDF, this risk is included in the 2025 RAMP Report because of its significant reliability consequences. This risk chapter describes the basis for selection of Cybersecurity Risk, the controls and/or mitigations put forth to reduce the likelihood or consequence of this risk, a discussion of alternative mitigations considered but not selected, and a graphic to show historical progress. This chapter presents cost and unit forecasts for the risk mitigating activities, but it does not request funding. Any funding requests for this risk will be made through the Company's Test Year (TY) 2028 General Rate Case (GRC) application. Finally, this chapter describes the methods applied to estimate the risk's monetized, pre-mitigated risk, the estimated risk-reduction benefits of each included control and mitigation, and the calculation of Cost-Benefit Ratios (CBRs) for each control and mitigation consistent with the method and process prescribed in the RDF.

A. Risk Definition and Overview

1. Risk Definition

For the purposes of this RAMP Report, SoCalGas's and SDG&E's Cybersecurity Risk refers to the risk of a major cybersecurity incident, which results in disruptions to electric or gas operations (Supervisory Control And Data Acquisition (SCADA) system, supply, transmission, distribution) and/or damage or disruption to Company operations (*e.g.*, human resources, payroll, billing, customer services), reputation, or disclosure of sensitive customer or Company data.

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1 This risk chapter is identical for SoCalGas and SDG&E because the Cybersecurity Risk is managed centrally for the Companies.

2 As discussed in Volume 1, Chapter RAMP-1, the RDF Framework broadly refers to the recent modifications to the Commission's Rate Case Plan adopted in Rulemaking (R.) 13-11-006, Safety Model Assessment Proceeding A.15-05-002 et al. (cons.), and R.20-07-013 (the Risk OIR), including D.24-05-064, Appendix A.

Certain controls and mitigations presented in this chapter are subject to compliance mandates beyond RDF requirements, such as those from North American Electric Reliability Corporation's (NERC) Critical Infrastructure Protection (CIP) standards and the Transportation Security Administration's (TSA) Security Directive (SD). A list of compliance requirements applicable to Cybersecurity is provided in Attachment A. Certain mitigation programs have value beyond the estimated risk reduction calculated under the RDF, such as protecting customers, and promoting public trust in the community.

2. Risk Overview

Cybersecurity is critical to the safe and reliable delivery of electric and gas service to customers, including critical infrastructure providers in Southern California (*e.g.*, financial services, telecommunication providers, other utilities). The Companies' service territories include millions of people, one of the nation's busiest ports, some of the country's largest cities, critical military bases, numerous defense contractors and small businesses.

Cybersecurity is a unique risk, as compared to other risks driven by operations and asset management, because it deals with intelligent adversaries that are attempting to achieve their objectives by gaining access to Company systems or information through artifice or other improper means. In addition, gaining information about the Companies' security controls and mitigation plans could be useful to an adversary—not only to directly harm the Companies and their stakeholders, including customers, but also to undermine broader national security and economic stability by exploiting vulnerabilities in critical infrastructure. Cybersecurity threats have continued to increase and have become more complex and impactful year over year. For these reasons, publishing the Companies' Cybersecurity-related controls, intelligence, strategies, and tactics in the public record could aid those adversaries, the bad actors that are attempting to disrupt the Companies' systems and society at large. Sensitive details associated with the content of this chapter are available upon Commission request for discussion in person.

The criticality of Cybersecurity is evidenced by the breadth of adversaries the Companies face. These adversaries include diverse types of threat actors with varying intent to cause harm; they are not just criminal entities or hackers looking to make a political statement or achieve financial gain. They also include advanced adversaries, often aligned to nation-states, that are targeting critical infrastructure for economic exploit, espionage, or covert action in preparation for some overt act (*e.g.*, disrupting energy supply). The Companies current and planned investment in Cybersecurity are prudent and reasonable to address this existing and growing threat.

Adversaries continue to use an evolving and increasingly more sophisticated set of tools and strategies to conduct attacks on the energy sector. Their suite of capabilities includes advanced malware, complex phishing attacks, identification of non-public vulnerabilities, and ransomware, among others. The Companies' strategy to counter rapidly evolving Cybersecurity threats must be flexible and enable adaption over time. Later in this narrative the discussion delves deeper into these threats and provides recent examples. Accordingly, timely and accurate Cybersecurity Threat Intelligence (CTI) is key to staying abreast of this ever-changing threat landscape. SoCalGas and SDG&E rely on federal, state, and local government partnerships for intelligence feeds along with peer utility industry relationships and private (subscription) based services for Industrial Control Systems (ICS) CTI. The Companies also obtain CTI from a variety of entities and sources, including Information Sharing and Analysis Centers (ISACs), the Federal Bureau of Investigations (FBI), Federal Energy Regulatory Commission (FERC), Department of Energy (DOE), Department of Homeland Security (DHS), Cybersecurity & Infrastructure Security Agency (CISA), Transportation Security Administration (TSA) and other U.S. intelligence community agencies. Information from threat intelligence sources in the utility industry continues to reveal adversaries that are employing advanced tradecraft in their attempts to access the nation's utility systems.

The next section examines the evolving threat landscape, with a focus on vulnerabilities in the Energy sector, which include the gas, bulk power grid, and renewable energy sectors and outlines specific risks to the Companies.

B. Threat Landscape

The cybersecurity threat landscape includes sophisticated adversaries like state-sponsored groups Volt Typhoon and Salt Typhoon (linked to Chinese intelligence) and Fancy Bear (APT28) from Russia, targeting Operational Technology (OT) and ICS environments and critical infrastructure. Cybercriminal organizations, such as the Z-Pentest hacker group, are increasingly attacking OT environments, including water treatment plants, and ransomware syndicates are exploiting these critical systems for higher payouts. Insider threats from employees or contractors with legitimate access also pose significant risks through credential exposure or social engineering schemes.

C. Tactics, Techniques, and Procedures

Tactics, Techniques, and Procedures (TTPs) refer to the specific methods and strategies used by cyber threat actors to achieve their objectives. TTPs include:

- **Remote Access Exploitation**: Attackers use brute-force attacks on Virtual Private Networks (VPNs) and exploit improperly configured remote access capabilities to access critical OT environments.
- **Vishing and Impersonation:** Spoofed calls to executives, impersonating IT staff or vendors, collect sensitive information using advanced voice phishing tactics.
- **Trojanized Software[3] and Watering-Hole Attacks:[4]** Malware in trusted software or websites targets specific organizations, similar to APT28 Fancy Bear campaigns.
- **Reconnaissance and Social Engineering:** Detailed mapping of organizational structures and employee behaviors using spear-phishing, spoofed phone numbers, and tailored watering-hole attacks.
- **Persistent and Adaptive Campaigns:** Persistent adversaries refine methods, focusing on credential theft, bypassing Multi-Factor Authentication (MFA), and data exfiltration.
- **HMI Manipulation:** Targeting programmable logic controllers (PLCs) with human-machine interfaces (HMIs) instead of exploiting zero-day vulnerabilities.
- **Disinformation Campaigns:** Groups like the Cyber Army of Russia (CAR) use disinformation alongside operational attacks, exaggerating control over critical infrastructure to spread propaganda.

D. Key Cyber Threat Vectors

Cybersecurity threat vectors, or attack vectors, are methods or mechanisms cybercriminals use to gain illegal, unauthorized access to computer systems and networks. Common threat vectors include:

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[3] "Trojanized software" refers to legitimate software that has been maliciously altered to include a Trojan horse. A Trojan horse is a type of malware that disguises itself as a benign application but performs harmful activities once installed, such as stealing data or providing unauthorized access to the attacker.

[4] A "watering-hole attack" involves compromising a specific website or group of websites that are frequently visited by the target victims. The attacker infects these sites with malware, which then infects the visitors' systems. The goal is to target a particular group or organization by exploiting their common online habits.

- **Ransomware and Targeted ICS Attacks**: Ransomware gangs prioritize OT environments to disrupt energy delivery systems, leveraging their critical nature to demand higher ransoms.
- **Denial-of-Service (DoS) Attacks**: Persistent DoS attacks degrade ICS and OT system communications, often serving as a precursor to more severe attacks.
- **Third-Party Equipment and Supply Chain Risks**: Vulnerabilities in foreign-manufactured transformers and other components, flagged for embedded backdoors, present ongoing risks.

E. Specific Risks to the Companies

Threats specific to the energy industry include:

- **Vulnerabilities in Renewable Energy Systems**: The FBI has warned of increased cyber threats to renewable energy infrastructure as the sector expands. Adversaries target wind and solar farms, exploiting less mature security controls compared to traditional power grids.
- **Remote Access and Internet-Facing Devices**: Increasing reliance on remote access solutions introduces risks such as credential theft, brute-force attacks, and vishing schemes targeting remote workers and administrators.
- **Vendor and Supply Chain Exploitation**: Attackers compromise third-party vendors to infiltrate utility systems. Vulnerabilities in equipment sourced from foreign manufacturers exacerbate these risks.
- **Reconnaissance and Targeted Social Engineering**: Threat actors conduct sophisticated reconnaissance and launch tailored spear-phishing campaigns against high-level executives, leveraging spoofed communication channels and impersonation tactics.

F. Examples of Attacks Targeting Victims in the United States

1. OT Attacks on Utility Infrastructure

Title: *APT28 Infiltrates Texas Water Utility*

- **Link:** https://apnews.com/article/texas-muleshoe-water-systems-cyberattacks-russia-5f388bf0d581fc8eb94b1190a7f29c3a
- **Summary: July 2020:** APT28 infiltrated a Texas water utility's OT systems through misconfigured remote access points. The attackers manipulated HMIs, disrupting operations and causing a water system to overflow. This incident exposed significant vulnerabilities in OT segmentation and inadequate access

control measures, highlighting the need for improved cybersecurity protocols in critical infrastructure.

***Title**: Colonial Pipeline hack explained: Everything you need to know*

- **Link**: https://www.techtarget.com/whatis/feature/Colonial-Pipeline-hack-explained-Everything-you-need-to-know
- **Summary: May 2021**: The Colonial Pipeline, a major U.S. fuel pipeline supplying nearly 45% of the East Coast's fuel, was forced to shut down after a ransomware attack by the group DarkSide. The attackers exploited a compromised VPN password, leading to widespread fuel shortages and emergency declarations across multiple states. The incident marked one of the most significant cyberattacks on U.S. critical infrastructure and highlighted the urgent need for stronger cybersecurity in the energy sector.

***Title:** CAR Sabotages Texas Water Utilities*

- **Link:** https://www.wired.com/story/cyber-army-of-russia-reborn-sandworm-us-cyberattacks/
- **Summary: April 2024:** CAR, potentially linked to APT44 Sandworm, released videos showing their ability to manipulate HMIs for water utility control systems in Abernathy and Muleshoe, Texas. This attack underscored the risks posed by poor access controls and unsecured OT interfaces, emphasizing the need for enhanced security measures to protect critical water infrastructure.

***Title:** CAR Targets Indiana Wastewater Plant*

- **Link:** https://www.cnn.com/2024/04/22/politics/russia-linked-hacking-group-targets-indiana-water-plant/index.html
- **Summary: April 2024:** CAR claimed responsibility for sabotaging the Tipton West Wastewater Treatment Plant in Indiana. The group demonstrated their capability to remotely access and manipulate critical infrastructure, raising concerns about the security of wastewater treatment facilities and the potential for significant environmental and public health impacts.

***Title:** Z-Pentest Disrupts Arkansas Water Treatment*

- **Link:** https://industrialcyber.co/utilities-energy-power-water-waste/hackers-target-arkansas-city-water-treatment-plant-prompting-federal-investigation/
- **Summary: September 2024:** The Z-Pentest hacker group forced hydraulic systems into manual control at a water treatment facility in Arkansas City, disrupting operations. This attack highlighted the growing sophistication of

cybercriminals targeting OT systems and the urgent need for robust cybersecurity defenses to protect essential services.

2. Attacks on IT

Title: *Volt Typhoon Targets Texas Power Grid*

- **Link:** https://www.mysanantonio.com/news/local/article/power-grid-attack-18551459.php
- **Summary: Summer 2023:** Chinese hackers, part of the Volt Typhoon campaign, attempted to access Texas power grid infrastructure, targeting the Public Utility Commission (PUC) of Texas and the Electric Reliability Council of Texas (ERCOT). Although no successful breaches were found, the attack highlighted vulnerabilities in the power grid and the need for enhanced cybersecurity measures to protect critical infrastructure.

Title: *Halliburton Cyberattack*

- **Link:** https://www.cybersecuritydive.com/news/halliburton-cyberattack/725065/
- **Summary: August 2024:** Halliburton, a leading energy services provider, experienced a cyberattack that led to the proactive shutdown of certain systems. The company notified law enforcement and confirmed that energy services were not impacted. This incident underscored the importance of cybersecurity in the energy sector and the need for rapid response protocols.

Title: *ENGlobal Ransomware Attack*

- **Link:** https://therecord.media/energy-industry-contractor-ransomware-disruption
- **Summary: November 2024:** ENGlobal, an energy sector vendor, faced a ransomware attack that involved illegal access and encryption of data files. The company restricted access to its IT systems to contain and remediate the attack. This incident marked the third disruptive cyberattack on Texas-based energy sector providers since August 2024, highlighting the persistent threat of ransomware.

Title: *BHI Energy Ransomware Attack*

- **Link:** https://www.bleepingcomputer.com/news/security/us-energy-firm-shares-how-akira-ransomware-hacked-its-systems/
- **Summary: May 2023:** BHI Energy, part of Westinghouse Electric Company, was attacked by the Akira ransomware gang. The attackers stole 690GB of data, including the company's Windows Active Directory database.

Title: *Lazarus Group Exploits VMWare Horizon*

- **Link:** https://www.bleepingcomputer.com/news/security/north-korean-lazarus-hackers-take-aim-at-us-energy-providers/

- **Summary: September 2022:** The North Korean APT group Lazarus exploited VMWare Horizon servers to infiltrate energy providers in the US, Canada, and Japan. They used custom malware for data theft and system control, highlighting the sophisticated and versatile attack strategies employed by Lazarus and the significant threats posed to critical infrastructure.

G. Examples of Attacks Targeting Victims Globally

1. OT Attacks on Utility Infrastructure

Title: *Dragonfly Infiltrates US and European Energy Firms*

- **Link:** https://www.bleepingcomputer.com/news/security/sabotage-warning-issued-on-hackers-hiding-deep-inside-energy-sector /

- **Summary: September 2017:** The Dragonfly group infiltrated several U.S. and European energy firms, positioning themselves to potentially sabotage critical infrastructure. They used common computer management tools and mundane malware, shifting focus from learning about energy facilities to gaining access to operational systems. This attack raised concerns about the group's ability to control key SCADA equipment and other operational systems.

2. Attacks on IT

Title: *EDP Ransomware Attack*

- **Link:** https://www.bleepingcomputer.com/news/security/edp-energy-giant-confirms-ragnar-locker-ransomware-attack/

- **Summary: April 2020:** The Portuguese energy giant EDP was attacked by the Ragnar Locker ransomware group, leading to unauthorized access and data theft. The attackers demanded a ransom of over $10 million. EDP implemented enhanced security measures and involved law enforcement authorities to investigate the breach and prevent future incidents.

Title: Enel Group Ransomware Attack

- **Link:** https://www.bleepingcomputer.com/news/security/enel-group-hit-by-ransomware-again-netwalker-demands-14-million/

- **Summary: October 2020:** Enel Group, a multinational energy company, was hit by the Netwalker ransomware group, demanding $14 million. The attackers threatened to leak stolen data to pressure Enel into paying the ransom. This incident highlighted the persistent threat of ransomware to large corporations and the significant financial and operational risks involved.

Title: *Shell Data Breach*

- **Link:** https://www.bleepingcomputer.com/news/security/energy-giant-shell-discloses-data-breach-after-accellion-hack/
- **Summary: March 2021:** Shell disclosed a data breach after attackers compromised its secure file-sharing system, affecting personal data and information from Shell companies and stakeholders. The Clop ransomware gang and FIN11 were identified as the groups behind the attack, exploiting a zero-day vulnerability in the Accellion File Transfer Appliance (FTA).

Title*: Suncor Energy's Petro-Canada Subsidiary Breach*

- **Link:** https://www.cybersecuritydive.com/news/suncor-hackers-breached-petro-canada-customer-data/685365/
- **Summary: June 2023:** Suncor Energy confirmed a cybersecurity breach affecting its Petro-Canada subsidiary. Hackers accessed basic information of Petro-Points members, disrupting credit and debit card purchases and car wash services.

Title*: Schneider Electric Ransomware Attack*

- **Link:** https://www.bleepingcomputer.com/news/security/energy-giant-schneider-electric-hit-by-cactus-ransomware-attack/
- **Summary: January 2024:** Schneider Electric was hit by the Cactus ransomware gang, disrupting its Resource Advisor cloud platform and stealing sensitive data. The attack highlighted the significant threat posed by ransomware to critical infrastructure and the importance of robust cybersecurity measures.

Title: *Schneider Electric Developer Platform Breach*

- **Link:** https://www.bleepingcomputer.com/news/security/schneider-electric-confirms-dev-platform-breach-after-hacker-steals-data/
- **Summary: November 2024:** Schneider Electric confirmed a breach of its developer platform by the Hellcat ransomware gang, leading to the theft of 40GB of data. The attackers used exposed credentials to access the server and demanded $125,000 to prevent the data from being leaked.

Title: *X_Trader Supply Chain Attack*

- **Link:** https://www.bleepingcomputer.com/news/security/critical-infrastructure-also-hit-by-supply-chain-attack-behind-3cx-breach/
- **Summary: April 2023:** North Korean-backed threat group used a trojanized installer for X_Trader software to deploy malware, impacting critical infrastructure organizations in the U.S. and Europe. The attack highlighted the risks associated with supply chain vulnerabilities and the need for robust cybersecurity measures.

Title: *Clop Ransomware Attack on Siemens Energy*

- **Link:** https://www.bleepingcomputer.com/news/security/siemens-energy-confirms-data-breach-after-moveit-data-theft-attack/
- **Summary: June 2023:** Siemens Energy confirmed a data breach from Clop ransomware attacks exploiting a MOVEit Transfer vulnerability. While data was stolen, no critical information was compromised, and business operations remained unaffected. This incident is part of a broader wave of Clop attacks affecting numerous organizations.

Title: *Darkside Ransomware Attack on Brazilian Utilities*

- **Link:** https://www.bleepingcomputer.com/news/security/eletrobras-copel-energy-companies-hit-by-ransomware-attacks/
- **Summary: February 2021:** Eletrobras and Copel, major Brazilian utilities, suffered ransomware attacks by Darkside. The attacks led to data theft and temporary suspension of some operations, highlighting the significant threat ransomware poses to critical infrastructure and the importance of robust cybersecurity measures.

H. Risk Scope

SoCalGas and SDG&E's Cybersecurity Risk analysis considers the scope noted in Table 1 below.

Table 1
Cybersecurity Risk Scope

	Cybersecurity Risk
In-Scope:	The scope of this risk includes gas and electric control systems, all company data and information systems, operational technology systems, and related processes.

I. Data Sources Used to Quantify Risk Estimates[5]

SoCalGas and SDG&E utilized internal data sources to determine a Cybersecurity Risk Pre-Mitigation Risk Value and calculate risk reduction estimates for mitigation activities (which enables estimation of Post Mitigation Monetized Risk Values and Cost Benefit Ratios). Where internal data is deemed insufficient, supplemental industry or national data is used, as appropriate and adjusted to account for risk characteristics associated with the Companies' specific operating locations and service territories. For example, certain types of incident events have not occurred within the SoCalGas and SDG&E service territories. Expanding the quantitative data sources to include industry data where such incidents have been recorded is appropriate to establish a baseline of risk and risk addressed by mitigative activities. Attachment B provides additional information regarding these data resources.

II. RISK ASSESSMENT

In accordance with Commission guidance, this section provides a qualitative description of the Cybersecurity Risk, including a risk Bow Tie, which delineates potential Drivers/Triggers and Potential Consequences, followed by a description of the Tranches determined for this risk.

A. Risk Selection

The Cybersecurity Risk was included as a risk in SoCalGas's and SDG&E's 2021 RAMP and was also included in the Companies' 2022, 2023, and 2024 Enterprise Risk Registries (ERR).[6] SoCalGas's and SDG&E's ERR evaluation and selection process is summarized in Chapter RAMP-2, Enterprise Risk Management Framework and in Chapter RAMP-3 Risk Quantification Framework.

SoCalGas and SDG&E selected this risk in accordance with the RDF Row 9.[7] Specifically SoCalGas and SDG&E assessed the top risks from the Companies' 2024 ERRs based on the Consequence of a Risk Event (CoRE) Safety attribute. The Cybersecurity Risk was among the risks presented in SoCalGas's and SDG&E's list of Preliminary 2025 RAMP Risks

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5 Copies and/or links to these data resources are provided in the workpapers served with this Report on May 15, 2025.

6 In the 2021 RAMP Report this risk was called "(Chapter SCG/SDG&E-Risk-6) Cybersecurity." The risk definition and elements are unchanged.

7 D.24-05-064, RDF Row 9 states that risks to be included in the RAMP Report, at minimum, are those identified in the Company's ERR comprising "the top 40% of ERR risks with a Safety Risk Value greater than zero dollars."

on December 17, 2024 at a Pre-Filing Workshop. Cybersecurity was selected electively, as it did not qualify based on the Safety risk attribute alone. At the pre-filing workshop, no party expressed opposition to inclusion of this risk in SoCalGas's or SDG&E's 2025 RAMP Reports.

B. Risk Bow Tie

In accordance with Commission requirements, this section describes the risk Bow Tie, possible Drivers, Potential Consequences, and a mapping of the elements in the Bow Tie to the mitigation(s) that addresses it.[8] As illustrated in the risk Bow Tie shown below in Figure 1, the Risk Event (center of the Bow Tie) is a Cybersecurity event, the left side of the Bow Tie illustrates Drivers/Triggers that could lead to a Cybersecurity event, and the right side shows the Potential Consequences of a Cybersecurity event. SoCalGas and SDG&E applied this framework to identify and summarize the information provided in Figure 1. A mapping of each mitigation to the addressed elements of the risk Bow Tie is provided in Attachment C.

Figure 1
Cybersecurity Risk: Risk Bow Tie

C. Potential Risk Event Drivers/Triggers[9]

When performing a risk assessment for the Cybersecurity Risk, SoCalGas and SDG&E identify potential leading indicators, referred to as Drivers or Triggers, that reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to

8 D.24-05-064, RDF Row 15.

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

the asset.[10] These Bow Tie Drivers/Triggers inform the Likelihood of a Risk Event (LoRE) component of the risk value. These include:

- **DT.1: Third Party and Supply Chain Risk**: Risks introduced through external partners, vendors, and supply chains are common and can have widespread impacts.
- **DT.2: Advanced Persistent Threats (APT)**: Highly sophisticated and targeted attacks that can cause significant damage over a prolonged period.
- **DT.3: Social Engineering and Insider Threats**: Human factors often present the greatest risk, as they can bypass technical controls through manipulation or exploitation.
- **DT.4: Malware and Malicious Software**: Widespread and varied, malware can cause extensive damage, from data breaches to operational disruptions.
- **DT.5: Network, Infrastructure, and Cloud Security Risk**: Compromises in these areas can lead to widespread access and control issues, affecting multiple systems and data.
- **DT.6: Operational Technology (OT) Security Risk**: Risks in OT environments can lead to significant operational disruptions, especially in critical infrastructure sectors.
- **DT.7: Human Factors and Poor Security Practices**: Inadequate security behaviors, policies, and mistakes by employees that can lead to security breaches.
- **DT.8: Cybersecurity Control Failures**: Failures or malfunctions in security controls, such as IDS/IPS, firewalls, and other security tools, that can lead to missed alerts and undetected intrusions.
- **DT.9: Emerging Threats**: New and evolving threats can be unpredictable and may not be fully understood or mitigated by existing defenses.
- **DT.10: Safety-Critical Cyber Risks**: Inadequate cybersecurity measures in safety-critical systems and processes, such as job site safety plans and job safety analysis, which can lead to vulnerabilities that compromise both safety and security.

D. Potential Consequences of Risk Event (CoRE)

Potential Consequences are listed to the right side of the risk Bow Tie. SoCalGas and SDG&E identify the Potential Consequences of this risk by analyzing internal data sources where available, industry data, and subject matter expertise (SME).[11] These Bow Tie Consequences inform the CoRE component of the risk value. If one or more of the Drivers listed

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[10] D.24-05-064, RDF Row 10-11.

[11] D.24-05-064, RDF Rows 10-11.

above were to result in an incident, the Potential Consequences, in a plausible worst-case scenario, could include:

- PC.1 - Disruption of energy flow systems
- PC.2 - Data corruption or unavailability
- PC.3 - Theft or destruction of systems/data
- PC.4 - Exposure of sensitive Company and/ or customer data
- PC.5 - Penalties and fines
- PC.6 - Erosion of public confidence
- PC.7 - Adverse litigation
- PC.8 - Serious injuries and/ or fatalities

While this risk chapter primarily addresses internal threats to the companies and their customers, a large-scale disruption in the Companies' ability to deliver energy could also pose significant societal impacts, particularly to public health and safety, including:

- Economic disruption
- Infrastructure and transportation system failures, including critical facilities such as hospitals or water treatment plants
- Heightened vulnerability of at-risk populations

These Potential Consequences were used by SoCalGas and SDG&E in the scoring of the Cybersecurity Risk during the development of their 2024 ERRs.

E. Evolution of Its Drivers and Consequences

As specified in the Phase 3 Decision,[12] the following changes to the previous ERR and/or the 2021 RAMP include:

1. Changes to Drivers/Triggers of the Risk Bow Tie

- **DT.1: Third Party and Supply Chain Risk**: Risks introduced through external partners, vendors, and supply chains are common and can have widespread impacts.
- *This driver was not included in the 2021 RAMP. Given the heightened activity from this threat vector, third party and supply chain risk was included as an event Driver/Trigger.*
- **DT.2: Advanced Persistent Threats (APTs)**: Highly sophisticated and targeted attacks that can cause significant damage over a prolonged period.

[12] D.24-05-064, RDF Row 8.

- *This driver was not included in the 2021 RAMP. APTs has been added as a Driver/Trigger for a cybersecurity incident because of their highly sophisticated and targeted nature. APTs are capable of causing significant damage over extended periods, making them particularly dangerous.*
- **DT.3: Social Engineering and Insider Threats**: Human factors often present the greatest risk, as they can bypass technical controls through manipulation or exploitation.
- *This driver was not included in the 2021 RAMP. Although Social Engineering and Insider Threats encompass various other Drivers and Triggers, such as human error, malicious software, access failures, and cyber control failures, it was added as a Driver/Trigger because human factors often present the greatest risk to security. Phishing and other social engineering attacks are among the most common and effective attack techniques.*
- **DT.4: Malware and Malicious Software**: Widespread and varied, malware can cause extensive damage, from data breaches to operational disruptions.
- *Two Drivers from the 2021 RAMP were merged to form this driver: (Manipulated data or integrity failure)* Any unintended changes to data as the result of a storage, retrieval or processing operation, including malicious intent, unexpected hardware failure, and human error.

  and
- *(Malicious software intrusion)* Any malicious program or code that is harmful to systems. For example, malware seeks to invade, damage, or disable computers, computer systems, networks, tablets, and mobile devices, often by taking partial control over a device's operations.
- **DT.5: Network, Infrastructure, and Cloud Security Risk**: Compromises in these areas can lead to widespread access and control issues, affecting multiple systems and data.
- *Two Drivers from the 2021 RAMP were merged to form this driver:* (*Infrastructure or availability failure*) An unplanned, severe, extensive and/or large-scale system outage caused by a cybersecurity- related event or incident.

  and
- *RAMP 2021 (Equipment loss or theft)* A type of data breach where there is a loss of a laptop, mobile device, or storage device such as backup tapes, hard drives, and flash drives whether by accidental loss or through malicious intent.
- **DT.6: Operational Technology (OT) Security Risk**: Risks in OT environments can lead to significant operational disruptions, especially in critical infrastructure sectors.
- *This driver was changed from the 2021 RAMP, which had: (Operational system failure)* A system failure occurring due to a cybersecurity event/incident, causing the system to freeze, reboot, function counter to its design or stop functioning.

- **DT.7: Human Factors and Poor Security Practices**: Inadequate security behaviors, policies, and mistakes by employees that can lead to security breaches.
- *Two Drivers from the 2021 RAMP were merged to form this driver: (Access control or confidentiality failure)* Inability to effectively perform identification, authentication and authorization of users and entities by evaluating required login credentials that can include passwords, personal identification numbers (PINs), biometric scans, security tokens or other authentication factors.
- *RAMP 2021 (Human error (e.g., clicking on a phishing email)* An accidental cybersecurity event/incident conducted by a human.
- **DT.8: Cybersecurity Control Failures**: Failures or malfunctions in security controls, such as Intrusion Detection Systems (IDS) or Intrusion Prevention Systems (IPS), firewalls, and other security tools, that can lead to missed alerts and undetected intrusions.
- *This driver was changed from the 2021 RAMP, which had: (Cybersecurity control failure)* A general failure of a cybersecurity control(s). *E.g.*, a vulnerability scanner ceases functioning, allowing an exploitable vulnerability to go unnoticed in the environment.
- **DT.9: Emerging Threats**: New and evolving threats can be unpredictable and may not be fully understood or mitigated by existing defenses.
- *This driver was not included in the 2021 RAMP. Emerging Threats was added as a Driver/Trigger for a cybersecurity incident because these threats are new, evolving, and often unpredictable. Examples of emerging threats include use of AI and quantum computing.*
- **DT.10: Safety-Critical Cyber Risks**: Inadequate cybersecurity measures in safety-critical systems and processes, such as job site safety plans and job safety analysis, which can lead to vulnerabilities that compromise both safety and security.
- *This driver was not included in the 2021 RAMP. Safety-Critical Cyber Risks was added as a new Driver/Trigger for a Cybersecurity Risk because inadequate cybersecurity in safety-critical systems can lead to vulnerabilities that compromise both safety and security, potentially causing accidents, data breaches, and operational disruptions.*

2. Changes to Potential Consequences of the Risk Bow Tie

- There were no changes to Potential Consequences.

F. Summary of Tranches

To determine groups of assets or systems with similar risk profiles, or Tranches, and in accordance with Row 14 of the RDF, SoCalGas and SDG&E applied the Homogeneous Tranching Methodology (HTM) as outlined in Chapter RAMP - 3: Risk Quantification Framework. As a result, the following classes, LoRE-CoRE pairs, and resulting number of Tranches were determined:

Table 2
Cybersecurity Risk Tranche Identification

Class	Number of LoRE-CoRE Pairs	Number of Resulting Tranches
Tier 1	1	1
Tier 2	1	1
Tier 3	1	1
Tier 4	1	1
TOTAL	**4**	**4**

Attachment D illustrates the derivation of the Tranches, as shown in Table 2 above, in accordance with the HTM. The classes were identified by SoCalGas and SDG&E as logical groups of assets and systems based on the Companies' operations. These classes also align risk treatments with asset risk profiles reflective of SoCalGas's and SDG&E's operations. More detailed Tranche information, including risk quantification by LoRE-CoRE pair, Tranche names, and mitigation associations (*i.e.*, cost mapping and risk reduction) to Tranches, is provided in workpapers.

III. PRE-MITIGATION RISK VALUE

In accordance with the RDF Row 19, Table 3 below provides the pre-mitigation risk values for Cybersecurity Risk. Further details, including pre-mitigation risk values by Tranche, are provided in workpapers. Explanations of the risk quantification methodology and other higher-level assumptions are provided in Chapter RAMP-3 Risk Quantification Framework.

Table 3
Cybersecurity Risk Monetized Risk Values
(Direct, in 2024 $ millions)

Company	LoRE	CoRE [Risk-Adjusted Attribute Values]			Total CoRE	Total Risk [LoRE x Total CoRE]
		Safety	Reliability	Financial		
SoCalGas	0.59	$0.003	$215.70	$4.73	$220.44	$129.02
SDG&E	0.51	$0.69	$3,466.54	$8.14	$3,475.37	$1,775.20
SoCalGas and SDG&E[13]	1.10	$0.32	$1,730.65	$6.32	$1,737.29	$1,904.22

A. Risk Value Methodology

SoCalGas's and SDG&E's risk modeling for the Cybersecurity Risk follows RDF guidance[14] for implementing a Cost Benefit Approach, as described below:

- **Cost Benefit Approach Principle 1 – Attribute Hierarchy (RDF Row 2):** Cybersecurity Risk is quantified in a combined attribute hierarchy as shown in Table 3 above, such that Safety, Reliability, and Financial are presented based on available, observable, and measurable data.
- **Cost Benefit Approach Principle 2 – Measured Observations (RDF Row 3):** The Cybersecurity Risk used observable and measurable data in the estimation of CoRE values. SoCalGas and SDG&E utilized a combination of internal and external data to estimate the consequence in terms of natural units (*e.g.*, fatalities, serious injuries, meters out, and customer minutes interrupted [CMI]) that occur as the result of a risk event.
- **Cost Benefit Approach Principle 3 – Comparison (RDF Row 4):** Cybersecurity Risk utilized proxy data from various sources including, but not limited to, Business Continuity Institute, IBISWorld, NetDiligence Cyber Claims Study, IBM Cost of a Data Breach (2024), Department of Energy, and National Institute of Health, to estimate the financial impacts, safety, and reliability impacts of cybersecurity incidents. Reference materials are further detailed in Attachment B.
- **Cost Benefit Approach Principle 4 - Risk Assessment (RDF Row 5):** Data sources used for Cybersecurity Risk – as described in the preceding paragraphs – were sufficient to model probability distributions for use in estimating risk values.
- **Cost Benefit Approach Principle 5 – Monetized Levels of Attributes (RDF Row 6):** In accordance with D.22-12-027 and D.24-05-064, RDF Row 6,

[13] SoCalGas and SDG&E individual Company risk values are provided for informational purposes only. All mitigation benefits and the resulting cost-benefit ratios are assessed using the Companies' combined risk scores. *See* Cybersecurity workpapers for more information.

[14] D.24-05-064, RDF Rows 2-7.

SoCalGas and SDG&E used a California-adjusted Department of Transportation monetized equivalent to calculate the Safety CoRE attribute at a monetized equivalent of $16.2 million per fatality, $4.1 million per serious injury, and $49 thousand for minor injury;[15] the Electric Reliability CoRE attribute is valued at a monetized equivalent of $3.76 per CMI; Gas Reliability is valued at a monetized equivalent of $3,868 per gas meter outage; and the Financial CoRE attribute is valued at $1 per dollar.[16]

- **Cost Benefit Approach Principle 6 – Adjusted Attribute Level (RDF Row 7):**

Table 4
Cybersecurity Risk Scaled vs Unscaled Value by CoRE Attribute
(Direct, in 2024 $ millions)

SoCalGas	Safety	Reliability	Financial	Total
Unscaled Risk Value	$0.002	$18.84	$2.29	$21.13
Scaled Risk Value	$0.002	$126.25	$2.77	$129.02
SDG&E	**Safety**	**Reliability**	**Financial**	**Total**
Unscaled Risk Value	$0.34	$139.09	$2.80	$142.23
Scaled Risk Value	$0.35	$1,770.69	$4.16	$1,775.20
SoCalGas and SDG&E	**Safety**	**Reliability**	**Financial**	**Total**
Unscaled Risk Value	$0.34	$157.93	$5.09	$163.36
Scaled Risk Value	$0.35	$1,896.94	$6.93	$1,904.22

Table 4 depicts the results of applying the risk scaling methodology described in Chapter RAMP-3 to the CoRE attributes for the Cybersecurity Risk. For the Cybersecurity Risk it is driven by the Reliability and Financial attributes due to the increase in the risk of Cybersecurity. Further information regarding the risk scaling function, including the risk scaling factor and the loss threshold at which the risk scaling factor begins to apply, is provided in Chapter-RAMP-3.

Further information regarding SoCalGas's and SDG&E's quantitative risk analyses, including raw data, calculations, and technical references are provided in workpapers.

IV. 2024-2031 CONTROL & MITIGATION PLAN

This section identifies and describes the controls and mitigations comprising the portfolio of mitigations for Cybersecurity Risk and reflects changes expected to occur from the last year of recorded costs at the time of filing this RAMP Report (2024) through the 2028 GRC cycle (2031). For clarity, a current activity that is included in the plan may be referred to as either a

[15] *See* D.22-12-027 at 35 ("We adopt Staff's recommendation to require a dollar valuation of the Safety Attribute in the Cost-Benefit Approach in the RDF using the DOT VSL as the standard value.").

[16] *See* Chapter RAMP-3: Risk Quantification Framework, Section II.

control and/or a mitigation. Table 5 below shows which control activities are in place in 2024 and which are expected to be on-going, completed, or new during the 2025-2031 periods. Because the TY 2024 GRC proceeding established rates through 2027,[17] information through 2027 is calculated as part of the baseline risk, in accordance with D.21-11-009.[18] For the TY 2028 GRC, SoCalGas and SDG&E calculated CBRs beginning with TY 2028 and for each Post-Test Year (PTY) (2029, 2030, and 2031).[19]

Table 5
Cybersecurity Risk 2024-2031 Control and Mitigation Plan Summary

ID	Control/Mitigation Description	2024 Control	2025-2031 Plan
C801	Perimeter Defenses	X	Ongoing
C802	Internal Defenses	X	Ongoing
C803	Sensitive Data Protection	X	Ongoing
C804	Operational Technology (OT) Cybersecurity	X	Ongoing
C805	IT Infrastructure Modernization	X	Ongoing

***Bold** indicates this control/mitigation includes mandated programs/activities.*

A. Control Programs

In accordance with Commission guidance, this section "[d]escribe[s] the controls or mitigations currently in place"[20] (*i.e.* activities in this section were in place as of December 31, 2024). Controls that will continue as part of the risk mitigation plan are identified in Table 5 above. The controls for Cybersecurity are evaluated at the program level due to the availability of data, the rapidly changing threats, and applicable counter measures. As mentioned in the Risk Overview section above, sharing specific details of the individual risk mitigation activity can provide adversaries crucial information that could aid their ability to disrupt Company systems. Therefore, the level of granularity for quantifying Cost-Benefit Ratios is currently at the operational program level (*i.e.*, Perimeter Defenses, Internal Defenses, Sensitive Data Protection, OT Cybersecurity, and IT Infrastructure Modernization), rather than each individual risk mitigation activity for the Cybersecurity Risk.

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17 *See* D.24-12-074.

18 *See* D.21-11-009 at 136, Conclusion of Law 7 (providing a definition for "baselines" and "baseline risk").

19 In the TY 2028 GRC, the last year of recorded costs, or base year, will be 2025. SoCalGas and SDG&E will forecast information for 2026 through 2031, in accordance with the Rate Case Plan.

20 D.18-12-014 at 33.

- **C801: Perimeter Defenses**

The Perimeter Defenses program includes activities that the Companies take to protect the external access points of their internal information technology systems. Perimeter Defenses are designed to prevent attacks, protect the integrity of, and detect unauthorized access to the Companies' internal information technology systems. The information technology environment includes the entire business technology system, including email, information storage, billing and customer records among others. The operational technology environment also uses Perimeter Defenses to protect operational technology assets.

A robust set of controls at the perimeter of corporate systems contributes to the Companies' *defense-in-depth* strategy. The purpose of the defense-in-depth strategy is to manage risk with diverse defenses so that if one layer of defense turns out to be inadequate, the additional layers of defense will prevent and detect further impacts and/or a potential breach.

Perimeter Defenses are an important component of defense-in-depth but can only reduce the probability of an adversary having unauthorized access to internal systems and data (*i.e.*, the LoRE). This control includes enhancements to firewalls and other intrusion protection measures to maintain the risk at the current manageable level and keep up with the increasing potential threats to the Companies' perimeter.

Perimeter Defenses reduce the frequency or probability of successful attacks. As a security strategy, it accomplishes this by limiting access to authorized users, reducing the likelihood that malicious code will enter the information technology environment, and delaying or frustrating potential attackers. This strategy also helps the Companies to understand the number of pathways into or out of the perimeter while simultaneously monitoring the perimeter in real time.

Accordingly, the Perimeter Defenses control addresses several Drivers/Triggers outlined above in Figure 1 including: DT.1: Third Party and Supply Chain Risk; DT.2: Advanced Persistent Threats (APT); DT.3: Social Engineering and Insider Threats; DT.4: Malware and Malicious Software; DT.5: Network, Infrastructure, and Cloud Security Risk; DT.6: Operational Technology (OT) Security Risk; DT.7: Human Factors and Poor Security Practices; DT.8: Cybersecurity Control Failures; DT.9: Emerging Threats; DT.10: Safety-Critical Cyber Risks; PC.1: Disruption of energy flow systems; PC.3: Theft or destruction of systems/data; PC.4:

Exposure of sensitive Company and/ or customer data; PC.5: Penalties and fines; PC.6: Erosion of public confidence; PC.8 Serious injuries and/ or fatalities.

Perimeter Defenses projects included within this control include:

- Network security and firewall infrastructure upgrades;
- Web Application Firewall Protection;
- Distributed Denial of Service Protection;
- Cloud application and infrastructure security;
- Endpoint monitoring and protection; and
- Perimeter Defense mechanisms.

- **C802: Internal Defenses**

Internal Defense program activities are designed to detect and prevent unauthorized users, those misusing authorized credentials, and malicious software (*i.e.*, malware) from propagating inside of the perimeter, moving within the IT system or into the OT system. Enhancements to the Companies' IT and OT systems' Access Management system reduces the risk to internal assets, systems, and the likelihood and impact of a Cybersecurity incident.

As another layer of *defense-in-depth*, the activities within this category include investments that directly reduce the risk to internal assets and information. The controls in this category are designed to detect unauthorized users from moving laterally or vertically within the IT system or into the OT system, in turn improving the ability to identify and respond to threats more quickly. The enhancements to the IT and OT systems' Access Management system allow the Companies to keep the current risk level steady.

Based on the foregoing, Internal Defenses address several Drivers/Triggers and Potential Consequences including: DT.2: Advanced Persistent Threats (APT); DT.3: Social Engineering and Insider Threats; DT.4: Malware and Malicious Software; DT.5: Network, Infrastructure, and Cloud Security Risk; DT.6: Operational Technology (OT) Security Risk; DT.7: Human Factors and Poor Security Practices; DT.8: Cybersecurity Control Failures; DT.9: Emerging Threats; DT.10: Safety-Critical Cyber Risks; PC.1: Disruption of energy flow systems; PC.2: Data corruption or unavailability; PC.3: Theft or destruction of systems/data; PC.4: Exposure of sensitive Company and/ or customer data; PC.5: Penalties and fines; PC.6: Erosion of public confidence; PC.7: Adverse litigation; PC.8: Serious injuries and/ or fatalities.

Internal Defenses projects presented in this control include:

- Endpoint Security Monitoring;
- Threat and Vulnerability Management;
- Third Party External Privileged Access Management;
- Data Loss Prevention (DLP);
- Identity & Access Management Enhancements;
- Cloud Access Security;
- Attack Surface Management; and
- Security Conformance Monitoring and Automation.

- **C803: Sensitive Data Protection**

Sensitive Data Protection is a core component of the Companies' *defense-in-depth* strategy for Cybersecurity Risk. The Sensitive Data Protection projects outlined below enhance technology to reduce the risk of unauthorized access. The Sensitive Data Protection control helps reduce the risk of unauthorized access to the Companies' information by understanding where sensitive data is stored, how it is transmitted, and how it is used. This helps to further protect customer and Company information. The activities for this control help the Companies continue to prudently manage sensitive data.

Sensitive Data Protection addresses several Drivers/Triggers and Potential Consequences including: DT.1: Third Party and Supply Chain Risk; DT.2: Advanced Persistent Threats (APT); DT.3: Social Engineering and Insider Threats; DT.4: Malware and Malicious Software; DT.7: Human Factors and Poor Security Practices; DT.8: Cybersecurity Control Failures; DT.9: Emerging Threats; PC.2: Data corruption or unavailability; PC.3: Theft or destruction of systems/data; PC.4: Exposure of sensitive Company and/ or customer data; PC.5: Penalties and fines; PC.6: Erosion of public confidence; PC.7: Adverse litigation.

The Companies' current control activities target sensitive data within information technology systems, including laptops and other mobile computing devices.

Sensitive Data Protection controls are designed to include:

- Identity Access Management Enhancements;
- Data Loss Prevention & Enhancements;
- Forensics Infrastructure Enhancements;
- Mobile Device Security; and

- Data Crawler Technology.
- **C804: Operational Technology (OT) Cybersecurity**

The OT Cybersecurity program focuses on securing the electric and gas control systems for the Companies. OT environments enable critical business functions, including safe and reliable energy delivery to customers throughout the service territory. OT Cybersecurity requires a specialized approach to balance operational needs with Cybersecurity Risk. Improving asset management helps identify unauthorized systems, which could potentially be a source of an attack. Anomaly detection, endpoint detection, and security event monitoring improve visibility into the OT environment, which allows for faster response and remediation. Enhanced secure access technologies help reduce the risk of unauthorized access. These risk mitigation activities strengthen the Companies' capabilities by securing the foundation of OT security. Additionally, these enhancements are necessary to maintain a secure OT system and mitigate the increasing potential threat to that critical system.

This specialized OT Cybersecurity addresses several Drivers/Triggers and Potential Consequences including: DT.1: Third Party and Supply Chain Risk; DT.2: Advanced Persistent Threats (APT); DT.3: Social Engineering and Insider Threats; DT.4: Malware and Malicious Software; DT.5: Network, Infrastructure, and Cloud Security Risk; DT.6: Operational Technology (OT) Security Risk; DT.7: Human Factors and Poor Security Practices; DT.8: Cybersecurity Control Failures; DT.9: Emerging Threats; DT.10: Safety-Critical Cyber Risks; PC.1: Disruption of energy flow systems; PC.2: Data corruption or unavailability; PC.3: Theft or destruction of systems/data; PC.5: Penalties and fines; PC.6: Erosion of public confidence; PC.8: Serious injuries and/ or fatalities.

The Companies' Cybersecurity program prioritizes OT controls, including: the management of its existing technology assets, improving threat intelligence and vulnerability management, and securing the communication infrastructure. The Companies are focused on maintaining a secure operational environment to support safe, reliable gas and electric systems and service.

The Companies' OT Cybersecurity projects presented in this control include:

- OT network security enhancements;
- OT asset management;
- OT sensor deployment and monitoring;

- OT vulnerability management; and
- OT security platform enhancements.
- **C805**: **IT Infrastructure Modernization**

One of the fundamental practices that supports a strong Cybersecurity program is the refresh of technology, both hardware and software, at regular intervals, to minimize risks posed by obsolete technologies that lead to security risks. This is frequently referred to as "Foundational Technology Systems Lifecycle Management."

Technology lifecycles are short and require frequent upgrades to meet modern security standards and capabilities. In addition to technology obsolescence, this approach also addresses security obsolescence. Security obsolescence refers to cybersecurity tools and processes that are no longer effective or potentially could create new vulnerabilities.

Vulnerabilities inherent in legacy technology can provide a foothold for entry or movement within the Companies' environment. Failure to invest in modern technologies could degrade the value of modern investments due to compatibility restrictions. Replacing legacy technology is a necessary method of managing Cybersecurity Risk.

In addition, there are fundamental control activities required to support and effectively manage the Cybersecurity capabilities listed in the previous sections. These fundamental activities referenced in the Operations & Maintenance (O&M) forecast (*see* Section E below) support the capital investments.

This chapter is intended to address the Company's core cybersecurity investments; it does not encompass every capital or expense item that may mitigate cybersecurity risk (for example, certain electric-operations sensor or OT upgrade projects are accounted for under their respective risk domains). Because many cyber-related expenditures overlap with other functions, the RAMP values attributed to this section are comparatively lower. Nevertheless, each investment described herein directly contributes to the reduction of enterprise risk, rather than serving solely as an infrastructural prerequisite.

The following controls are representative, but not exhaustive, of the core measures through which the Company reduces cybersecurity risk:

- Security Policy Framework
- Risk Management and Assessment
- Cybersecurity Awareness and Training

- Security Assessment and Vulnerability Management
- Asset Management
- Protective Technologies (Network, User, Application)
- System Authentication Services (*e.g.*, public key infrastructure (PKI))
- Security Operations Center (SOC), which:
    - Continuously monitors security-related events across systems and applications;
    - Detects anomalies and escalates confirmed security incidents;
    - Investigates and responds to incidents; and
    - Conducts regular exercises and drills to validate incident-response capabilities.

IT Infrastructure Modernization addresses several Drivers/Triggers and Potential Consequences outlined above in Figure 1 including: DT.2: Advanced Persistent Threats (APT); DT.3: Social Engineering and Insider Threats; DT.4: Malware and Malicious Software; DT.5: Network, Infrastructure, and Cloud Security Risk; DT.9: Emerging Threats; PC.2: Data corruption or unavailability; PC.4: Exposure of sensitive Company and/ or customer data; PC.6: Erosion of public confidence; PC.8: Serious injuries and/ or fatalities.

The projects presented in this control include:

- Technology refreshes, including, but not limited to:
    - Infrastructure;
    - Operating systems;
    - Middleware; and
    - Applications.
- System maintenance to confirm continued secure configurations, patching, upgrading, among others.
- Use of effective architecture and other mechanisms to confirm high availability and service continuity for critical systems.

B. Changes from 2024 Controls

SoCalGas and SDG&E plan to continue each of the existing controls discussed above, and reflected in Table 5, through the 2025-2031 period. The identified Drivers, Consequences, and controls categories do not change significantly,[21] however, as discussed above, the specific mitigation projects within the controls must continually change and evolve as existing threats evolve and become more sophisticated and as new Cybersecurity threats emerge.

C. Mitigation Programs

SoCalGas and SDG&E do not currently foresee implementing new mitigations not described above during the 2025-2031 period. As noted above in the Risk Overview section, gaining information about the Companies' control and mitigation plan for Cybersecurity Risk could be useful to an adversary therefore it is presented at a summary level. That is, the mitigations represent broad categories of controls rather than individual projects to avoid disclosing information to adversaries. The broad control categories are intended to capture emerging Cybersecurity threats, and the projects within the existing controls continually change and evolve in response to new and changing threats.

D. Climate Change Adaptation

In assessing Cybersecurity Risk, controls and/or mitigations that address climate adaptation planning were determined to be inapplicable (from the perspective of climate exposure, asset sensitivity, and asset adaptive capacity). A list of climate-relevant controls and mitigations is provided in Volume 1, Chapter RAMP-5: Climate Change Adaptation.

E. Foundational Programs

Foundational Programs are "[i]nitiatives that support or enable two or more Mitigation programs or two or more Risks but do not directly reduce the Consequences or reduce the Likelihood of safety Risk Events." [22] For the Cybersecurity Risk there are no activities that meet this definition of a Foundational Program.

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[21] In its 2021 RAMP filing, SoCalGas and SDG&E referred to the IT Infrastructure Modernization control as Obsolete IT Infrastructure and Asset Replacement. The controls are substantively the same.

[22] D.24-05-064, Appendix A at A-4.

F. Estimates of Costs, Units, and Cost-Benefit Ratios (CBRs)

The tables in this section provide a quantitative summary of the risk control and mitigation plan for Cybersecurity Risk, including the associated costs,[23] units, and CBRs. Additional information by Tranche is provided in workpapers. The costs shown are estimated using assumptions provided by SMEs and available data. In compliance with the Phase 3 Decision,[24] for each enterprise risk, SoCalGas and SDG&E use actual results and industry data and when that is not available, supplement the data with SME input. Additional details regarding the data and expertise relied upon in developing these estimates is provided in Attachment B.

Table 6
SoCalGas Cybersecurity Risk Control and Mitigation Plan

Recorded and Forecast Costs Summary (Direct, in 2024 $ thousands)							
Control/Mitigation		**Adjusted Recorded**		**Forecast**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C801	Perimeter Defenses	1,991	3,851	4,091	79,297	29,174	12,993
C802	Internal Defenses	11,879	8,625	8,982	62,665	66,759	26,946
C803	Sensitive Data Protection	2,998	0	0	5,400	9,720	0
C804	Operational Technology (OT) Cybersecurity	338	0	0	18,449	13,778	0
C805	IT Infrastructure Modernization	9,113	0	0	12,299	9,929	0
Total		**26,319**	**12,476**	**13,073**	**178,110**	**129,360**	**39,939**

Bold *indicates this control/mitigation includes mandated programs/activities.*

23 Cybersecurity Risk is centrally managed and includes Shared Services and Shared Assets that are allocated and billed to the entity or entities receiving those services or using the asset. Shared Assets are recorded on the financial records of the Company that receives the most service or use from the asset. In this 2025 RAMP Application costs are presented where they are incurred, before allocations.

24 D.24-05-064, RDF Row 10.

Table 7
SDG&E Cybersecurity Risk Control and Mitigation Plan

Recorded and Forecast Costs Summary (Direct, in 2024 $ thousands)							
Control/Mitigation		**Adjusted Recorded**		**Forecast**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C801	Perimeter Defenses	0	1,103	1,346	0	0	4,038
C802	Internal Defenses	116	10,284	10,724	2,789	1,458	31,722
C803	Sensitive Data Protection	0	527	526	0	0	1,578
C804	Operational Technology (OT) Cybersecurity	3,897	0	0	14,764	11,100	0
C805	IT Infrastructure Modernization	0	0	0	18,900	0	0
Total		**4,013**	**11,914**	**12,596**	**36,453**	**12,558**	**37,338**

Bold *indicates this control/mitigation includes mandated programs/activities.*

Table 8
SoCalGas Cybersecurity Risk Control & Mitigation Plan

Recorded and Forecast Units[25] Summary							
Control/Mitigation		**Recorded Units**		**Forecast Units**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C801	Perimeter Defenses	25,000	12	14	100,000	75,000	42
C802	Internal Defenses	25,000	12	15	100,000	75,000	45
C803	Sensitive Data Protection	25,000	0	0	50,000	50,000	0
C804	Operational Technology (OT) Cybersecurity	25,000	0	0	100,000	75,000	0
C805	IT Infrastructure Modernization	25,000	0	0	100,000	75,000	0

Bold *indicates this control/mitigation includes mandated programs/activities.*

[25] For capital, the unit of measure is Users Protected, for O&M, the unit of measure is Full-Time Equivalents (FTEs).

Table 9
SDG&E Cybersecurity Risk Control & Mitigation Plan

Recorded and Forecast Units[26] Summary							
Control/Mitigation		**Recorded Units**		**Forecast Units**			
ID	**Name**	**2024 Capital**	**2024 O&M**	**2028 O&M**	**2025-2028 Capital**	**PTY Capital**	**PTY O&M**
C801	Perimeter Defenses	0	5	6	0	0	18
C802	Internal Defenses	25,000	29	30	50,000	25,000	90
C803	Sensitive Data Protection	0	3	3	0	0	9
C804	Operational Technology (OT) Cybersecurity	25,000	0	0	100,000	75,000	0
C805	IT Infrastructure Modernization	0	0	0	50,000	0	0

Bold *indicates this control/mitigation includes mandated programs/activities.*

In Table 10 below, CBRs are presented in summary at the mitigation or control level for the TY 2028 GRC cycle.[27] CBRs are calculated based on scaled, expected values unless otherwise noted, and are calculated for each of the three required discount rates[28] in each year of the GRC cycle and for the Post-Test Years in aggregate (2029-2031). Costs and CBRs for each year of the GRC cycle and the aggregated years are provided in workpapers.

Table 10
Cybersecurity Risk Cost Benefit Ratio Results Summary
2028-2031
(Direct, in 2024 $ millions)

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C801	Perimeter Defenses	$58	$22	103.98	97.52	87.83
C802	Internal Defenses	$88	$79	33.71	32.54	29.31
C803	Sensitive Data Protection	$10	$2	236.70	227.09	204.55

26 For capital, the unit of measure is Users Protected, for O&M, the unit of measure is Full-Time Equivalents (FTEs).

27 A combined CBR for SoCalGas and SDG&E is presented for each mitigation or control. Cybersecurity Risk is managed centrally for the Companies.

28 *See* Chapter RAMP-3 Risk Quantification Framework for definitions of discount rates, as ordered in the Phase 3 Decision.

ID	Control/Mitigation Name	Capital (2028 – 2031)	O&M (2028 – 2031)	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
C804	Operational Technology (OT) Cybersecurity	$32	$0	220.11	213.21	192.03
C805	IT Infrastructure Modernization	$21	$0	197.04	182.04	163.97

***Bold** indicates this control/mitigation includes mandated programs/activities.*

Tranche-level CBRs by year and in aggregate for each mitigation are provided in workpapers.

V. ALTERNATIVE MITIGATIONS

Pursuant to D.14-12-025, D.16-08-018, and D.18-12-014[29] SoCalGas and SDG&E considered two alternatives to the Risk Mitigation Plan for Cybersecurity Risk. The risk mitigation plan for the Cybersecurity Risk is defined as the planned portfolio of control programs. Typically, analysis of alternatives occurs when designing the portfolio to obtain the best result or product for the cost. The alternatives analysis considers changes in risk reduction, cost, reasonableness, current conditions, modifications to the plan and constraints, such as budget and resources.

The Companies considered two alternative portfolios of mitigation activities in addition to the planned portfolio control program to address the Companies' Cybersecurity Risk. The alternative portfolios were analyzed in the context of CBRs, as outlined in the tables below.

For the alternative analysis, the Companies analyzed the effectiveness of three portfolios:

1. The risk mitigation plan for the Cybersecurity Risk (the Plan);
2. Alternative Portfolio 1; and
3. Alternative Portfolio 2.

To create these three different portfolios, the Companies first assessed the potential impact of each capital project under consideration, identifying each as high/medium/low impact based on several criteria:

- The project implementation's impact on the maturity of cybersecurity at the Companies;

[29] *See, e.g.,* D.18-12-014 at 33-35.

- The extent to which each project addresses recommendations from Critical Security Controls (CSC) 18,[30] ICS-CERT,[31] and other frameworks;
- The extent to which each project addresses threats to cybersecurity of high impact and likelihood;
- The effectiveness in mitigating a credible attack impacting safety, and;
- The urgency or time horizon for the project's implementation to assess how quickly a project needs to be completed or the specific timeframe within which it should be implemented. Projects with higher urgency or shorter time horizons are prioritized to address immediate cybersecurity threats and vulnerabilities.

After each project was tagged as high/medium/low impact, the following three portfolios were developed: The risk mitigation plan for the Cybersecurity Risk, Alternative Portfolio 1 and Alternative Portfolio 2.

A. The Risk Mitigation Plan for the Cybersecurity Risk

The Companies' risk mitigation plan includes a mix of high impact and medium impact projects. The identified high-impact and medium-impact projects were grouped into the five programs described above, as applicable:

1. Perimeter Defenses;
2. Internal Defenses;
3. Sensitive Data Protection;
4. Operational Technology Cybersecurity; and
5. IT Infrastructure Modernization.

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30 CSC-18: The Customer Information System CSC version 8 includes 18 prioritized measures designed to enhance cybersecurity posture. These controls cover areas such as asset management, software inventory, data protection, secure configurations, account and access management, vulnerability management, audit logging, and penetration testing, available at https://www.cisecurity.org/controls.

31 ICS-CERT: The Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) provides a control system security focus in collaboration with US-CERT, available at *https://us-cert.cisa.gov/ics* to:

- Conduct vulnerability and malware analysis.
- Provide onsite support for incident response and forensic analysis.
- Provide situational awareness in the form of actionable intelligence.
- Coordinate the responsible disclosure of vulnerabilities/mitigations.
- Share and coordinate vulnerability information and threat analysis through information products and alerts.

The quantitative analysis conducted by the Companies shows that the Companies' Plan of high- and medium-impact projects is the most cost-effective portfolio for managing the increase in Cybersecurity Risk, as is demonstrated by the CBRs compared to other alternative portfolios.

B. Alternative Portfolio 1

The Companies' Alternative Portfolio 1 consists of high impact projects only. The identified high-impact projects were grouped into the same five programs described above, as applicable. The quantitative analysis conducted by the Companies shows that the Companies' Alternative Portfolio 1, comprising only high-impact projects, is estimated to have a slightly higher CBR than the Plan when considering the CBR of the individual categories. However, this portfolio does not provide enough risk reduction to address the increasing rate of Cybersecurity Risk. The effectiveness of the projects in this alternative portfolio is lower than the projected growth rate of the risk. If Alternative Portfolio 1 is executed, Cybersecurity Risk will increase compared to the Companies' risk mitigation plan.

C. Alternative Portfolio 2

Alternative Portfolio 2 consists of all cybersecurity projects under consideration (*i.e.,* high-impact, medium-impact and low-impact). Whereas the Companies' risk mitigation plan includes high- and medium-impact projects, and Alternative Portfolio 1 includes only high-impact projects, Alternative Portfolio 2 includes all projects that the Companies have currently identified. Alternative Portfolio 2 has the highest cost, with the most risk reduction. Alternative Portfolio 2 has a CBR lower than the Companies' Plan since the additional projects in the portfolio (the low-impact projects not included in the Companies' risk mitigation plan for the Cybersecurity Risk) provide an incremental benefit; however, that incremental benefit is less effective relative to its incremental cost.

D. Costs and Cost Benefit Ratios (CBRs) for Alternative Portfolios

The costs and CBRs for Alternative Portfolio 1 and Alternative Portfolio 2 are presented in the tables that follow.[32]

[32] A combined CBR for SoCalGas and SDG&E is presented for each mitigation or control. Cybersecurity Risk is managed centrally for the Companies.

Table 11
SoCalGas Cybersecurity Risk Alternative Mitigation Plan

Alternative Mitigation Forecasted Costs Summary (Direct, in 2024 $ thousands)					
Alternative Mitigation		Forecasted			
ID	Name	2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A801	Alternative Portfolio 1	166,013	120,531	51,745	39,945
A802	Alternative Portfolio 2	184,110	133,112	51,745	39,945

Table 12
SDG&E Cybersecurity Risk Alternative Mitigation Plan

Alternative Mitigation Forecasted Costs Summary (Direct, in 2024 $ thousands)					
Alternative Mitigation		Forecasted			
ID	Name	2025-2028 Capital	PTY Capital	2025-2028 O&M	PTY O&M
A801	Alternative Portfolio 1	36,454	12,558	49,494	37,341
A802	Alternative Portfolio 2	36,454	12,558	49,494	37,341

Table 13
Cybersecurity Risk Alternative Mitigation Cost Benefit Ratio Results Summary
(Direct, in 2024 $ millions)

ID	Alternative Mitigation Name	Capital TY 2028	O&M TY 2028	CBR (Societal)	CBR (Hybrid)	CBR (WACC)
A801	Alternative Portfolio 1					
	C801: Perimeter Defenses	29.3	5.4	105.29	98.69	88.88
	C802: Internal Defenses	17.9	19.7	34.23	33.02	29.74
	C803: Sensitive Data Protection	0.0	0.5	243.34	233.43	210.25
	C804: Operational Technology (OT) Cybersecurity	6.9	0.0	223.51	216.43	194.92
	C805: IT Infrastructure Modernization	11.4	0.0	199.20	183.92	165.65
A802	Alternative Portfolio 2					
	C801: Perimeter Defenses	29.3	5.4	103.28	96.86	87.25
	C802: Internal Defenses	19.7	19.7	33.59	32.41	29.19
	C803: Sensitive Data Protection	0.0	0.5	232.90	223.34	201.18
	C804: Operational Technology (OT) Cybersecurity	6.9	0.0	219.38	212.43	191.33
	C805: IT Infrastructure Modernization	11.5	0.0	195.46	180.63	162.70

VI. HISTORICAL PROGRESS GRAPHIC

As directed by the Commission in the Phase 2 Decision, this section illustrates the accomplishments in safety work and the progress in mitigating safety risks over the two immediately preceding RAMP cycles. The historical progress graphic for SoCalGas's and SDG&E's Cybersecurity Risk mitigation programs and activities aligns with safety goals to illustrate trends in historical progress and identify remaining tasks necessary to continue mitigating risks.

Figure 2 below shows SoCalGas's and SDG&E's cybersecurity rating score by BitSight.[33] Cybersecurity rating services, like BitSight, evaluate an organization's cybersecurity posture by continuously monitoring and assessing various risk factors and provide a security score (or rating) that reflects an organization's overall security performance. Security rating services provide an objective, data-driven view of an organization's cybersecurity program, developing cybersecurity ratings by analyzing networks, assets, and vulnerabilities in real-time. Similar to a credit score, which reflects a business's creditworthiness based on its financial history and ability to repay debts, cybersecurity rating services offer a security score that indicates the organization's ability to manage and mitigate Cybersecurity Risks. The score allows external stakeholders such as investors, financial institutions, and government agencies to gauge how effectively an organization is protecting against potential threats. For example, insurance companies may use these ratings to determine premiums and coverage limits or regulators may utilize these ratings to assess compliance with cybersecurity regulatory obligations. BitSight uses a scale from 250 to 900 to rate organizations based on their security performance.

Recent studies have demonstrated a correlation between a cybersecurity rating and the risk of a cybersecurity incident.[34] BitSight compared its ratings to publicly disclosed data breaches and concluded that companies with a rating of 400 or lower were five times more likely to experience a publicly disclosed data breach than companies with a rating of 700 or higher[35]

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33 *See* Bitsight, available at https://www.bitsight.com/about/our-story.

34 *See* Bitsight, Bitsight Security Ratings Correlate to Breaches, available at https://help.bitsighttech.com/hc/en-us/articles/360011652613-Bitsight-Security-Ratings-Correlate-to-Breaches#Marsh-McLennan.

35 *See* Bitsight, Bitsight Security Ratings Correlated to Breaches, Data Sheet, available at https://www.bitsight.com/resources/datasheet-bitsight-security-ratings-correlate-breaches.

and that its ratings are indicative of the risk of data breach. A Marsh McLennan Cyber Risk Analytics Center (Marsh McLennan) study identified a clear correlation between lower security ratings and higher likelihood of cybersecurity incidents.[36] An analysis by Verisk (formerly known as AIR Worldwide) demonstrated that organizations with ratings of 700 or greater had a breach probability of less than 1%, while those with ratings below 500 had a probability of nearly 3%.[37] As shown in Figure 2, for the period 2016 through 2024 SoCalGas and SDG&E's BitSight cybersecurity rating score ranged from 683 to 794.

Figure 2
Cybersecurity Risk Historical Progress Graphic
BitSight Cybersecurity Rating Score

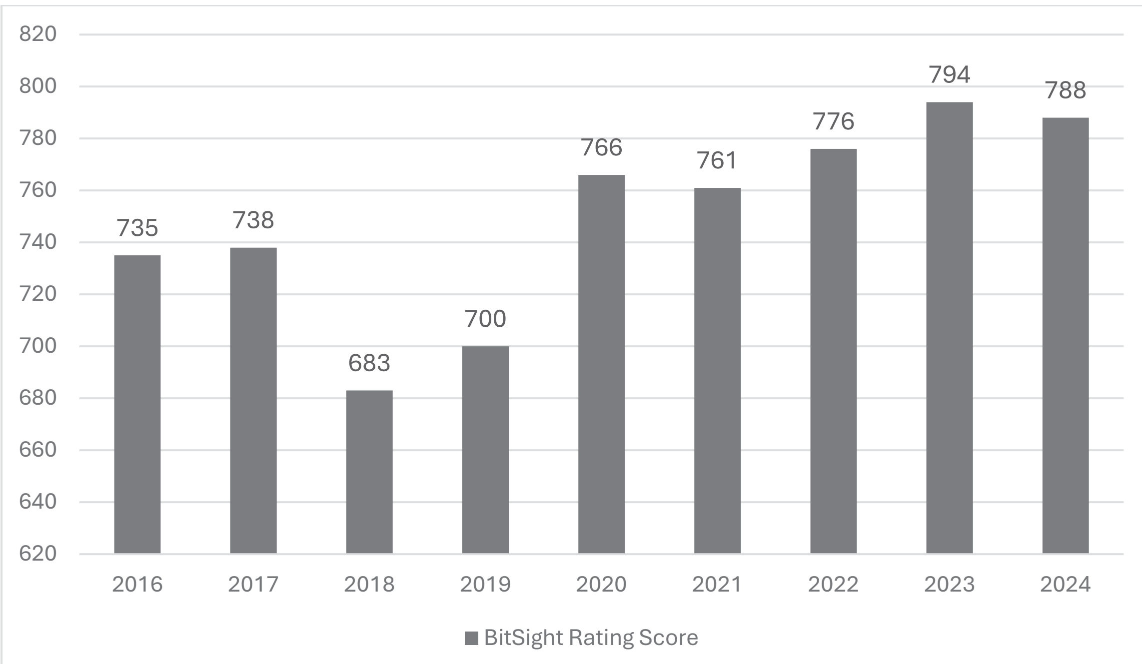

Figure 3 below presents an overview of certain cybersecurity risk mitigation programs and activities implemented during this period.

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[36] *See* Bitsight, New Study Finds Significant Correlation Between Bitsight Analytics and Cybersecurity Incidents (October 25, 2022), available at https://www.bitsight.com/blog/new-study-finds-significant-correlation-between-bitsight-analytics-and-cybersecurity-incidents.

[37] *See* Bitsight, Bitsight Security Ratings Correlate to Breaches, Verisk: Correlation to Breach, available at https://help.bitsighttech.com/hc/en-us/articles/360011652613-Bitsight-Security-Ratings-Correlate-to-Breaches#Marsh-McLennan.

Figure 3
Cybersecurity Risk Historical Progress Graphic
Cybersecurity Mitigation Programs and Activities

Perimeter Defenses	Intenal Defenses	Sensitive Data Protection	OT Cybersecurity	IT Infrastrucutre Modernization
• Firewall upgrades and process automation • Distributed Denial of Service Protection • Internet of Things (IoT) Sensors • Perimeter Defense mechanisms	• Endpoint Security Monitoring • Threat and Vulnerability Management • Insider Threat Detection and User Behavior Analytics • Incident Management Improvements • Supply Chain Risk Management • Cloud Access Security	• Identity Access Management Enhancements • Data Loss Prevention & Enhancements • Mobile Device Security • Data Crawler Technology	• OT Network Anomaly Detection • OT Advanced Security Incident Management (SIEM) and Analytics • OT Malware Defense • OT Secure Remote Connection	• Technology refreshes of Infrastructure, Operating systems, Middleware, Applications • System maintenance to confirm continued secure configurations, patching, upgrading, among others

Additionally, for the period 2022 through 2024, SoCalGas and SDG&E remediated more than 2.6 million cybersecurity vulnerabilities to mitigate potential security threats. The number of cybersecurity vulnerabilities remediated refers to the total count of security weaknesses or flaws in a system, network, or application that have been identified and successfully fixed. This metric is crucial for understanding how effectively an organization is addressing and mitigating potential security threats. In the realm of threat and vulnerability management, zero-day vulnerabilities represent a significant challenge. These are security flaws that are unknown to the software vendor and can be exploited by attackers before a patch is available. The Citrix Bleed vulnerability is an example, affecting numerous organizations before it was identified and addressed.[38] While the Companies implement robust security measures to mitigate known vulnerabilities, zero-day vulnerabilities create a critical gap between the time they are exploited and the time they are remediated. This gap underscores the importance of proactive monitoring,

[38] The Citrix Bleed vulnerability (CVE-2023-4966) was a critical flaw that allowed unauthenticated, remote attackers to obtain valid session tokens from the device's memory, enabling them to bypass authentication. This vulnerability was actively exploited, leading to significant security risks for affected organizations. *See* ITPRO, What is Citrix Bleed and should you be worried? (October 26, 2023), available at https://www.itpro.com/security/cyber-attacks/what-is-citrix-bleed-and-should-you-be-worried.

rapid response strategies, and continuous improvement in security practices to minimize potential threats. The safety work that remains to be done is addressed in the controls/mitigations detailed above in Section IV. 2024-2031 Control and Mitigation Plan.

ATTACHMENTS

ATTACHMENT A

CONTROLS AND MITIGATIONS WITH REQUIRED COMPLIANCE DRIVERS

The table below indicates some examples of the compliance Drivers that underpin identified controls and mitigations. This is not a complete list.

ID	Control/Mitigation Name	Compliance Driver
C801	Perimeter Defenses	NERC Critical Infrastructure Protection (CIP) Standards, TSA Security Directive (SD)
C802	Internal Defenses	NERC CIP Standards, TSA SD
C803	Sensitive Data Protection	NERC CIP Standards, California Consumer Privacy Act (CCPA), TSA SD
C804	Operational Technology (OT) Cybersecurity	NERC CIP Standards, TSA SD
C805	IT Infrastructure Modernization	NERC CIP Standards, TSA SD

ATTACHMENT B

CYBERSECURITY - REFERENCE MATERIAL FOR QUANTITATIVE ANALYSES

The Phase 3 Decision RDF at Row 10 and Row 29 directs each utility to identify Potential Consequences of a Risk Event using available and appropriate data.[39] Appropriate data may include Company specific data or industry data supplemented by the judgment of subject matter experts. Provided below is a listing of the inputs utilized as part of this assessment and the description of the data.

Risk Data	Source Type	Source Information
Cyber Attack Impact Per Year	External Data	Agency: Business Continuity Institute Link: https://www.thebci.org/news/cyber-attacks-rise-in-volume-as-attackers-revolutionise-their-attack-vectors.html#:~:text=Increase%20in%20volume%20and%20methods,to%20a%20successful%20cyber%2Dattack Description: Expected Likelihood of Cyberattack with Limited Impact Per Year
Data Violations in the Utilities Industry	External Data	Agency: Statista Link: https://www.statista.com/statistics/1318379/us-number-of-private-data-compromises-by-industry/ Description: Industry Due to Cyberattacks in 2023
Reportable Cyberattacks that could have affected Electric System	External Data	Agency: Department of Energy, Report on Electric Emergency and Disturbance Events, 2022 – 2023 (available upon request) Description: Number of reportable electric cyberattacks that could have affected electric system reliability (2022 - 2023)
People Affected by Blackout	External Data	Agency: Department of Energy

39 D.24-05-064, RDF Row 10 and Row 29.

Risk Data	Source Type	Source Information
		Link: https://www.energy.gov/oe/august-2003-blackout#:~:text=August%2014%20and%2015%2C%202003,50%20million%20customers%20were%20impacted Description: Number of People affected by the August 2003 blackout
Fatalities Attributed to Blackout	External Data	Agency: Reuters Link: https://www.reuters.com/article/business/healthcare-pharmaceuticals/spike-in-deaths-blamed-on-2003-new-york-blackout-idUSTRE80Q07H/ Description: Number of Fatalities occurred during August 2003 blackout
Financial Impact to Public	External Data	Agency: Net Diligence Link: https://netdiligence.com/wp-content/uploads/2023/10/2023-NetDiligence-Cyber-Claims-Study_v1.1.pdf Description: Financial Impact to the public due to a cybersecurity attack.
Cost of Data Breach	External Data	Agency: IBM Link: https://www.ibm.com/downloads/documents/us-en/107a02e94948f4ec Description: Financial Impact to the public because of the data breach

ATTACHMENT C

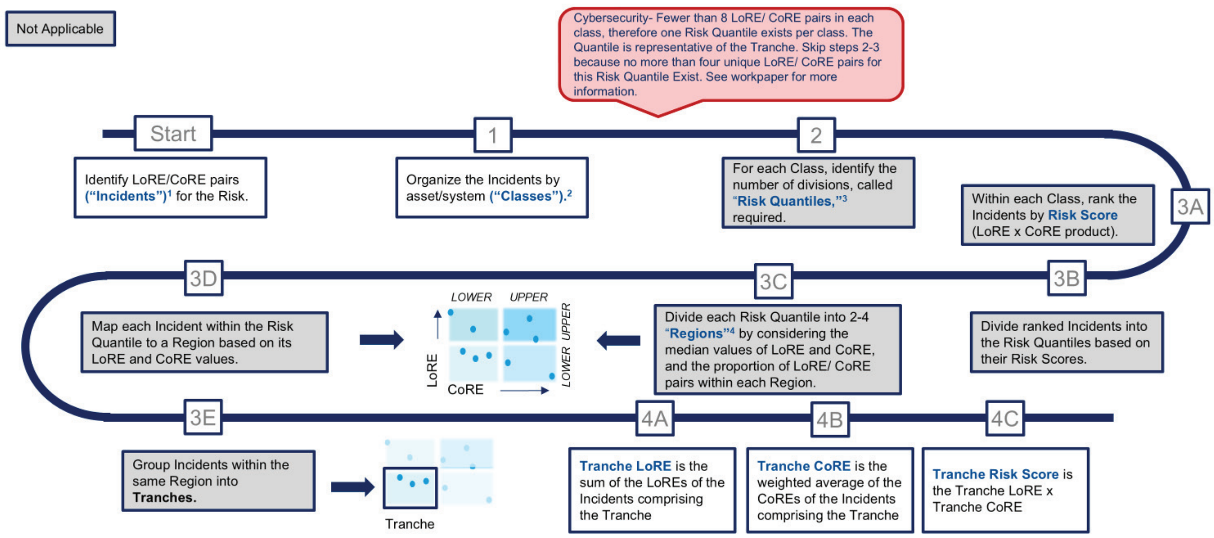
CYBERSECURITY - SUMMARY OF ELEMENTS OF BOW TIE

SUMMARY OF ELEMENTS OF BOW TIE			
ID	**Control/Mitigation Name**	**Drivers Addressed**	**Consequences Addressed**
C801	Perimeter Defenses	DT.1; DT.2; DT.3; DT.4; DT.5; DT.6; DT.7; DT.8; DT.9; DT.10	PC.1; PC.3; PC.4; PC.5; PC.6; PC.8
C802	Internal Defenses	DT.2; DT.3; DT.4; DT.5; DT.6; DT.7; DT.8; DT.9; DT.10	PC.1; PC.2; PC.3; PC.4; PC.5; PC.6; PC.7; PC.8
C803	Sensitive Data Protection	DT.1; DT.2; DT.3; DT.4; DT.7; DT.8; DT.9	PC.2; PC.3; PC.4; PC.5; PC.6; PC.7
C804	Operational Technology (OT) Cybersecurity	DT.1; DT.2; DT.3; DT.4; DT.5; DT.6; DT.7; DT.8; DT.9; DT.10	PC.1; PC.2; PC.3; PC.5; PC.6; PC.8
C805	IT Infrastructure Modernization	DT.2; DT.3; DT.4; DT.5; DT.9	PC.2; PC.4; PC.6; PC.8

ATTACHMENT D:

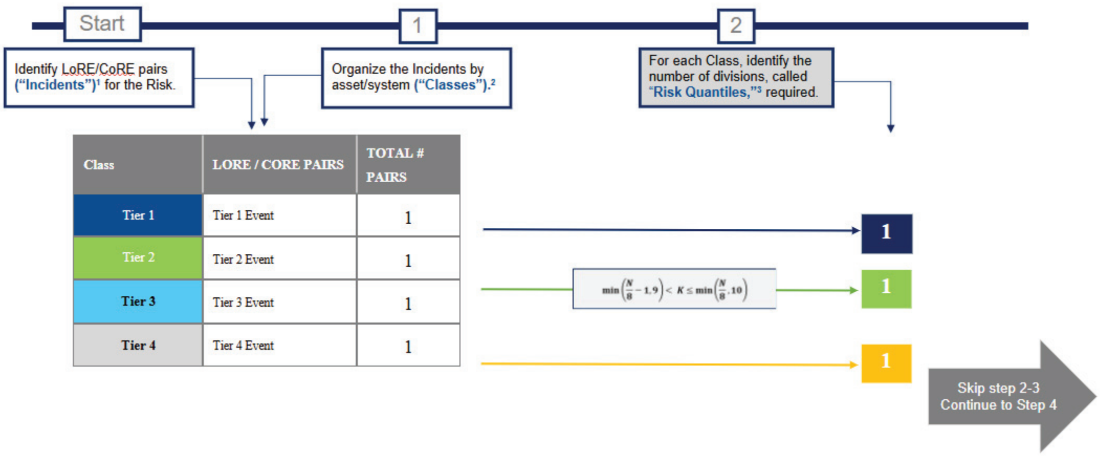
CYBERSECURITY - APPLICATION OF TRANCHING METHODOLOGY

A sample walkthrough of the Homogeneous Tranching Methodology (HTM) as outlined in Volume 1, Chapter RAMP - 3: Risk



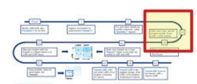
NOTES [1]*For example, **Incidents (or "Risk Incidents")** for Cybersecurity events may include incursions that lead to adverse outcomes*
[2]*For example, **Classes (or "Asset Classes")** for Cybersecurity include Internal Defense, Perimeter Defense, Sensitive Data Protection, OT Cybersecurity, IT Infrastructure Modernization.*
[3]***Quantiles** are divisions of equal numbers of incidents (quartiles have 4 divisions, quintiles have 5, etc.) The number of incidents dictates the number of quantiles needed.*
[4]*The four **Regions** are: 1. Lower LoRE-Lower CoRE (LL-LC), 2. Lower LoRE-Upper CoRE (LL-UC), 3. Upper LoRE-Lower CoRE (UL-LC), and 4. Upper LoRE-Upper CoRE (UL-UC).*

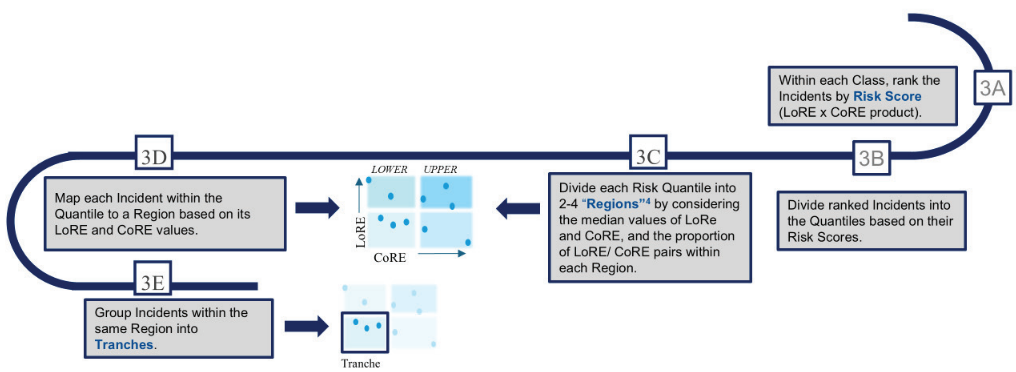
Not Applicable

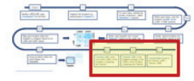


Class	LORE / CORE PAIRS	TOTAL # PAIRS
Tier 1	Tier 1 Event	1
Tier 2	Tier 2 Event	1
Tier 3	Tier 3 Event	1
Tier 4	Tier 4 Event	1

Not Applicable







4A

Tranche LoRE is the sum of the LoREs of the Incidents comprising the Tranche

4B

Tranche CoRE is the weighted average of the CoREs of the Incidents comprising the Tranche

4C

Tranche Risk Score is the Tranche LoRE x Tranche CoRE

Class	Risk Quantile	Incident (LoRE/CoRE) Pair	Risk Quantile Region	Tranche	4A Tranche LoRE	4B Tranche CoRE	4C Tranche Risk Score
Tier 1	1	Tier 1 Event	None	Tier 1	0.78	$0.01M	$0.01M
Tier 2	1	Tier 2 Event	None	Tier 2	0.191	$5.29M	$1.01M
Tier 3	1	Tier 3 Event	None	Tier 3	0.085	$892.71M	$75.69M
Tier 4	1	Tier 4 Event	None	Tier 4	0.04	$45,687.82M	$1,827.51M

2025 Risk Assessment Mitigation Phase

APPENDIX 1

Glossary of Terms

May 15, 2025

APPENDIX 1

GLOSSARY OF TERMS

A.	Application
AAL	Average Annual Loss
AB	Assembly Bill
ABI	Advanced Baseline Imager
AFN	Access and Functional Needs
AIS	Abbreviated Injury Scale
ALARP	As Low As Reasonably Practical
ALR	Anodeless Risers
ANSI	American National Standards Institute
AOC	Abnormal Operating Conditions
AP	Assessment Plan
API	American Petroleum Institute
API RP	American Petroleum Institute Recommended Practice
APLIC	Avian Power Line Interaction Committee
APP	Advanced Protection Program
APTs	Advanced Persistent Threats
ASC	Advisory Safety Council
ASME	American Society of Mechanical Engineers
AWS	Amazon Web Services
BCF	Billion Cubic Feet
BESS	Battery Energy Storage Systems
BPS	Bulk Power System
BSRP	Bare Steel Replacement Program
BY	Base Year
C&I	Commercial and Industrial
CAB	Cellulose Acetate Butyrate
CA-ISO	California Independent System Operator
Cal/OSHA	California Occupational Safety and Health Administration
CalEnviroScreen	California Communities Environmental Health Screening Tool
CalGEM	California Geologic Energy Management Division
CARB	California Air Resources Board
CAVA	Climate Adaptation Vulnerability Assessment
CBA	Cost-Benefit Approach
CBO	Community Based Organizations
CBOWG	Community-Based Organization Working Group
CBR	Cost Benefit Ratio
CC	Covered Conductor
CCC	Combined Covered Conductor
CCM	Control Center Modernization
CCR	California Code of Regulations
CCTV	Closed Circuit Television
CDC	Centers for Disease Control and Prevention

CEADPP	Company Emergency and Disaster Preparedness Plan
CEI	Climate Equity Index
CEJST	Climate and Economic Justice Screening Tool
CEP	Community Engagement Plan
CES4	CalEnviroScreen 4.0
CFF	Cross-Functional Factor
CFR	Code of Federal Regulations
CGA	Common Ground Alliance
CISA	Cybersecurity & Infrastructure Security Agency
CMI	Customer Minute of Interruption
CMIP5	Coupled Model Inter-Comparison Project 5
CMP	Corrective Maintenance Program
CNF	Cleveland National Forest
COF	Consequence of Failure
COL	Conclusion of Law
Commission	California Public Utility Commission
CONUS	Continental United States
CoRE	Consequence of Risk Event
CP	Cathodic protection
CPI	Consumer Price Index
CPI-U	Consumer Price Index for all Urban Consumers
CPRT	Contractor Performance Response Team
CPS	Current Population Survey
CPUC	California Public Utility Commission
CRA	Customized Resiliency Assessments
CRC	Community Resource Centers
CSB	Chemical Safety Board
CSO	Chief Safety Officer
CSS	Contractor Safety Services
CTI	Cybersecurity Threat Intelligence
CUPA	Certified Unified Program Agency
CVI	Climate Vulnerability Index
CVM	Climate Vulnerability Metric
CWSAC	Community Wildfire Safety Advisory Council
D&A	Drug and Alcohol
D.	Decision
D.20-01-002	Rate Case Plan Decision
DAC	Disadvantaged Communities
DACAG	Disadvantaged Communities Advisory Group
DAFWP	Drug & Alcohol-Free Workplace Policy
DAMPP	Drug & Alcohol Misuse Prevention Plan
DART	Employee Days Away, Restricted and Transfer
DCRI	Distribution Communications Reliability Improvements
DHS	Department of Homeland Security
DIRT	Damage Information Reporting Tool

DLP	Data Loss Prevention
DOE	Department of Energy
DoS	Denial-of-Service
DOT	Department of Transportation
DPA	Damage Prevention Analyst
DREAMS	Distribution Risk Evaluation & Monitoring System
DRIP	Distribution Riser Inspection Program
DRS	District Regulator Station
DT	Driver/Trigger
DVC	Disadvantaged and Vulnerable Communities
EAM	Enterprise Asset Management
ECA	Engineering Critical Assessment
EFD	Early Fault Detection
EFV	Excess Flow Valve
EII	Electric Infrastructure Integrity
EJI	Environmental Justice Index
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPM	Electronic Pressure Monitors
ERCOT	Electric Reliability Council of Texas
ERM	Enterprise Risk Management
ERR	Enterprise Risk Registry
ERS	Essential Reliability Services
ESC	Executive Safety Council
ESCMP	Environmental and Safety Compliance Management Program
ESJ	Environmental and Social Justice
ETS	Electrical Test Station
EUP	Electrical Undergrounding Plan
EV	Expected Value
Ex.	Exhibit
FAA	Federal Aviation Administration
FACT	Facilitating Access to Coordinated Transportation
FBI	Federal Bureau of Investigations
FCC	Federal Communications Commission
FCP	Falling Conductor Protection
FERC	Federal Energy Regulatory Commission
FOF	Findings of Fact
FPI	Fire Potential Index
FSCA	Fire Science and Climate Adaptation
FTA	File Transfer Appliance
FTE	Full-Time Equivalents
GAP	Generator Assistance Program
GED	Gas Distribution Emergency Department
GIPP	Gas Infrastructure Protection Program
GO	General Order

GPD	Generalized Pareto Distribution
GQCM	Gas Compliance Quality Management
GRC	General Rate Case
GRI	Gas Research Institute
GRID	General Rate Case Integrated Database
GSA	U.S. General Services Administration
HCA	High Consequence Areas
HECA	High Energy Control Assessments
HFTD	High Fire-Threat District
HLC	Hotline Clamps
HMI	Human-Machine Interfaces
HP	High Potential
HP Risk	High Pressure Gas System Risk
HPI	Healthy Places Index 3.0
HTM	Homogeneous Tranching Methodology
HWW	High Wind Warning
I.	Investigation
I.19-06-014	Safety Culture OII
IAEA	International Atomic Energy Agency
IAQ	Indoor Air Quality
ICE	Interruption Cost Estimator
ICP	Incentive Compensation Plan
ICS	Industrial Control Systems
IDS	Intrusion Detection Systems
IIE	Incident Involving an Employee
IIP	Intelligent Image Processing
IIPP	Injury and Illness Prevention Program
ILI	In-Line-Inspection
IOU	Investor-Owned Utility
IPCC	Intergovernmental Panel on Climate Change
IPS	Intrusion Prevention Systems
IR	Infrared
ISA	International Society of Arboricultural
ISACs	Information Sharing and Analysis Centers
ISN	ISNetworld®
ISO	Organization for Standardization
kV	Kilovolt
LACDPH	LA County Department of Public Health
LBNL	Lawrence Berkley National Laboratory
LiDAR	Light Detection and Ranging
LMS	Learning Management System
LOF	Likelihood of Failure
LoRE	Likelihood of a Risk Event
LPCN	Low Power Communication Network
M&R	Meter & Regulator

MAIS	Maximum Abbreviated Injury Scale
MAOP	Maximum Allowable Operating Pressure
MAVF	Multi Attribute Value Function
MFA	Multi-Factor Authentication
MFL	Magnetic Flux Leakage
MIP	Microgrid Incentive Program
MP	Medium Pressure
MP System Risk	Medium Pressure Gas System
MS SQL	Microsoft Structured Query Language
MSA	Master Service Agreements
MSL	Metalskin Liners
MSUP	Master Special Use Permit
MW	Megawatt
MWE	Median Weekly Earnings
NERC	North American Electric Reliability Corporation
NERC CIP	North American Electric Reliability Corporation's Critical Infrastructure Protection
NIMS	National Incident Management System
NMS	Network Management System
NRI	FEMA National Risk Index
NSC	National Safety Council
NSOTA	Non-State-of-the-Art
NTSB	National Transportation Safety Board
NU	Natural Units
O&M	Operations & Maintenance
OEIS	Office of Energy Infrastructure Safety
OIR	Order Instituting Rulemaking
OP	Ordering Paragraph
OP Qual	Operator Qualification
OSHA	Occupational Safety and Health Administration
OT	Operational Technology
PC	Potential Consequence
PCB	Polychlorinated Biphenyls
PEDS	Protective Equipment Device Settings
PG&E	Pacific Gas and Electric Company
Phase 2 Decision	D.22-12-027
Phase 3 Decision	D.24-05-064
PHMSA	Pipeline and Hazardous Materials Safety Administration
PINs	Personal Identification Numbers
PIR	Potential Impact Radius
PKI	Public Key Infrastructure
PLCs	Programmable Logic Controllers
PLRP	Post Line Restoration Project
PMU	Phasor Measurement Unit
PoI	Probability of Ignition

PPE	Personal Protective Equipment
PQ	Power Quality
PSIF	Potential to Cause Serious Injuries or Fatalities
PSP	Pilot Study Plan
PSPS	Public Safety Power Shutoff
PTTA	Phase 3 Tranching Approach
PTY	Post Test Year
Pub. Util. Code	California Public Utilities Code
PUC	Public Utility Commission
QA	Quality Assurance
QEW	Qualified Electric Workers
QRA	Quantitative Risk Analytics
R.	Rulemaking
R.18-04-019	Climate Adaptation OIR
R.21-10-001	Order Instituting Investigation into SoCalGas's Organizational Culture
RAMP	Risk Assessment and Mitigation Phase
RAVS	Review and Verification Services
RCP	Rate Case Plan
RDF	Rate-Based Decision-Making Framework
RFP	Request for Proposal
RFW	Red Flag Warning
RIDI	Risk-Informed Drone Inspection
Risk OIR	R.20-07-013
RMP	Residential Meter Protection
RMPP	Residential Meter Protection Project
RMV	Rupture Mitigation Valves
RO	Repeat Offender
RPA	Resources Planning Act Assessment
RSE	Risk-Spend Efficiency
RTU	Remote Terminal Units
Rules	Commission's Rules of Practice and Procedure
Safety Culture OII	I.19-06-014
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SCL	Safety Classification and Learning
SDG&E	San Diego Gas & Electric Company
SED	Safety Enforcement Division
SIF	Serious Injury and Fatality
SIMP	Storage Integrity Management Program
SIMPBA	Storage Integrity Management Program Balancing Account
SIMS	Safety Information Management System
SIP	System Improvement Plan

SLIP	Sewer Lateral Inspection Program
S-MAP	Safety Model Assessment Proceeding
SME	Subject Matter Expert
SMS	Safety Management System
SMYS	Specified Minimum Yield Strength
SoCalGas	Southern California Gas Company
SOTA	State-Of-The-Art
SPD	Safety Policy Division
SPMR	Safety Performance Metrics Report
SRA	State Responsibility Area
SRP	Sensitive Relay Profiles
SSP	Shared Socioeconomic Pathway
SUG	Strategic Undergrounding
TIMP	Transmission Integrity Management Program
TLM	Transformer Load Monitoring
TRA	Ticket Risk Analysis
TSA	Transportation Security Administration
TTPs	Tactics, Techniques, and Procedures
TY	Test Year
UICS	Utility Incident Command System
USA	Underground Service Alert
USB	Underground Safety Board
UT	Ultrasonic Testing
Valve Rule	Valve Installation and Minimum Rupture Detection Standards Rule
VMA	Vegetation Management Area
VMS	Vegetation Management System
VPD	Vapor Pressure Deficit
VPNs	Virtual Private Networks
VSL	Value of Statistical Life
WACC	Weighted Average Cost of Capital
WCRC	Wildfire and Climate Resilience Center
WF	Wildfire and PSPS
WFI	Wireless Fault Indicator
WiNGS	Wildfire Next Generation System
WISQARS	Web-based Injury Statistics Query and Reporting System
WMP	Wildfire Mitigation Plan
WUI	Wildland Urban Interface

2025 Risk Assessment
Mitigation Phase

APPENDIX 2

RAMP Requirements Roadmap

May 15, 2025

2025 RAMP REQUIREMENTS COMPLIANCE ROADMAP

Unless otherwise indicated, the compliance citation applies to both SoCalGas and SDG&E

The tables that follow provide a general list of the RAMP requirements set forth in relevant Commission decisions that informed the content and presentation of SoCalGas's and SDG&E's 2025 RAMP Reports and/or workpapers and a roadmap to the general areas where those requirements are addressed. This list is not intended to capture every requirement, rather, it is provided as general guidance to help the reader navigate the Reports.

I. 2025 RAMP Report Requirements

D.18-12-014 – Settlement Decision

Topic	Requirement	Compliance
General	1. Identify top risks based on assessments for safety, reliability and financial attributes.	• Vol 1 RAMP-1 • Vol 1 RAMP-2
General	2. Describe the controls or mitigations currently in place to create a baseline for understanding how safety mitigation improves over time.	• Vol 2 All Risk Chapters
General	3. Present a plan for improving the mitigation of each risk.	• Vol 2 All Risk Chapters
General	4. Present two alternative mitigation plans that were considered.	• Vol 2 All Risk Chapters • Workpapers
General	5. Present an early stage "risk mitigated to cost ratio" or related optimization.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers
General	6. Identify lessons learned in the current round to apply in future rounds.	• Vol 1 RAMP-1 • Vol 1 RAMP-3
General	7. Use required probabilistic analysis and continue to move towards more probabilistic analysis.	• *See* RDF Row 5 • Vol 1 RAMP-3 • Workpapers
General	8. Continue to move towards improved data collection, provide a timeline for improvement.	• *See Data Availability Assessment. Report* filed on 12/6/24.

General	9. Describe Company's safety culture, executive engagement, organization and compensation policies.	• Vol 1 RAMP-4
General	10. Respond to immediate or short-term crises outside of the RAMP and GRC process.	• Vol 1 RAMP-4
D.21-11-009 - S-MAP Phase 1, Tracks 1 & 2		
Topic	**Requirement**	**Compliance**
Controls and Mitigations	OP1b. Each IOU shall evaluate all mitigations for efficacy and efficiency, whether the mitigation is "in process" or newly proposed; and	• Vol 2 Risk Chapters • Workpapers
Controls and Mitigations	OP1c. Each IOU shall calculate ~~RSEs~~ CBRs for all mitigations, including controls that are ongoing.	• Vol 1 RAMP-3 • Vol 2 Risk Chapters • Workpapers
PSPS Events	The IOUs shall treat PSPS events as a risk within the RDF framework, not just as a mitigation, just as they would for any other risk to safety, reliability, and finances. Similar to other risks, the IOUs shall address the likelihood and consequences of PSPS events in the RDF and in future RAMP filings.	• Vol 1 RAMP-1 • Vol 2 SDG&E-Risk-4: Wildfire and PSPS • Workpapers
Baselines	OP1d: Each IOU shall establish baselines for mitigation measures as follows: • The baseline is a reference point in time at the start of the new General Rate Case (GRC) cycle. • The baseline risk as applied to RAMP and GRC proceedings refers to the amount of residual risk evaluated at the baseline (i.e. at the start of the new GRC cycle) after taking into account all risk reduction benefits from all risk mitigation activities projected to have been performed by the start of the new GRC cycle. • The projected risk mitigation activities include those that are classified by the IOUs as controls, as well as all mitigation	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers

	activities for which the IOUs are seeking approval and/or funding in the current or upcoming RAMP and GRC applications.	
Foundational Programs	OP1e: Each IOU shall include the cost of foundational programs in their mitigation ~~RSE~~ CBR calculations if the aggregate cost over the upcoming GRC funding period of the foundational programs supporting a portfolio of risk mitigations exceeds the following: For SDG&E, for its electric and other operations, the lesser of $5 million, or 20 percent of the cost of the portfolio of enabled mitigations, subject to a minimum of $2.5 million for the percentage test; For SDG&E, for its gas operations, the lesser of $2.5 million, or 20 percent of the cost of the portfolio of enabled mitigations, subject to a minimum of $0.5 million for the percentage test; and, For SoCalGas, the lesser of $5 million, or 20 percent of the cost of the portfolio of enabled mitigations, subject to a minimum of $1 million for the percentage test.	• Vol 2 All Risk Chapters • Workpapers
Costs of Foundational Elements	OP1g: Each IOU shall incorporate the costs of foundational elements into the ~~RSEs~~ CBRs they present in their next RAMP filing, shall clearly and transparently explain and justify their chosen distribution of foundational costs to mitigations, and shall comply with applicable requirements of Decision (D.) 18-12-014 to explain their rationale and assumptions in categorizing foundational costs.	• Vol 2 All Risk Chapters • Workpapers

D.22-10-002 – S-MAP Phase 1 Track 3 & 4, Attachment A

Topic	Requirement	Compliance
Updating Cost and Other Information	19. The IOU's RAMP cost estimates shall include funding levels, unit costs, the scope of mitigation programs, and the source of estimates. • Where standard work units and unit costs are not available, the utilities will include an explanation as to why they are not available."	• Vol 2 All Risk Chapters • Workpapers
Historical Graphics	20. The IOUs shall provide graphics of historical progress in their RAMP reports that clearly illustrate what safety work has been accomplished and what work remains to be done. The graphics should be consistent with the IOU's safety goals and should provide information on risk mitigations and progress over at least the two immediately preceding RAMP cycles.	• Vol 2 All Risk Chapters

D.22-12-027 – S-MAP Phase 2 Decision

Topic	Requirement	Compliance
Value of Statistical Life (VSL) Calculation	Each IOU shall apply the most current published United States Department of Transportation (DOT) value of a statistical life (VSL), adjusted for the base year of their respective RAMP filing, as the standard value in expressing the Safety Attribute described in Appendix A in dollars. OP2: a.1) If applicable, each IOU shall justify its choice of an alternative VSL within the high and low ranges provided by the United States Department of Health and Human Services and provide a sensitivity analysis for the Cost-Benefit Ratio impact of its choice compared to the standard DOT VSL	• Vol 1 RAMP-1 • Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers

Value of Injury Prevention	OP2: a.ii) Each IOU shall apply one of two following methods for the dollar valuation of injury prevention, as defined in Appendix A, depending on the availability of data: (1) a serious injury as 0.25 of a fatality, or (2) the injury severity level using DOT estimates for the value of injury prevention as indicated here…….	• Vol 1 RAMP-1 • Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers
Electric Reliability Attribute	OP2: Each IOU shall use the most current version of the Lawrence Berkeley National Laboratory (LBNL) Interruption Cost Estimate (ICE) Calculator to determine a standard dollar valuation of electric reliability risk for the Reliability Attribute included in Appendix A. OP2 b.i) If applicable, each IOU shall <u>justify its choice of an alternative model</u> by providing an analysis comparing the results of its preferred alternative model to the results using the ICE Calculator.	• Vol 1 RAMP-1 • Vol 1 RAMP-3 • Vol 2: SDG&E-Risk-4, Risk-5 and SCG/SDG&E Risk-8 • Workpapers
Gas Reliability Attribute	OP2: c) Each IOU shall <u>apply a dollar value for gas reliability based on the implied value from their most recent Multi-Attribute Value Function Risk Score calculation</u> presented in their most recent RAMP or shall justify its choice of an alternative model by providing an analysis comparing the results of its preferred alternative model to the results using the implied values. If using the implied value from its most recent RAMP … for SDG&E and SoCalGas, use the 2021 RAMP filings,…	• Vol 1 RAMP-3 • Vol 1 RAMP-3 • Vol 2 SCG-Risk-1, 2, 3, and 4 • Vol 2 SDG&E-Risk-1, 2, and 3 • Workpapers
Environmental and Social Justice Pilot Study	OP 5 …Southern California Gas Company (SoCalGas), and San Diego Gas & Electric Company (SDG&E) (collectively investor-owned utilities or IOUs) shall each conduct an Environmental and Social Justice (ESJ) Pilot Study that includes consideration of Disadvantaged and Vulnerable Communities (DVCs)as defined in this decision and shall file the results of their Pilot studies as described in this decision with their next Risk Assessment Mitigation Phase (RAMP) filing.	• Vol 1 RAMP-1 • Appendix 4

Environmental and Social Justice Pilot Study CBO Feedback	OP 5 The IOUs shall provide timely information to Commission Energy Division Staff, who will consult with the Disadvantaged Communities Advisory Group (DACAG) and the Community-Based Organization Working Group (CBOWG) or their designees, prior to finalizing their ESJ Pilot Study plans. The IOUs shall work with Commission Energy Division Staff to make sure each utility's ESJ Pilot Study plan is on an appropriate DACAG and CBOWG meeting agenda in time for these groups to provide meaningful feedback on the plans. The IOUs shall each hold a public webinar on their ESJ Pilot Study during the planning phase of the pilot as described in this decision.	• Vol 1 RAMP-1 • Appendix 4
ESJ Pilot Study Wildfire Smoke	OP 7 …San Diego Gas & Electric Company, and Southern California Gas Company shall use public studies of the health impacts of wildfire smoke available in 2023 and thereafter to structure their risk methodology related to evaluating the estimated impacts from wildfire smoke in their Environmental and Social Justice Pilot Studies.	• Appendix 4

D.24-05-064 S-MAP Phase 3 Decision

Topic	Requirement	Compliance
Post Test Year Forecasting Requirement	All Controls and Mitigation programs must include CBRs in each of the GRC post-test years as well as an aggregate CBR for the entire post-test year period and the entire GRC period, by Tranche.	• Vol 1 RAMP-1 • Vol 2 RAMP-3 • Vol 2 All Risk Chapters • Workpapers
Climate Change Approaches	OP 3: Climate Adaptation and Vulnerability Assessment report, as required in D.20-08- 046, should be identified in the IOU's RAMP filings; d) should seek to avoid, if possible, any long-term asset investment strategy that would be at risk in the future because of climate change impacts.	• Vol 1 RAMP-5 • Vol 2 Risk Chapters, as applicable

Climate Change Approach - Data Analysis and Workpapers	May quantitatively consider climate change impacts in their Risk Assessment and Mitigation Phase (RAMP) filings, including through use of forecasts and Subject Matter Expert input. a) <u>Data and analysis used for this purpose</u> shall meet the data standards indicated in Decision 19-10-054 and more generally as adopted in Rulemaking 18-04-019 or a successor proceeding, as discussed in this decision, and <u>must be provided in full in work papers submitted at the time of the RAMP filing</u>	• NA
Climate Change Approach	b) When quantitatively considering climate change impacts in the RAMP filing, the IOUs should clearly identify the known climate hazards considered	• NA
Climate Change comportment with CAVA	c) Any assets identified by an IOU as at risk or vulnerable to climate change in its most recent Climate Adaptation and Vulnerability Assessment report, as required in D.20-08- 046, should be identified in the IOU's RAMP filings;	• Vol 1 SCG RAMP-5 • Vol 1 SDG&E RAMP-5 • Vol 2 SCG-Risk-2, 3, 4, 5, and 6 Vol 2 SDG&E Risk- 2, 3, 4, 5, and 7

D.24-05-064 – Phase 3 Attachment A

Topic	Requirement	Compliance
Building a Cost Benefit Approach – Step 1A, Row 2	<u>Principle 1.</u> <u>Attribute Hierarchy</u>: Attributes are combined in a hierarchy, such that the primary Attributes are typically labels or categories and the sub-Attributes are observable and measurable.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers
Building a Cost Benefit Approach – Step 1A, Row 3	<u>Principle 2.</u> <u>Measured Observations</u>: Each sub-Attribute has Levels expressed in Natural Units that are observable during ordinary operations and as a Consequence of the occurrence of a Risk Event.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters
Building a Cost Benefit Approach – Step 1A, Row 4	<u>Principle 3.</u> <u>Comparison</u>: Use a measurable proxy for an Attribute that is logically necessary but not directly measurable. This principle only applies when a necessary Attribute is not directly measurable. For example, a measure of the number of complaints about	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters/ Attachment B where applicable • Workpapers

	service received can be used as a proxy for customer satisfaction."	
Building a Cost Benefit Approach – Step 1A, Row 5	Principle 4. Risk Assessment: When Attribute Levels that result from the occurrence of a Risk Event are uncertain, assess the uncertainty in the Attribute Levels by using expected value or percentiles, or by specifying well-defined probability distributions, from which expected values and tail values can be determined. Monte Carlo simulations or other similar simulations (including calibrated subject expertise modeling), among other tools, may be used to satisfy this principle.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters/Attachment B • Workpapers
Building a Cost Benefit Approach – Step 1A, Row 6	Principle 5. Monetized Levels of Attributes: Apply a monetized value to the Levels of each of the Attributes using a standard set of parameters or formulas, from other government agencies or industry sources, as determined by the Phase II Decision Adopting Modifications to the Risk-Based Decision-Making Framework Adopted in D.18-12-014 and Directing Environmental and Social Justice Pilots in Rulemaking (R.) 20-07-013. A utility may deviate from the agreed upon standard set of parameters or formulas by submitting a detailed explanation as to why the use of a different value would be more appropriate. The use of a different set of parameters or formulas to determine the Monetized Levels of Attributes requires an analysis comparing the results of its "equivalent or better" set of parameters or formulas against the results of the agreed upon standard set of parameters or formulas"	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Workpapers
Building a Cost Benefit Approach – Step 1A, Row 7	Principle 6. Risk Adjusted Attribute Levels: Apply a Risk Scaling Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Attribute Levels. The Risk Scaling Function is an adjustment made in the risk model due to different magnitudes of Outcomes, which can capture aversion or indifference	• Vol 1 RAMP-3 • Vol 2 SDGE-Risk-4 • Workpapers

	towards those Outcomes. The Risk Scaling Function can be Linear or convexly non-Linear. For example, the Risk Scaling Function is Linear to express indifference if avoiding a given change in the Monetized Attribute Level does not depend on the Attribute Level. Alternatively, the Risk Scaling Function is convexly non-Linear to express aversion if a change in the Attribute level results in an increasing rate of change in the Risk-Adjusted Monetized Attribute Level as the Level of the Attribute increases.	
Benefit Approach – Step 1A, Row 7	When completing Rows 5 and 24 in the RDF, if a utility chooses to address tail risk using the power law or other statistical approach and chooses to present Risk-Adjusted Attribute Levels by relying on a convex scaling function, then it must supplement its analysis by also presenting Risk-Adjusted Attribute Levels by relying on a Linear scaling function.	• Vol 1 RAMP-3 • Vol 2 SDG&E-Risk-4 • Workpapers
Identify Risks for the Enterprise Risk Register Step 1B, Row 8	<u>Risk Identification and Definition:</u> Utilities' risks are defined in their respective Enterprise Risk Registers. The Enterprise Risk Register is the starting point for identifying the risks that will be included in the RAMP. The process for determining these risks will be described in the RAMP. The RAMP will consider risks using the same risk definitions as in the ERR.	• Vol 1 RAMP-2 • Vol 1 RAMP-3 • Vol 2 – All Risk Chapters
	Each RAMP filing will highlight any changes to the ERR from the previous RAMP or GRC filings	• Vol 1 RAMP-2 • Vol 2 All Risk Chapters
Risk Assessment and Risk Ranking in Preparation for RAMP Step 2A, Row 9	<u>Risk Assessment:</u> Using the Cost-Benefit Approach developed in accordance with Step 1A, for each Risk included in the Enterprise Risk Register, the utility will compute a monetized Safety Risk Value using only the Safety Attribute. The utility will sort its ERR Risks in descending order by the monetized Safety Risk Value. For the top 40% of ERR risks with a Safety Risk Value greater than zero dollars, the utility will compute a monetized Risk Value using at least the	• Vol 1 RAMP-1 • Vol 1 RAMP-2 • Vol 1 RAMP-3

	Safety, Reliability and Financial Attributes to determine the output for Step 2A. The output of step 2A, along with input from stakeholders described in Row 12 below, will be used to decide which risks will be addressed in the RAMP.	
Identification of Potential Consequences of Risk Event Step 2A, Row 10	The identified potential Consequences of a Risk Event should reflect the unique characteristics of the utility. For each enterprise risk, the utility will use actual results, available and appropriate data (e.g., Pipeline and Hazardous Materials Safety Administration data), and/or Subject Matter Experts (SMEs) to identify potential Consequences of the Risk Event, consistent with the Cost-Benefit Approach developed in Step 1A. The utility should use utility specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. Similarly, if data reflecting past results are used, that data must be supplemented by SME judgment that takes into account the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission.	• Vol 2 All Risk Chapters, Attachment B • Workpapers
Identification of the Frequency of the Risk Event Step 2A, Row 11	The identified Frequency of a Risk Event should reflect the unique characteristics of the utility. For each enterprise risk, the utility will use actual results and/or SME input to determine the annual Frequency of the Risk Event. The utility should use utility specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. In addition, if data reflecting past results are used, that data must be supplemented by SME judgment that takes into account the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission.	• Vol 2 All Risk Chapters, Attachment B • Workpapers

	The utility will take into account all known relevant Drivers when specifying the Frequency of a Risk Event. Drivers should reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset. For example, where applicable, Drivers may include: the presence of corrosion, vegetation, dig-ins, earthquakes, windstorms or the location of a pipe in an area with a higher likelihood of dig-ins.	
Selecting Enterprise Risks for RAMP Step 2B, Row 12	Risk Selection Process for RAMP: Using the analysis performed in Step 2A, the utility will preliminarily select risks to be included in the RAMP. The utility will host a publicly noticed workshop, to be appropriately communicated to interested parties and at a minimum, should include the CPUC's Safety Policy Division (SPD), to gather input from SPD, other interested CPUC staff, and interested parties to inform the determination of the final list of risks to be included in the RAMP. Based on input received from SPD, other interested CPUC staff, and interested parties, the utility will make its determination of the final list of risks to be addressed in its RAMP. The rationale for taking or disregarding input during the workshop will be addressed in the utility's RAMP.	• Vol 1 RAMP-1 • Vol 1 RAMP-2 • Vol 1 RAMP-3
Calculation of Risk Step 3, Row 13	For purposes of the Step 3 analysis, pre- and post-mitigation risk will be calculated by multiplying the Likelihood of a Risk Event (LoRE) by the Consequences of a Risk Event (CoRE). The CoRE is the sum of each of the Risk-Adjusted Attribute Values using the utility's full Cost-Benefit Approach.	• Vol 2 All Risk Chapters
Definition of Risk Events and Tranches Step 3, Row 14	Detailed pre- and post-mitigation analysis of Mitigations will be performed for each risk selected for inclusion in the RAMP. The utility will endeavor to identify all asset groups or systems subject to the risk and each Risk Event associated with the risk. For example, if	• Vol 1 RAMP 3 • Vol 2 All Risk Chapters, Attachment D • Appendix 3

	Steps 2A and 2B identify wildfires associated with utility facilities as a RAMP Risk Event, the utility will identify all Drivers that could cause a wildfire and each group of assets or systems that could be associated with the wildfire risk, such as overhead wires and transformers.	• Workpapers
	For each Risk Event, the utility will subdivide the group of assets or the system associated with the risk into Tranches. Risk reductions from Mitigations and Cost Benefit Ratios will be determined at the Tranche level, which gives a more granular view of how Mitigations will reduce Risk.	
	The determination of Tranches will generally be based on how the risks, as a product of LoRE and CoRE, and assets are managed by each utility, data availability and model maturity, and strive to achieve as deep a level of granularity as reasonably possible. The rationale for the determination of Tranches, or for a utility's judgment that no Tranches are appropriate for a given Risk Event, will be presented in the utility's RAMP submission.	
	For the purposes of the risk analysis, all of the elements (i.e., assets or system) that are scoped for a given RAMP and GRC Application and contained within the identified Tranche would be considered to have homogeneous risk profiles, meaning they should have the same LoRE and CoRE.	
	The best practice for determining the homogeneity of risk profiles in reporting Tranches is the use of quintiles of LoRE and quintiles of CoRE, resulting in 25 reporting tranches. The utility can and should submit more granular data in workbooks included with RAMP and GRC filings if it is available. If the assets or system associated with a given risk are less than 25 in number, the utility may use an alternative means of determining homogeneity of risk profiles,	

	including quartiles or other smaller divisions of LoRE and CoRE, but this alternative means must be described in detail in the RAMP filing.	
	If a utility desires to use an alternative determination of Tranches not reflecting 25 homogenous risk profiles based on LoRE and CoRE, or they wish to use a percentile ranking approach that would result in more than 25 reporting Tranches, the utility must submit a White Paper describing their preferred method for determining Tranches and relevant workpapers to SPD no later than 45 days before their first pre-RAMP workshop and must serve the White Paper to the service list of R.20-07-013 or a successor proceeding as well as the service list of the utility's most recent RAMP application no later than 45 days before their first pre-RAMP workshop. Staff and parties may provide input on the IOU's White Paper within the 21 days of the submittal. The utility must also include the White Paper in its RAMP filing, clearly indicating any changes to the previously served version. An IOU may submit this White Paper without prejudice to the right of parties to the RAMP or GRC to challenge such alternative determination of tranches.	• Vol 1 RAMP-3 • Appendix 3 • Workpapers
Bow Tie Step 3, Row 15	For each risk included in the RAMP, the utility will include a Bow Tie illustration. For each Mitigation presented in the RAMP, the utility will identify which element(s) of its associated Bow Tie the Mitigation addresses.	• Vol 1 RAMP-2 • Vol 2 All Risk Chapters
Expressing Effects of a Mitigation, Step 3, Row 16	The effects of a Mitigation on a Tranche will be expressed as a change to the Tranche-specific pre-mitigation values for LoRE and/or CoRE. The utility will provide the pre- and post-mitigation values for LoRE and CoRE determined in accordance with this Step 3 for all Mitigations subject to this Step 3 analysis.	• Vol 1 RAMP-3 • Appendix C • Workpapers

Determination of Pre-Mitigation LoRE by Tranche Step 3, Row 17	The pre-mitigation LoRE is the probability that a given Risk Event will occur with respect to a single element of a specified Tranche over a specified period of time (typically a year) in the planning period, before a future Mitigation is in place.	• Instructional, informs workpapers
Determination of Pre-Mitigation CoRE Step 3, Row 18	The pre-mitigation CoRE is the sum of each of the pre-mitigation Risk-Adjusted Attribute Values using the utility's full Cost-Benefit Approach. The CoRE is calculated using the full Cost-Benefit Approach tool constructed consistent with Step 1A above.	• Instructional, informs workpapers
Determination of Post-Mitigation LoRE Step 3, Row 20	The monetized pre-mitigation risk value will be calculated as the product of the pre-mitigation LoRE and the pre-mitigation CoRE for each Tranche subject to the identified Risk Event.	• Instructional, informs workpapers
Determination of Post-Mitigation CoRE Step 3, Row 21	The post-mitigation LoRE calculation will be conducted at the same level of granularity as the pre-mitigation risk analysis within Step 3. The calculated value is the probability of occurrence of a Risk Event after the future Mitigation is in place.	• Instructional, informs workpapers
Measurement of Post-Mitigation Monetized Risk Value Step 3, Row 22	The monetized post-mitigation risk value will be calculated as the product of the post-mitigation LoRE and post-mitigation CoRE for each Tranche subject to the identified Risk Event.	• Instructional, informs workpapers
Measurement of Risk Reduction Provided by Mitigation Step 3, Row 23	The risk reduction provided by a risk mitigation will be measured as the difference between the values of the monetized pre-mitigation risk value and the monetized post-mitigation risk value.	• Instructional, informs workpapers

Use of Expected Value for CoRE; Supplemental Calculations Step 3, Row 24	In the case of wildfire risks, if the utility choose to present an Alternative Analysis regarding tail value, the utility: (a) should use a truncated power law distribution method as a best practice by conducting multiple tests of truncation values to determine goodness of fit to existing data and then include the results in their RAMP application; and, (b) may use an alternative modeling method to the truncated power law, and submit to SPD and serve to the service list of R.20-07-013, or a successor proceeding, and the utility's most recent RAMP application proceeding a White Paper and related workpapers clearly justifying its approach no later than 45 days before its first pre-RAMP workshop. Staff and parties may provide input on the IOU's White Paper within 21 days of the submittal. The utility must also include the White Paper in its RAMP filing, clearly indicating any modifications to the earlier served version.	• Instructional, informs workpapers • Vol 2 SDG&E Risk-4
Cost-Benefit Ratios Calculation Step 3, Row 25	The Cost-Benefit Ratio calculation should be calculated by dividing the dollar value of Mitigation Benefit by the Mitigation cost estimate. • The values in the numerator and denominator should be present values to ensure the use of comparable measurements of Benefits and costs. • The Benefits should reflect the full set of Benefits that are the results of the incurred costs. When calculating CBRs for each mitigation, the IOUs must provide the following three scenarios: a) Societal Discount Rate Scenario b) Weighted-Average Cost of Capital Discount Rate Scenario, and c) Hybrid Discount Rate Scenario For capital programs, the costs in the denominator should include incremental expenses made necessary by the capital investment.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Appendix 5 • Instructional, informs workpapers

Mitigation Strategy Presentation in the RAMP and GRC Step 3, Row 26	The utility's RAMP filing will provide a ranking of all RAMP Mitigations by Cost-Benefit ratios. In the GRC, the utility will provide a ranking of Mitigations by Cost Benefit Ratios, as follows: (1) For Mitigations addressed in the RAMP, the utility will use risk reduction estimates, including any updates, and updated costs to calculate Cost-Benefit Ratios and explain any differences from its RAMP filing; (2) For Mitigations that require Step 3 analysis under and consistent with Row 28, the utility will include the Cost-Benefit Ratios, calculated in accordance with Step 3, in the ranking of Mitigations by Cost-Benefit Ratios. In the RAMP and GRC, the utility will clearly and transparently explain its rationale for selecting Mitigations for each risk and for its selection of its overall portfolio of Mitigations. The utility is not bound to select its Mitigation strategy based solely on the Cost-Benefit Ratios produced by the Cost-Benefit Approach. Mitigation selection can be influenced by other factors including, but not limited to, funding, labor resources, technology, planning and construction lead time, compliance requirements, Risk Tolerance thresholds, operational and execution considerations, and modeling limitations and/or uncertainties affecting the analysis. In the GRC, the utility will explain whether and how any such factors affected the utility's Mitigation selections.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters • Appendix 5 • Workpapers
Dynamic Analysis Step 3, Row 27	If LoRE or CoRE is expected to change substantially over time due to factors such as asset age, asset condition, and varying effect of Mitigation over time, these changes should be specified and	• Vol 1 RAMP-3 • Workpapers

	incorporated into the calculation of monetized pre- and post-mitigation risk values and Cost-Benefit Ratios. One means of incorporating these changes is by the use of the dynamic analysis demonstrated by the Joint Intervenors in the test drive problems for high pressure gas pipelines for PG&E and SoCalGas/SDG&E in Phase 2 of A.15-05-002 et al	
Transparency in RAMP and GRC – Results can be understood Step 3, Row 29	Inputs and computations for the Steps described in this document should be clearly stated and defined in RAMP and, when applicable, the GRC. The sources of inputs should be clearly specified. When SME judgment is used, <u>the process that the SMEs undertook to provide their judgment should be described</u>. Any questionnaire or document used to solicit SME judgment will be made available to the CPUC and parties upon request. The utility should specify all information and assumptions that are used to determine both monetized pre- and post-mitigation risk values.	• Vol 1 RAMP-3 • Vol 2 All Risk Chapters, Attachment B and Attachment D • Workpapers
Sensitivity Analysis Step 3, Row 30	The utility will <u>identify critical parameters and assumptions made in performing the risk analysis and explain why such parameters are critical</u>. The utility will <u>be prepared to complete a sensitivity analysis</u> of its results when requested. Intervenors may request sensitivity analyses via the discovery process.	• Vol 1 RAMP-3

2025 Risk Assessment Mitigation Phase

APPENDIX 3

White Paper Describing Alternative Tranching Method

May 15, 2025

White Paper Describing Alternative Tranching Method of Southern California Gas Company and San Diego Gas & Electric Company

November 1, 2024

Table of Contents

I. Introduction and Purpose

This paper describes Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company's (SDG&E) (together, the Companies) approach to tranching risk for their respective Risk Assessment and Mitigation Phase (RAMP) application and report to be filed with the California Public Utilities Commission (CPUC or Commission) in May 2025.[1]

By initiating Rulemaking (R.) 20-07-013 the Commission set in motion an iterative and collaborative process of risk-based evaluation and prioritization of safety-based utility activity and risk mitigation. Through the phased approach of the Safety Model Assessment Proceeding (S-MAP) and the resultant Risk-Based Decision-Making Framework (RDF), the utilities, intervenors, and the Commission continue to participate in shaping an evolving construct that informs the Commission regarding safety related forecasted and risk mitigation spending through the RAMP and related assessment reports.[2] Decision (D.) 24-05-064 (the Phase 3 Decision) provides the most current guidance and revisions to the RDF while affording flexibility such that the utilities can consider the most appropriate method of evaluating and presenting certain of their data.[3] Specifically, as being presented here, the RDF's Cost Benefit Approach[4] offers the utilities the option to use an approach adopted by the Commission in the Phase 3 Decision, or to develop and adopt an alternative approach to the tranching of its risk portfolio, and explain the alternative approach through a white paper provided a minimum of 45 days prior to the date of its pre-RAMP workshop. Staff and parties have 21 days from submittal to provide input on the White Paper, and the alternative approach will be discussed in the Companies' RAMP Risk workshop. SoCalGas and SDG&E appreciate the opportunity to present an alternative tranching methodology to support the thoughtful consideration and transparent assessment by the Commission and intervenors of the broad portfolio of risks and mitigation activities to be presented in their respective RAMP reports.

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1 A "tranche" is a "[a] logical disaggregation of a group of assets (physical or human) or systems into subgroups with like characteristics for purposes of risk assessment." D.21-11-009, Appx. D. For purposes of this whitepaper, "tranching" refers to the act of dividing assets into tranches to be used in RAMP analysis.

2 Risk Spend Accountability Report (RSAR), Safety Performance Metric Report (SPMR), and the Risk Mitigation Accountability Report (RMAR).

3 Another example of options afforded in the Cost Benefit Approach is the alternative to the Department of Transportation Value of a Statistical Life (VSL) and dollar value of electric and gas reliability (Phase 2 Decision); and tail risk consequence modeling (Phase 3 Decision).

4 D.24-05-064, Appendix A "Risk-Based Decision Framework".

As described herein, the Companies' tranching approach is designed to promote the following goals to advance the Commission's overall RDF objectives:

- Achieve data-driven results;
- Promote increased transparency and granularity;
- Establish measurable LoRE and/or CoRE distinction between tranches;
- Align with and inform risk mitigation efforts compatible with the Companies' existing and prospective operating procedures; and
- Result in homogenous risk profiles (to the extent possible based on available data).

The Companies tested the development of tranches in accordance with the Commission's Risk-Based Decision-Making Framework RDF Cost Benefit Approach, Step 3, Row 14, as recently revised via the Phase 3 Decision (Phase 3 Tranching Approach). The results of this testing, discussed further below, indicate the methodology may not best enable achievement of the Commission's RDF objectives.

Following testing of the Phase 3 Tranching Approach (PTTA), the Companies developed and describe herein an alternative Homogenous Tranching Method (or HTM) that they believe is better suited to the achievement of Commission's RDF objectives. This methodology, to be used to develop their 2025 RAMP reports, builds upon the PTTA and provides greater flexibility such that it can be applied to all of the Companies' diverse RAMP risks.[5] The HTM is designed to prevent potential information loss observed in PTTA testing, by identifying the specific Risk Profiles (Classes) targeted by the Risk-Treatment,[6] the particular risk levels within Classes that the Risk Treatment predominantly reduces, and the specific LoRE/CoRE regions within those risk levels that are most affected.[7] Importantly, the HTM enhances the ability of the Commission to identify the "riskiest portions of [a utility's]

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[5] The Companies met with the Commission's Safety Policy Division (SPD) staff on September 10, 2024 and October 14, 2024 to discuss their observations and HTM approach.

[6] According to the International Organization for Standardization (ISO) 31000:2018, risk treatment involves the process of selecting and implementing measures to modify risk. This can include avoiding the risk, taking or increasing the risk to pursue an opportunity, removing the risk source, changing the likelihood, changing the consequences, sharing the risk, or retaining the risk by informed decision. For purposes of this whitepaper, the Companies use the term "risk treatment" to refer to a risk control or mitigation in the RAMP context.

[7] LoRE is the likelihood of a risk event. D.21-11-009, Appx. D at 2. CoRE refers to the consequences of a risk event. *Id.* at 1. A LoRE/CoRE pairing is a likelihood and resulting consequence of a risk event that can be combined in an ordered pair and plotted on an x-y plane, and a LoRE/CoRE region is a collection of LoRE/CoRE pairs that are in relatively close proximity to one another on an x-y plane.

infrastructure and/or management system," consistent with the Phase 3 Decision's stated objectives.[8]

Section II of this paper describes the PTTA testing, results, and observations leading to the development of the HTM and this whitepaper.

Section III describes the HTM approach the Companies have developed to tranche their risks, which include preliminary RAMP Risks, including Medium Pressure Gas, High Pressure Gas, Gas Excavation Damage, Gas Storage (SoCalGas only), Wildfire & PSPS (SDG&E only), Electric Infrastructure Integrity (EII) (SDG&E only), Employee Safety, Contractor Safety, and Cybersecurity.

The Companies note that analysis of risks and preparation for their respective RAMP filings are ongoing. Thus, the results used for purposes of testing the PTTA and for developing and testing the HTM are preliminary and subject to further adjustment and assessment.

II. The Phase 3 Decision's Tranching Methodology (PTTA): Testing, Observations, and Challenges

A. The PTTA: Definition and Objectives

The Phase 3 Decision adopted the PTTA for tranching (segmenting) risks and "requir[es utilities] to use this approach to determine tranches in most cases," while allowing for flexibility.[9] The PTTA is described in the Phase 3 Decision as follows:

> The best practice for determining the homogeneity of risk profiles in reporting Tranches is the use of quintiles of LoRE and quintiles of CoRE, resulting in 25 reporting tranches. The utility can and should submit more granular data in workbooks included with RAMP and GRC filings if it is available, but that more granular data shall be aggregated into at least 25 reporting tranches with homogeneous risk profiles. If the assets or system associated with a given risk are less than 25 in number, the utility may use an alternative means of determining homogeneity of risk profiles, including quartiles or other smaller divisions of LoRE and CoRE, but this alternative means must be described in detail in the RAMP filing.
>
> If an IOU prefers to determine tranches not based on homogeneous risk profiles using LoRE and CoRE quintiles, or they wish to use a percentile ranking approach that would result in more than 25 reporting tranches, the IOU must submit a White Paper describing its preferred method for

[8] D.24-05-064 at 28.

[9] D.24-05-064 at 26-27.

> determining tranches along with relevant workpapers to SPD no later than 45 days before their first pre-RAMP workshop and must serve the White Paper to the service list of R.20-07-013 on the same timeframe. Staff and Parties may provide input on the IOU's White Paper on an alternative approach to creating tranches within 21 days of the submittal. This alternative approach to creating tranches shall be discussed in the pre-RAMP workshop, a requirement that reflects the first of the IOUs' two proposed approaches. The IOU must also include the White Paper in its RAMP filing, clearly indicating any changes to the previously served version.[10]

The PTTA articulates, among other things, two core objectives for tranching:

1) The number of tranches for each risk should be the result of pairing each of five equal Likelihood of Risk Event subdivisions (LoRE quintiles) with each of five equal Consequence of Risk Event subdivisions (CoRE quintiles), or a total of twenty-five tranches,[11] and

2) Each resultant tranche should feature "homogeneity of risk profiles;" that is, all of the events within a tranche should be similarly "risky" and have the same LoRE and CoRE.

Further, the Risk OIR Phase 3 Decision concludes that the approach should provide benefits to "understand[ing] if a utility is requesting funding for mitigations in the riskiest portions of their infrastructure and/or management system," as follows:[12]

> Filing of RAMP analyses using LoRE/CoRE quintile tranches will aid the Commission and [help] parties understand if a utility is requesting funding for mitigations in the riskiest portions of their infrastructure and/or management system. This is essential if the Commission is to ensure strategic targeting of mitigations such that the greatest risk reduction benefits are achieved at the lowest cost, while taking into account the need to minimize risks as quickly as possible. Ensuring the greatest risk reduction benefits are achieved at the lowest cost is essential to ensuring just, reasonable, and affordable rates.

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[10] D.24-05-064 at 26-27.

[11] Quintiles are achieved when a grouping is divided into five (5) equal subgroups. Alternatively, the Companies understand from their meetings with SPD that SPD considers other "quantile" subdivisions - such as quartiles (four equal subgroups) or terciles (three equal subgroups) – to be consistent with the PTTA.

[12] D.24-05-064 at 28.

B. Testing the PTTA

With the intent of understanding, empirically, the implications of fitting real data into the PTTA, the Companies tested the PTTA on preliminary unscaled model results for SoCalGas medium-pressure gas pipeline system (MP Gas) and SDG&E Wildfire without PSPS, as well as for a randomly generated risk example from a uniform distribution.

Specifically, the Companies divided the LoREs and CoREs into "quintiles" consistent with the above-described methodology. A quintile is defined as a quantile for the special case of five equal proportions.[13] Although the quintile concept inherently reflects equal divisions, the Phase 3 Decision did not provide clear guidance on how to accomplish proportional "equality."

The Companies interpret the term "equal" such that the modelled LoREs and expected value CoREs would each be divided into five groups of near-equal size.[14] This is accomplished using percentiles, *i.e.*, by sorting the LoREs from smallest to largest and then defining group boundaries at the 20%, 40%, 60%, and 80% LoRE quantiles. This process can be repeated using the CoREs to obtain the CoRE quintiles. Each LoRE and corresponding CoRE can be expressed as an ordered pair (*i.e.,* ($LoRE_i$, $CoRE_i$)) and plotted on an x-y axis, with a 5x5 grid to demarcate the boundaries for the LoRE and CoRE quintiles. In this graphical representation, there would be a near equal number of LoRE/CoRE pairs in each column (the quintiles of LoRE) and a near equal number of LoRE/CoRE pairs in each row (the quintiles of CoRE) (*see* Figure 1, 2 and 3 below). This maximizes the likelihood of having an equal number of pairs within each LoRE/CoRE tranche, thereby reducing the likelihood of having empty tranches[15] or tranches with a disproportionately high number of pairs.

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13 *See, e.g.,* Cambridge Dictionary, *available at* *https://dictionary.cambridge.org/us/dictionary/english/quintile* (defining quintile as "one of five equal measurements that a set of things can be divided into").

14 The term "near-equal" alludes to the fact that dividing into five equal groups may not be possible. For example, in the case where the number of points is not evenly divisible by 5, it is not possible that all 5 groups will have the exact same number of points.

15 An empty tranche results from developing 25 tranches in accordance with the PTTA approach and determining that certain of the tranches have no actual risk associated with them. An empty tranche is essentially no tranche at all – *i.e.,* it is a dummy tranche that is created solely for the purpose of adhering to the PTTA. For this reason, the Companies have adopted an approach that avoids empty tranches.

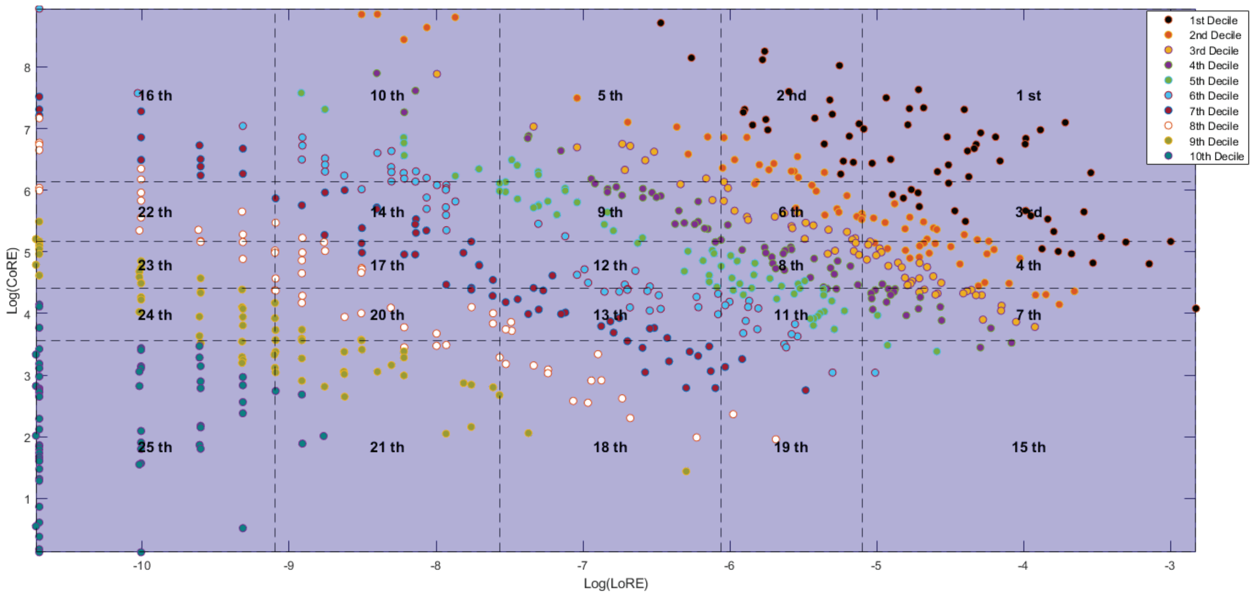

Figure 1. Preliminary Unscaled Wildfire without PSPS Log-Log plot of LoRE/Expected CoRE Quintile Approach. For added information, the pairs are identified by color to which risk decile they belong to. The numbers within the tranche regions define the order of the tranches from the highest resulting risk to the lowest.

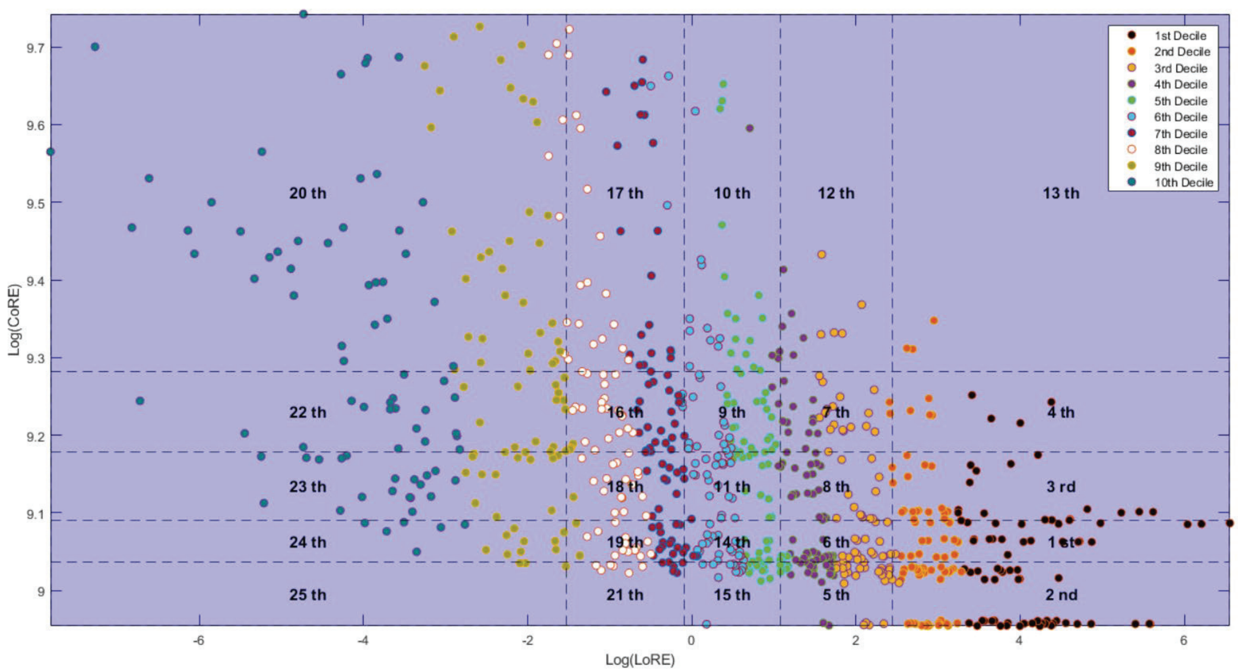

Figure 2. Preliminary Unscaled SoCalGas Medium Pressure Pipe Mains and Services Log-Log plot of LoRE/Expected CoRE Quintile Approach. For added information, the pairs are identified by color to which risk decile they belong to. The numbers within the tranche regions define the order of the tranches from the highest resulting risk to the lowest.

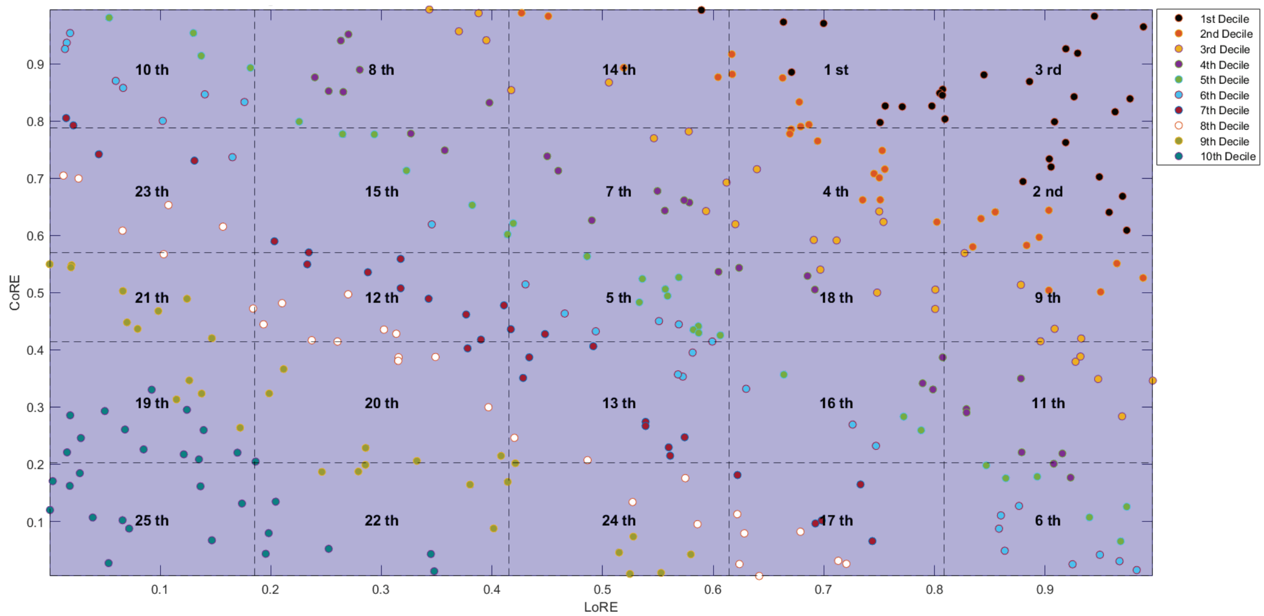

Figure 3. Randomly Generated LoRE/ CoRE pairs from a uniform distribution. For added information, the pairs are identified by color to which risk decile they belong to. The numbers within the tranche regions define the order of the tranches from the highest resulting risk to the lowest.

Conversely, an alternative interpretation of "equal" could involve dividing the LoREs and CoREs into five groups with equidistant boundaries (*e.g.*, if the dataset ranges from 0 to 50, the groups would be defined by values between 0-10, 10-20, etc.) Unless the data is perfectly uniformly distributed, however, this method would not result in an equal number of LoREs or CoREs in each quintile, making it impossible to have an equal number of pairs within each tranche. For instance, if one LoRE quintile has 20 values and another has 10, graphically, one column would have 20 pairs and another would have 10 pairs. Consequently, it would be impossible for the 10 tranches resulting from dividing these two columns by the CoRE quintile boundaries to have an equal number of pairs.

Even with a near-equal number of LoRE/CoRE pairs along a single dimension, SoCalGas and SDG&E still observed that, unless these pairs are scattered in a precisely uniform manner in both dimensions, the groups necessarily will have an unequal number of pairs in each quintile tranche and may result in empty tranches. For example, the 5x1 tranche (*i.e.*, the 5th LoRE column from left and 1st CoRE row from the bottom) in Figure 1 holds only five pairs, while the 5x2 tranche holds over 30 pairs. Even in the case of a uniformly distributed example, as seen in Figure 3, the number of pairs vary from one quintile tranche to the next, which demonstrates that a precise uniform distribution of the LoRE/CoRE pairs is an extreme case. This effect can lead to both clustering and sparsity in the data. For example, a tranche might exhibit a relatively high total risk score compared to other tranches due to a dense concentration of LoRE/CoRE pairs. However, these pairs may not necessarily correspond to the highest risk segments within that risk chapter.

C. Observations: Information Loss

The analysis reveals inconsistencies between the PTTA objective to develop tranches with "homogeneity of risk profiles" and the guidance to produce twenty-five tranches reflective of each possible pairing of LoRE and CoRE quintiles.[16]

SoCalGas and SDG&E observed that the risk (LoRE x CoRE) of similar levels will scatter across many quintile tranches. As a result, a quintile tranche can aggregate the highest risk pairs with some of the lowest risk pairs. In Figure 1, the Companies see that the first decile risks are mixed with the fifth decile risks. By "decile of risk," the Companies mean that the risks computed from the LoRE/CoRE pairs are divided into 10 risk quantiles. This is done by ordering the risks from highest to lowest and then grouping them into 10 nearly equal groups. The first decile represents the top 10% of risk, the second decile represents the next top 10% of risk, and so on. This type of aggregation can lead to potentially minimizing the presence of risk with respect to specific assets.

The Companies also observe that broadly applying the PTTA to an entire risk chapter could mix unlike risk profiles in a way that does not best represent the differences in risk profiles of the assets within the risk. For example, SoCalGas's Medium Pressure system includes a variety of above and below ground assets such as pipeline mains and services, regulator stations, risers, and meter set assemblies (MSAs). Applying a tranching algorithm to the entire system could result in gas mains, regulators, and risers being grouped together into a single tranche. This approach does not best represent risk profiles, as these assets require different risk treatments and largely are not physically connected. Therefore, while these assets may be regarded under the same RAMP risk chapter (*i.e.,* Medium Pressure Gas System), it makes sense to view the assets separately. This is consistent with the Phase 3 Decision's intended benefit of the PTTA, in part, to identify "the riskiest portions of [a utility's] infrastructure and/or management system. . . ."[17]

Overall, the Companies observed that many of the resultant tranches include a heterogeneous mix of risk events, often related to multiple asset types with uncorrelated risk treatments. Consequently, the resulting PTTA tranches are not homogenous. This ultimately limits the ability of this methodology to support the Commission's risk-informed decision-making objectives.

D. The Challenge: Preventing Information Loss and Meeting RDF Objectives

In light of the findings of their PTTA analysis, the Companies developed an alternative

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[16] *See* D.24-05-064 at 26-27.

[17] D.24-05-064 at 28.

HTM.[18] The Companies will apply the HTM to all their RAMP risks to provide greater transparency and better inform the Commission and interested stakeholders. To prevent the information loss and lack of risk homogeneity identified during testing of the PTTA and ultimately better-inform the Commission's decision-making process, the HTM strives to achieve three objectives:

1. Promote homogeneity of risk profiles within tranches;
2. Establish tranches on the basis of LoRE x CoRE pairings; and
3. Better align the tranches with risk treatments.

The HTM allows for a risk to be broken down into Classes, or groups of assets with similar risk profiles. The method further disaggregates the risk within a Class into different risk levels, and then divides the risk levels into similar LoRE/CoRE regions. This offers the advantage of identifying the specific Risk Profiles (Classes) targeted by the Risk-Treatment, the particular risk levels within these Classes that the treatment predominantly reduces, and the specific LoRE/CoRE regions within those risk levels that are most affected.

III. The Homogenous Tranche Method (HTM)

A. The HTM Delivers Homogenous Risk Profiles and Other RDF Objectives

The HTM alternative provides a rigorously defined algorithm that addresses unfavorable PTTA observations while delivering, where possible, "homogenous risk profiles," meaning all of the elements within the tranche should be of the same risk profile, at the same risk quantile, and divided into similar LoRE/CoRE regions. The HTM aims to meet this objective while preserving the critically distinct characteristics within the risk. As a result, when a risk-treatment is analyzed, it is clear what risk profile (*e.g.*, gas regulators), what level of risk (*e.g.*, the top 20%), and of which LoRE/CoRE nature (*e.g.*, lower LoRE/upper CoRE) are most affected. This provides a clearer picture of risk treatment that enhances the Commission's ability to identify the "riskiest portions of [a utility's] infrastructure and/or management system," consistent with the Phase 3 Decision's stated objectives.[19]

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18 D.24-05-064, Appendix A, Step 3 provides that utilities "may use an alternative modeling method to the truncated power law and submit to SPD and serve to the service list of R.20-07-013, or a successor proceeding, and the utility's most recent RAMP application proceeding a Whitepaper and related workpapers clearly justifying its approach no later than 45 days before its first pre-RAMP workshop."

19 D.24-05-064 at 28.

B. The Step-by-Step Methodology and Graphical Representations

The HTM approach differs from the PTTA at the outset by identifying each of the Classes that make up the risk.

The steps for the HTM are as follows:[20]

Step 1. Organize the granular level risk and associated LoRE/CoRE pairs, the starting LoRE/CoRE pairs, into groups, referred to as "Classes," based on similar risk profiles (*e.g.*, Mains, Regulators, Risers).

Step 2. Within each Class, rank the risk scores (LoRE x CoRE) into quantiles using the following algorithm. A K-quantile is defined here as a quantile of order K (*e.g.*, tercile (2-quantile), quartile (4-quantile)). And N is defined here as the number of starting LoRE/CoRE pairs within the Class.

1) If N is less than 8, then $K = 1$ and you can move to Step 3.

2) If N is not less than 8, find the whole number K such that the following inequality is satisfied:

$$\min\left(\frac{N}{8} - 1,9\right) < K \leq \min\left(\frac{N}{8}, 10\right),$$

then continue to Step 3.

Step 3. For each risk K-quantile from Step 2, create up to four homogenous LoRE/CoRE Tranches. These will be the final tranches of the HTM.

1) If no more than four unique LoRE/CoRE pairs for this Risk Quantile exist, then the Risk Quantile is the final Tranche and sub-Steps 2-3 do not apply. Note, if there are no more than four unique LoRE/CoRE pairs, then one can simply examine the values of those LoREs/CoREs and grouping them is no longer necessary.

2) Separate the Risk Quantile into regions using the median of the LoRE and the median of the CoRE. This will separate the LoREs into two groups of near-equal numbers where about half are less than the LoRE median, and the other is greater than the median.

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[20] Any further developments or adjustments to the HTM steps that result from the Companies' continued development and preparation of their RAMP presentations will appear in their respective RAMP filings.

For values equal to the median, decide which group (lower LoRE or upper LoRE) will produce the greater balance of the starting pairs. Do the same for the CoREs. Since there are at least five unique LoRE/CoRE pairs, this will produce at least two LoRE/CoRE homogeneous regions.

3) Dissolve any region with a relatively low number of LoRE/CoRE pairs compared to other regions. One way this can be achieved is by computing the Euclidean distance to every LoRE/CoRE pair in the other regions. Then the closest point (nearest neighbor) will determine which tranche the pair should be recategorized into.

4) As a result, there will be two to four Tranches for each Risk Quantile. The homogenous profiles for each risk K-quantile will be from the following:

   1. Lower LoRE/Upper CoRE
   2. Upper LoRE/Lower CoRE
   3. Upper LoRE/Upper CoRE
   4. Lower LoRE/Lower CoRE

Step 4. For each final Tranche, T_i, define the LoRE(T_i) as the sum of the LoREs from the starting LoRE/CoRE pairs that make up T_i. Then define the CoRE(T_i) as the sum of all the Risks from the starting LoRE/CoRE divided by LoRE(T_i).

Figures 4-6 illustrate the HTM applied to two of the Company's unscaled preliminary risks: Wildfire without PSPS and Medium Pressure Mains and Services excluding Excavation (Medium Pressure Pipe). For Medium Pressure Pipe, two approaches are shown: 1) treating everything as one class, skipping step 1 of the HTM algorithm, and 2) defining four hypothetical classes for step 1. Wildfire without PSPS is treated as a single class, so only one HTM example is provided.

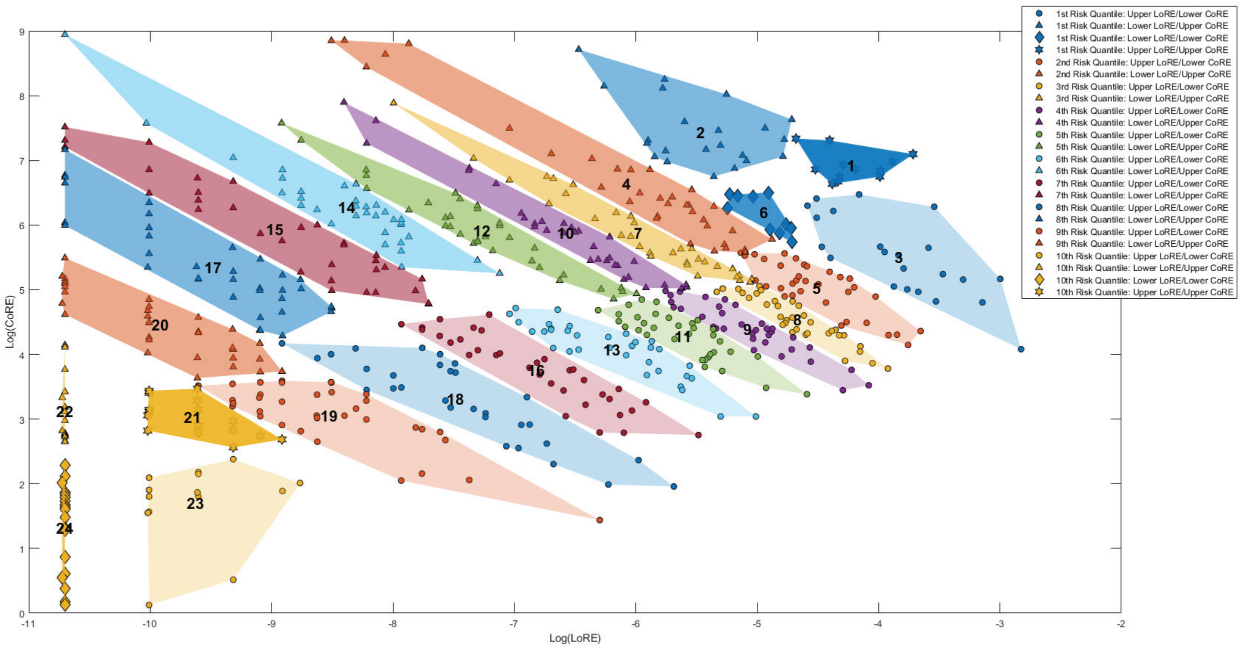

Figure 4. Preliminary Unscaled Wildfire without PSPS Log-Log plot of LoRE/Expected CoRE Alternative Homogenous Tranche Method. Here Wildfire without PSPS is a Class as defined in Step 1 of the HTM algorithm. The numbers within the tranche regions define the order of the tranches from the highest resulting risk to the lowest.

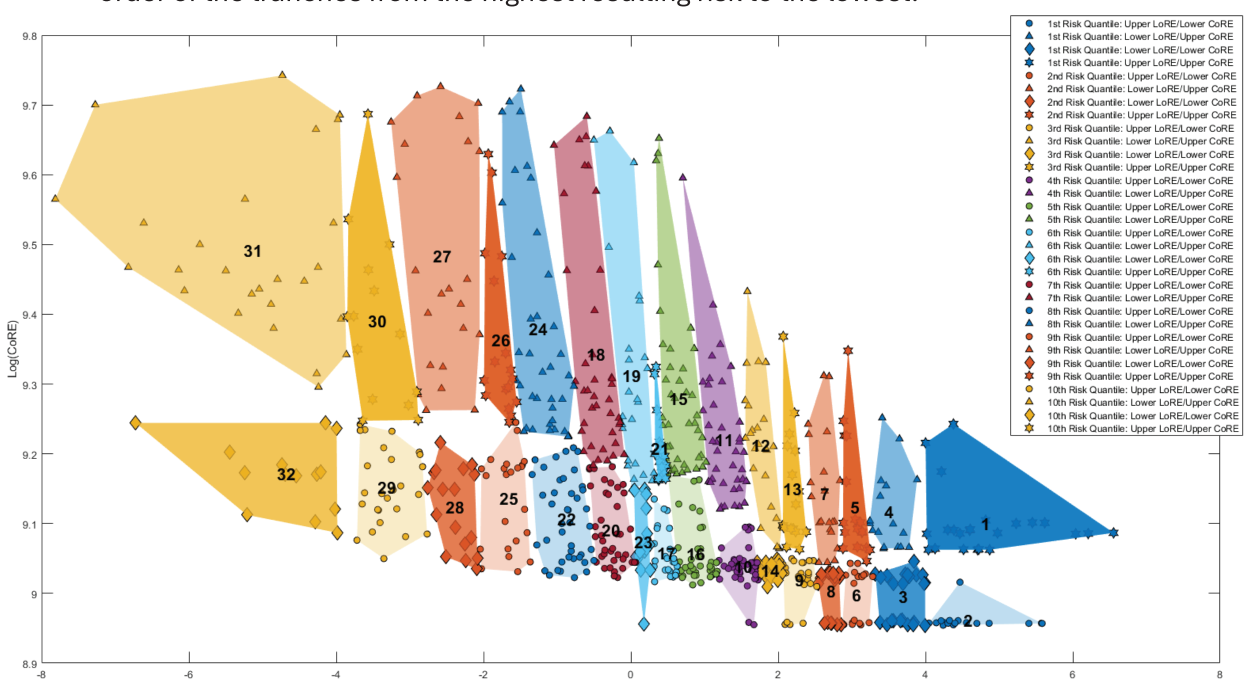

Figure 5. Preliminary Unscaled SoCalGas Medium Pressure Pipe Log-Log plot of LoRE/Expected CoRE Alternative Homogenous Tranche Method. Here for comparison reasons, Step 1 of the HTM algorithm is skipped and the entire dataset is treated as one Class. The numbers within the tranche regions define the order of the tranches from the highest resulting risk to the lowest.

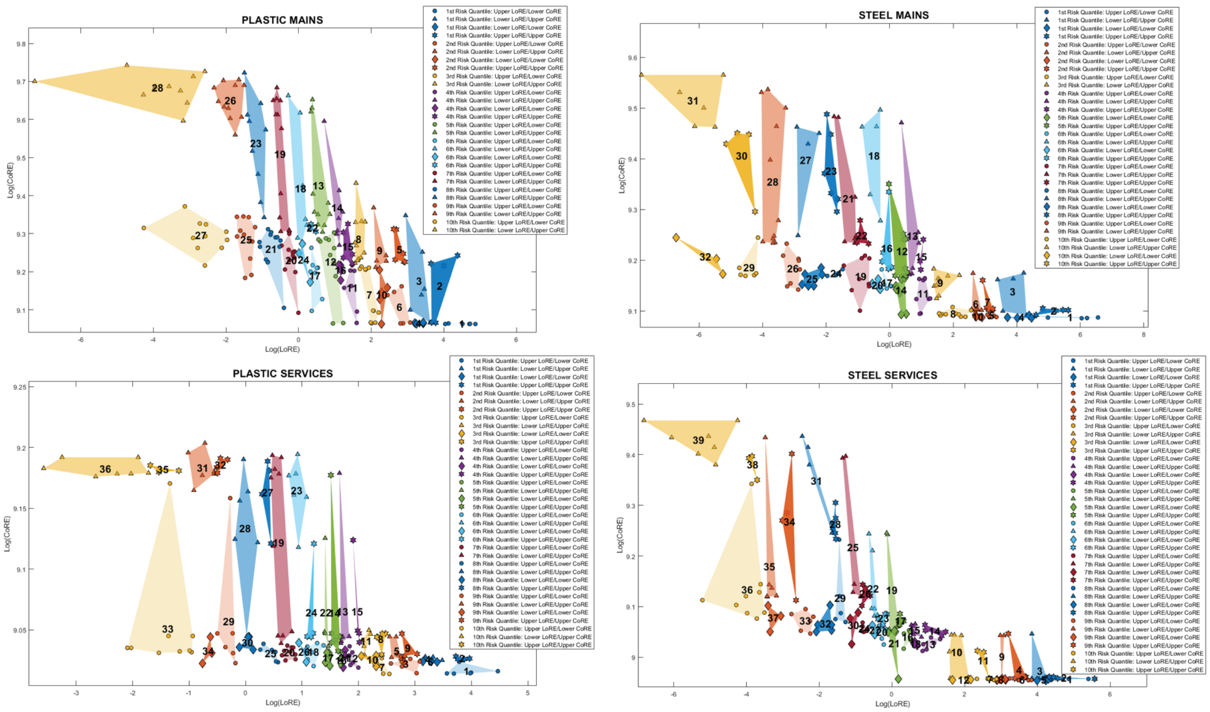

Figure 6. Preliminary Unscaled SoCalGas Medium Pressure Pipe Log-Log plot of LoRE/Expected CoRE Alternative Homogenous Tranche Method. Here for illustration of Step 1 of the HTM algorithm, four hypothetical classes are identified. The numbers within the tranche regions for each class define the order of the tranches from the highest resulting risk to the lowest within that Class.

C. Methodology Applicability

The HTM is intended for use with all RAMP risks, at varying levels. Specifically, as of the time of this White Paper's submission, the Companies anticipate that there is sufficient granularity of modeling for the five RAMP risks referenced below for the algorithm to be used to define the final tranches into 2-4 LoRE/CoRE regions as defined in sub-step 4 of step 3. The five preliminary RAMP risks are:

1. Wildfire & PSPS (SDG&E only)
2. Electric Infrastructure Integrity (SDG&E only)
3. Gas Excavation
4. High Pressure Gas
5. Medium Pressure Pipe

It is anticipated that certain RAMP risks, however, will lack the granularity of modeling to break down beyond Step 1 of the HTM algorithm. In other words, these risks feature a low number of starting LoRE/CoRE ordered pairs. After defining the similar risk profiles (Classes), for example Office personnel vs. Field personnel, if there are no more than four LoRE/CoRE pairs per Class, those pairs define the final tranches of those Classes within the risk. At the time of submitting this whitepaper, SoCalGas and SDG&E expect this to be the case for the following four preliminary RAMP risks:

1. Employee Safety
2. Contractor Safety
3. Cybersecurity
4. Gas Storage (SoCalGas only)

IV. Conclusion

Consistent with Commission guidance, the Companies submit this White Paper to present their alternative approach to tranching risks for their respective RAMP reports and additionally will be presenting this methodology at their December 2024 pre-RAMP workshop, where the Companies will also present their preliminary RAMP risks. As discussed in this paper, the Companies believe the HTM approach better achieves the Commission's RDF objectives in that it promotes data-driven results and increased transparency and granularity; establishes measurable LoRE and/or CoRE distinction between tranches; aligns with and informs risk mitigation efforts compatible with the Companies' existing and prospective operating procedures; and results in homogenous risk profiles (to the extent possible based on available data). The Companies are continuing to assess and analyze risks in preparation of their respective RAMP reports. Thus, results modeled here are preliminary and will be updated in the Company's respective RAMP reports.

2025 Risk Assessment Mitigation Phase

Appendix 4

Environmental Social Justice

Pilot Study Plan

May 15, 2025

TABLE OF CONTENTS

Introduction

In February 2019 and updated in April 2022, the California Public Utilities Commission (Commission) adopted its Environmental Social Justice (ESJ) Action Plan as a comprehensive strategy and framework for furthering principles of ESJ in Commission policy-setting and decision-making processes. The April 7, 2022 update to the ESJ Action Plan, Version 2.0 represents a continuation of efforts to systematize considerations of ESJ principles across Commission activities and reinforces its focus on equity, defined as "increasing access to power, redistributing and providing additional resources, and eliminating barriers to opportunity, to empower low-income communities of color to thrive and reach full potential."[1] The Phase 2 Decision (D.) 22-12-027[2] of the Risk-Based Decision-Making Framework (RDF) Order Instituting Rulemaking (OIR) (Rulemaking 20-07-013) directs the Investor Owned Utilities (IOUs) to undertake Environmental and Social Justice Pilots as part of each IOU's next Risk Assessment and Mitigation Phase (RAMP) filing and requires the IOUs to consider seven Action Items in the pilots. Southern California Gas Company (SoCalGas) has addressed these requirements in this ESJ pilot study plan (SoCalGas ESJ Pilot Study Plan or Pilot Study).

Purpose and Objective

As the nation's largest natural gas distribution utility, delivering energy to over 21 million customers, SoCalGas's risk-based decision-making is guided by an unwavering commitment to delivering safe, reliable, and affordable energy to customers. SoCalGas invests in mitigations to proactively reduce risk and enhance safety in the communities it serves. In this Pilot Study, SoCalGas analyzed the impacts of several of these mitigation investments to evaluate equity among Disadvantaged and Vulnerable Communities (DVCs) and non-DVCs. The SoCalGas ESJ Pilot Study Plan seeks to incorporate social justice into the risk assessment and mitigation process by exploring equity issues and the needs of the most vulnerable, including actions

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1 California Public Utilities Commission (CPUC), *Environmental & Social Justice Action Plan Version 2.0* (April 7, 2022) at 8, *available at:* https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/esj-action-plan-v2jw.pdf.

2 D. 22-12-027 at 65-67 (Ordering Paragraph (OP) 5).

targeting improved air quality and climate resilience. In compliance with D.22-12-027,[3] the following action items are evaluated in this Pilot Study:[4]

- Action Item No. 1: Consider equity in the evaluation of Consequences and risk mitigation within the RDF, using the most current version of CalEnviroScreen to better understand how risks may disproportionately impact some communities more than others;

- Action Item No. 2: Consider investments in clean energy resources in the RDF, as possible means to improve safety and reliability and mitigate risks in DVCs;

- Action Item No. 3: Consider Mitigations that improve local air quality and public health in the RDF, including supporting data collection efforts associated with AB 617 regarding community air protection program;

- Action Item No. 4: Evaluate how the selection of proposed mitigations in the RDF may impact climate resiliency in DVCs;

- Action Item No. 5: Evaluate if estimated impacts of wildfire smoke included in the RDF disproportionately impact DVCs;

- Action Item No. 6: Estimate the extent to which risk mitigation investments included in the RDF impact and benefit DVCs independently and in relation to non-DVCs in the IOU service territory; and

- Action Item No. 7: Enhance outreach and public participation opportunities for DVCs to meaningfully participate in risk mitigation and climate adaptation activities consistent with D.20-08-046.

Workshops

In accordance with D.22-12-027 Ordering Paragraph 5, SoCalGas held the following workshops jointly with San Diego Gas & Electric Company (SDG&E):

1. Community-based Organization Working Group (CBOWG) Workshop – July 12, 2024
2. Disadvantaged Communities Advisory Group (DACAG) Workshop – July 19, 2024
3. Public Workshop – August 12, 2024

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[3] *Id.*

[4] Action item No. 5 from D.22-12-027 does not apply to SoCalGas, as a natural gas utility.

SoCalGas was appreciative of the stakeholder feedback provided in these workshops which is summarized below. Stakeholder feedback topics included risk analysis and mitigation impacts. These topics were addressed in multiple workshops, including whether SoCalGas intends to modify mitigations based on the analysis in this Pilot Study, and what next steps would be if the analysis revealed an inequity to DVCs. Presenters and attendees also discussed specific mitigations and action items, such as how hydrogen microgrids and hydrogen blending can help disadvantaged communities, and whether the utilities would study indoor air quality as part of this study. In addition, there was meaningful dialogue about DVC screening tools, and how the definition of a DVC would be applied to the action items in the Pilot Study. For example, the public workshop on August 12, 2024 included a discussion regarding consideration of defining DVCs by where DVC community members work, as opposed to only analyzing where DVC community members reside as reflected in census tracts. Further, SoCalGas and SDG&E received suggestions for multiple screening tools to consider for ESJ analysis, including the Healthy Places Index,[5] the Climate and Economic Justice Screening Tool from the White House Council on Environmental Quality Climate,[6] and the Living Infrastructure Field Kit from Accelerate Resilience Los Angeles.[7] Stakeholders also expressed interest in how to actively participate in risk mitigation planning activities including how best to address meaningful risks facing their communities and ensuring DVCs receive the benefits flowing to their communities. This included asking the utilities to consider impacts to DVC small businesses and coordination with Assembly Bill (AB) 617[8] communities[9] as part of their risk mitigation planning activities.

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5 Public Health Alliance of California, *California Healthy Places Index*, *available at:* https://www.healthyplacesindex.org/.

6 Public access to the CEJST tool was removed on January 22, 2025, but previous versions of the tool remain available. *See* CEJST, *Explore the map*, *available at:* https://edgi-govdata-archiving.github.io/j40-cejst-2/en/#3/33.47/-97.5.

7 Accelerate Resilience L. A. (ARLA), *Living Infrastructure Field Kit, available at:* https://livinginfrastructure.org/.

8 AB 617 (Garcia, 2017), *available at:* https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617. AB 617 provides funding to support early actions to address localized air pollution through targeted incentive funding to deploy cleaner technologies in these communities in addition to other requirements.

9 CARB, *Community Air Protection Program Communities – Community Hub 2.0*, *available at:* https://ww2.arb.ca.gov/capp/cst/ch2/community-air-protection-program-communities.

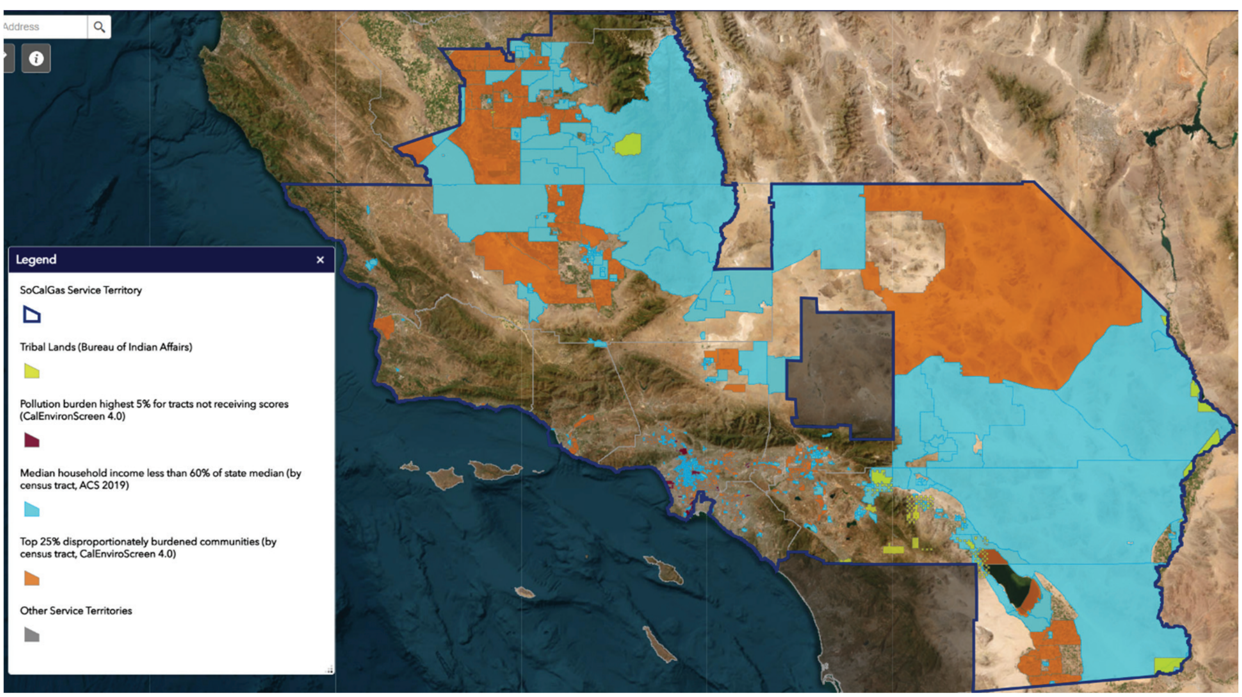
Disadvantaged and Vulnerable Communities

SoCalGas followed the DVC definition provided in D.22-12-027 which adopts the definition from D.22-08-046:

- the 25 percent highest scoring census tracts according to the most current version of CalEnviroScreen;
- all California tribal lands;
- census tracts that score in the highest five percent of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data; and,
- census tracts with median household incomes less than 60 percent of state median income.[10]

Figure 1 illustrates DVCs within SoCalGas's service territory, following the aforementioned DVC definition and data sources.

Figure 1: DVCs in SoCalGas Territory



10 D. 22-12-027 at 48.

Approach and Methodology

For Action Items 1, 4, and 6 of this Pilot Study, SoCalGas evaluated two enterprise risks and their associated mitigation impacts to DVCs:

1. **Medium Pressure Gas System Risk:** Medium pressure gas system risk is defined as the risk of failure of a medium pressure pipeline (including appurtenances to and at the meter) which results in serious injuries, fatalities, and/or damages to the infrastructure.[11]
    a. The analysis for this Pilot Study focused primarily on pipeline replacement of medium pressure mains, however, the medium pressure gas system risk is addressed by a number of additional programs which mitigate risk that were not included in this analysis. Those include, but are not limited to, cathodic protection activities, leak survey, leak repair, pipeline monitoring, regulator station replacement and enhancement activities, several maintenance and inspection programs, as well as multiple infrastructure protection programs. Additional details on these activities and programs can be found in the Medium Pressure Gas System RAMP Chapter SCG-Risk-3.
2. **Excavation Damage Risk:** Excavation damage risk is defined as risk to both high and medium pressure infrastructure associated with third-party digging activities that may damage SoCalGas's natural gas system and possibly lead to asset failure resulting in catastrophic consequences.
    a. The analysis for this Pilot Study primarily focused on Locate and Mark, the process of identifying and displaying underground pipelines at street level (*e.g.*, spray paint or flags). Mitigations that were not analyzed as part of this Pilot Study include public awareness campaigns such as media advertising of 811 DigAlert[12] announcements, damage prevention strategies, and damage prevention mapping. Additional details on these

[11] *See* Chapter SCG-Risk-3: Risk Quantification Framework.

[12] DigAlert, *About DigAlert, available at:* https://www.digalert.org/about.

activities and programs can be found in the Excavation Damage RAMP Chapter SCG-Risk-4.

For Action Item 2 of the Pilot Study, SoCalGas evaluated its efforts and mitigations to improve safety and reliability through decarbonized energy solutions. SoCalGas selected the Honor Rancho Compressor Modernization project (HRCM) for evaluation for this action item. For Action Item 3, SoCalGas evaluated air quality enhancements through SoCalGas's alternative fuel fleet vehicles (AFVs) program as part of SoCalGas's efforts to achieve its goal to have a zero emissions fleet by 2035. For Action Item 7, SoCalGas evaluated opportunities to leverage community collaborations to bring further awareness to climate resilience and adaptation in DVCs through broader community engagement.

Data Methodology - Medium Pressure Gas System Risk

SoCalGas's risk analysis in this Pilot Study of the medium pressure gas system used inputs from the 2023 Quantitative Risk Assessment (QRA) which is a data-driven risk model that analyzes threats and factors, including pipe-specific data such as age and material, or community-level factors such as population density and consists of data as of year-end 2022, to determine the probabilities of failures for each pipe segment. All results were calculated based on average risk at the census-tract level utilizing the CalEnviroScreen census tract data merged with geospatial medium pressure pipeline segment location data across SoCalGas's service territory. The segment location data was extracted from Geographic Information System (GIS) software, and pipe segment risk value data was extracted from Copperleaf, an enterprise-wide risk-informed investment decision support system.[13] Using inputs from the QRA, Copperleaf calculated monetized values of risk associated with each pipe segment, which was used to plan 2024 mitigation activities. Geospatial analysis was used to examine safety, reliability, and climate risk at the pipeline segment level across DVCs and non-DVCs within the SoCalGas service territory. The impact of SoCalGas's 2024 mitigation investments was integrated with current risk data to evaluate differences in risk reductions and climate resilience enhancements between DVC and non-DVC communities.

[13] *See* Chapter SCG/SDG&E RAMP-2: Enterprise Risk Management Framework at Section IV.

Data Methodology – Excavation Damage Risk

To evaluate baseline Excavation Damage risk in DVCs and non-DVCs, SoCalGas mapped the geospatial location of excavation damage dig-ins dating back to 2019. The dig-in locations were then mapped between DVC and non-DVC areas as defined by CalEnviroScreen 4.0.[14]

Executive Summary

Action Item 1: On average, this evaluation indicated that pipelines in DVCs face a 54% higher baseline safety risk per foot and a 74% higher baseline reliability risk per foot than those in non-DVCs across the entire SoCalGas service territory.

Action Item 2: The Honor Rancho Compressor Modernization (HRCM) project includes replacing 25% of its horsepower (hp) with zero-emissions electric engines. This upgrade is expected to reduce expected peak daily emissions of nitrogen oxides (NOx) during normal operation (i.e., not including startup emissions) by up to 95%, and also lowering levels of carbon monoxide (CO), volatile organic compounds (VOC), respirable particulate matter (PM10[15]), and sulfur oxides (SOx). These reductions do not reflect the preferential use of electric engines.

Action Item 3: SoCalGas's AFV fleet conversion program has achieved significant air emissions reductions, with approximately 15,000 metric tons of CO2 reduction per year. Moreover, approximately 96% of the AFV fleet serve a DVC, AB 617 Community Air Protection Program (CAPP) community, or Consistently Nominated Communities (CNC) community. These AFV vehicles are stationed at 92% of SoCalGas's facilities with 76% of those facilities located in a DVC, CAPP community, or CNC community.

Action Item 4: Wildfire, storm surge, and flood risk are 9-12% higher in non-DVCs, as DVCs are primarily in non-coastal, dense urban areas. Mitigation efforts occur in both DVCs and non-DVCs, and these efforts improve regional climate resilience in both types of communities.

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[14] State of California – Office of Environmental Health Hazard Assessment (OEHHA), *CalEnviroScreen 4.0*, *available at:* https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

[15] Fine particulate matter (PM2.5) is a subset of respirable particulate matter (PM10). PM2.5 is assumed to be equal to PM10 emissions for combustion of natural gas.

Action Item 6: Pipeline replacements reduced average safety risk per foot by 40% in both DVCs and non-DVCs where mitigation occurred. Pipeline replacements successfully reduced average reliability risk per foot by approximately 50% in DVCs where mitigations occurred and by approximately 44% in non-DVCs where pipeline replacement mitigation occurred.

Action Item 7: SoCalGas leveraged previously established Regional Advisory Boards from its Climate Adaptation Vulnerability Assessment (CAVA) program. Organized into four regions, SoCalGas was able to tap into knowledgeable and engaged representatives of DVC communities that had been providing input on climate risks over the past year. These groups were also introduced to the RAMP process along with the ESJ Pilot Study Plan and were asked for input on risks to medium pressure pipelines and third-party excavation damages. This Pilot Study effort was able to expand the conversation on broader risks facing DVCs in order to help prioritize investments to mitigate these impacts.

Action Item No. 1

Consider equity in the evaluation of consequences and risk mitigation within the Risk-Based Decision-Making Framework (RDF), using the most current version of CalEnviroScreen to better understand how risks may disproportionately impact some communities more than others.

Medium Pressure Gas System Risk

For purposes of this Pilot Study, the medium pressure gas system safety risk is derived from the likelihood and expected safety consequences of a serious incident based on RAMP safety risk parameters. Similarly, the medium pressure gas system reliability risk is derived from the likelihood and expected reliability consequences of a serious incident or hazardous leak based on RAMP safety risk parameters. These inputs and results are based on calculations by SoCalGas's Quantitative Risk Assessment (QRA).

Figure 2 shows the mean safety risk per foot across the medium pressure gas system. The blue gradient symbology on the map reflects relative safety risk with higher risk shown with the darker blue shading. Areas with no coloring indicate no medium pressure pipes in this region. Generally, safety risk is concentrated in dense urban areas such as downtown Los Angeles, or pockets in smaller areas such as East Los Angeles and Burbank.

Figure 2: Mean Safety Risk per Foot Across the Medium Pressure Gas System

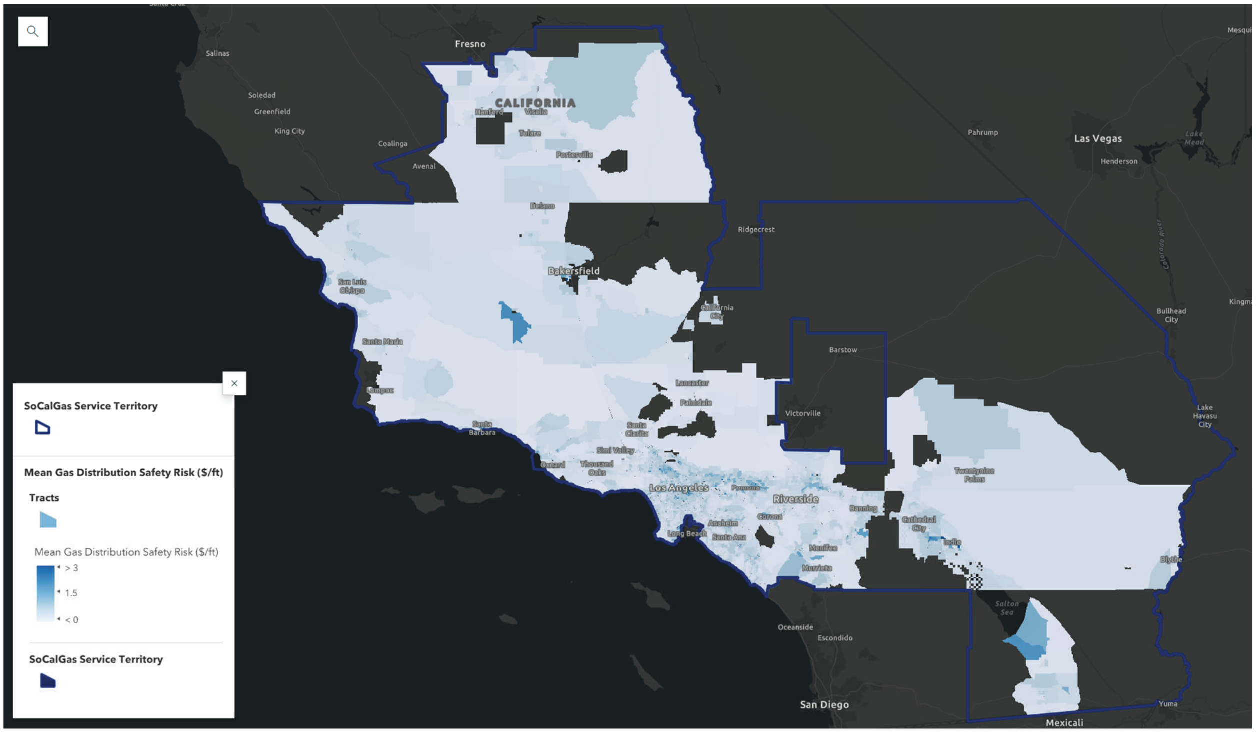


Figure 3a and 3b shows DVCs (blue cross-hatching) overlayed with census tract-level average baseline safety risk per foot (blue shading). On average across the SoCalGas service territory, safety risk per foot is 54% higher in DVCs compared to non-DVCs. Several factors account for this difference, including pipe factors, such as pipe age and material, along with community-level factors such as higher population density in urban areas where DVCs are often located.

Figure 3a: Mean Medium Pressure Gas System Safety Risk in DVCs and non-DVCs across SoCalGas Service Territory

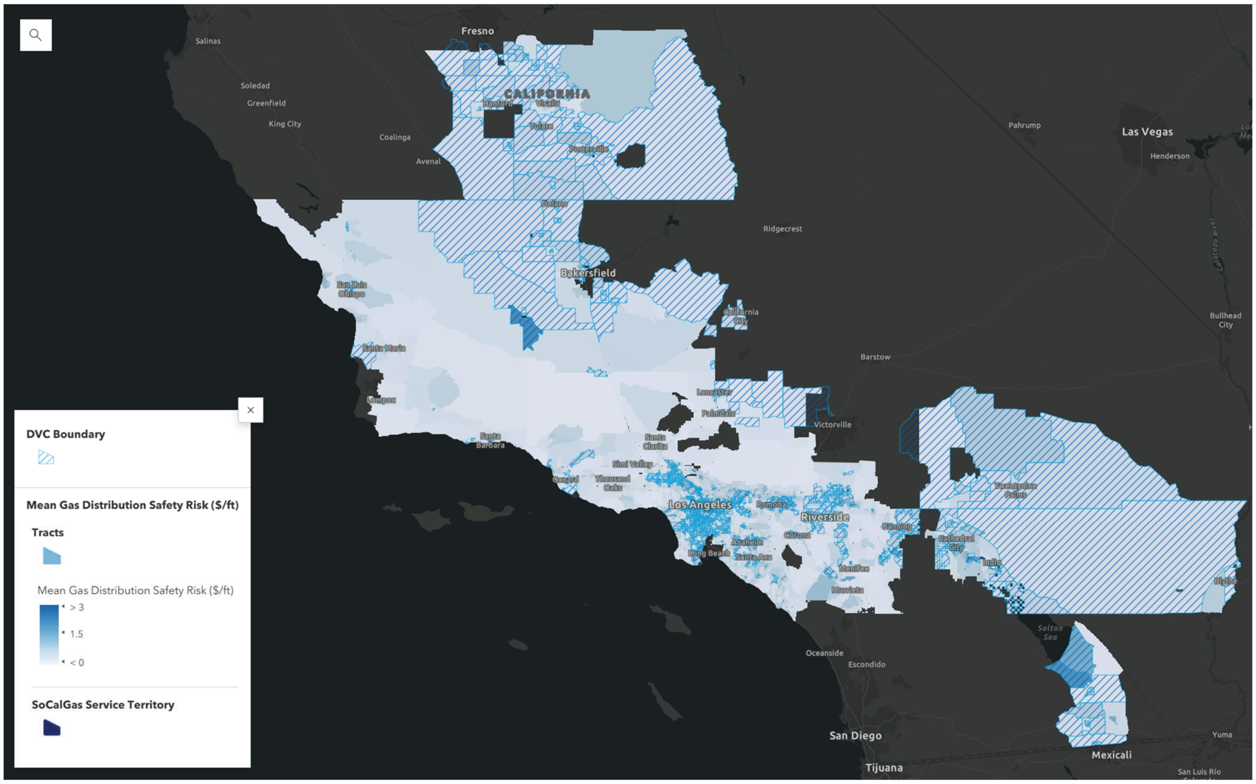


Figure 3b: Mean Medium Pressure Gas System Safety Risk in DVCs and non-DVCs in Los Angeles Basin Area

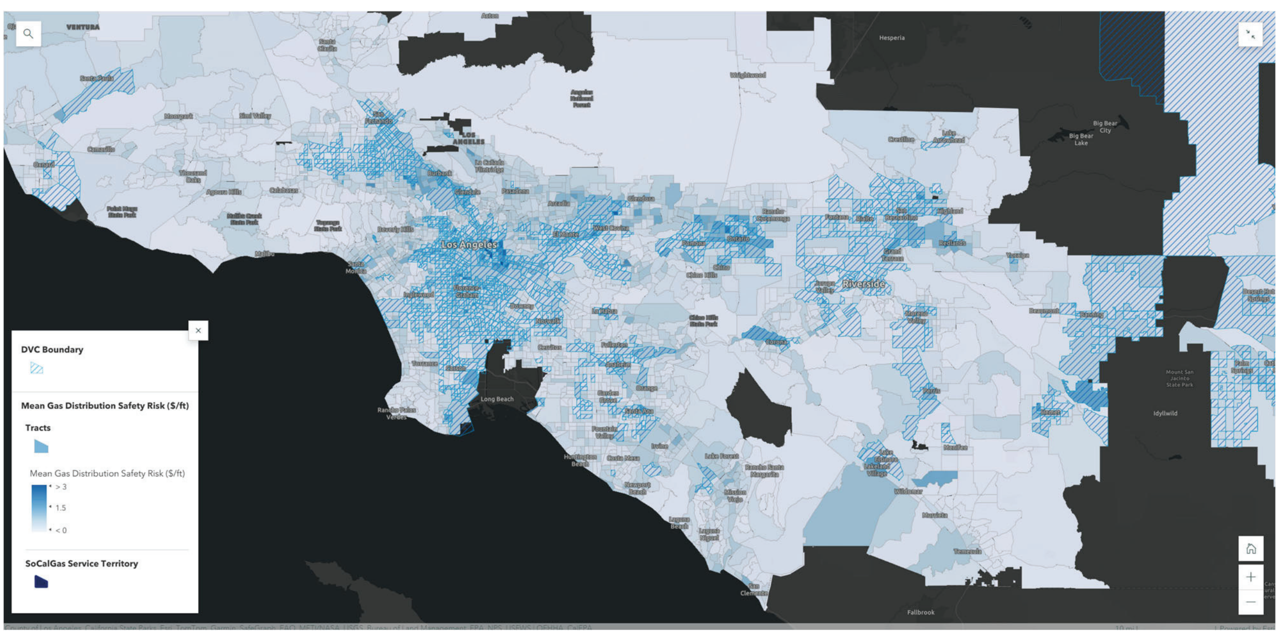


Figure 4 shows the mean medium pressure gas system reliability risk per foot across medium pressure pipes in SoCalGas's service territory. As reflected in the legend, the blue gradient on the map reflects relative reliability risk with higher risk shown with the darker blue shading. Areas with no coloring indicate no medium pressure pipelines in this region. As with safety risk, medium pressure pipe segments with higher reliability risk are generally concentrated in urban areas such as the Los Angeles Basin and surrounding communities, with other areas of elevated reliability risk in rural counties such as Tulare, Kern, Kings, and San Bernardino.

Figure 4: Mean Medium Pressure Gas System Reliability Risk in SoCalGas Service Territory

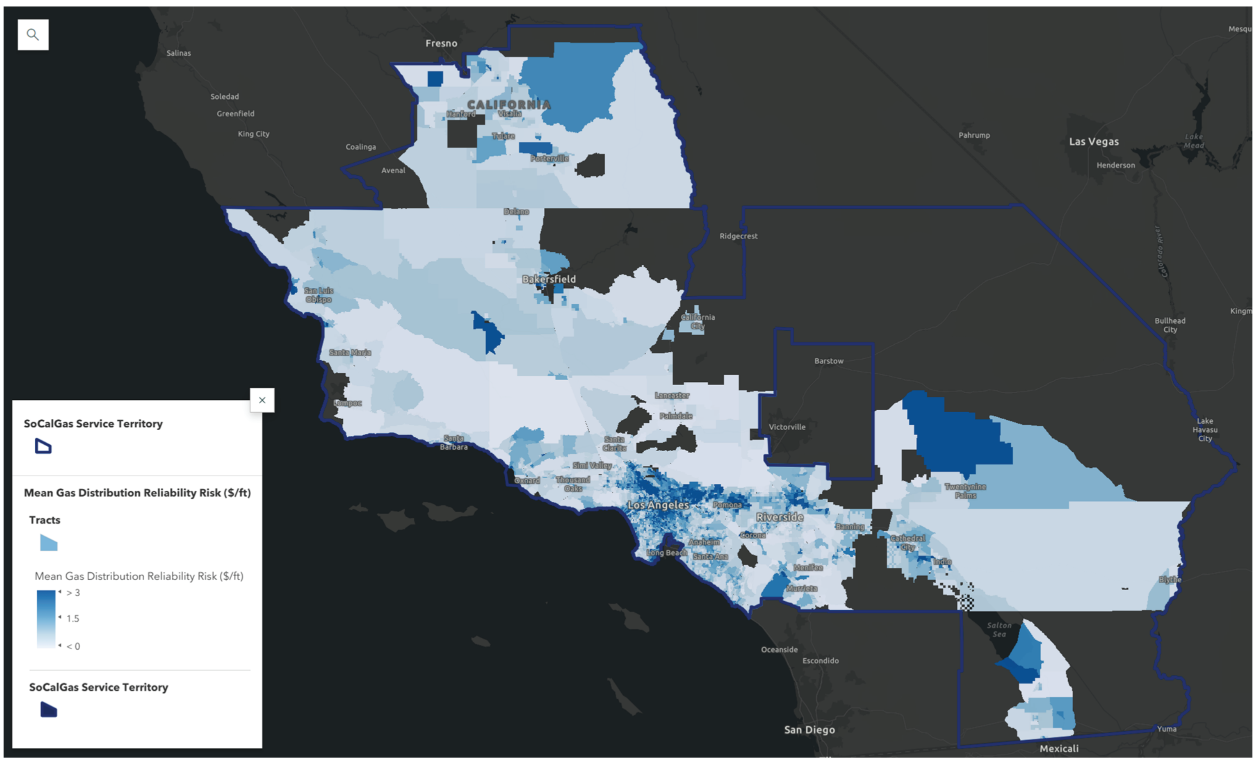


Figure 5a and 5b shows DVCs (blue cross-hatching) overlayed with census tract-level average baseline reliability risk per foot (blue shading). On average across the SoCalGas service territory, this analysis indicates that reliability risk per foot is 74% higher in DVCs compared to non-DVCs. Similar to safety risk, several factors account for this difference, including pipe factors, such as pipe age and material, along with community-level factors such as higher population density in urban areas where DVCs are often located.

Figure 5a: Mean Medium Pressure Gas System Reliability Risk in DVCs and non-DVCs across SoCalGas Service Territory

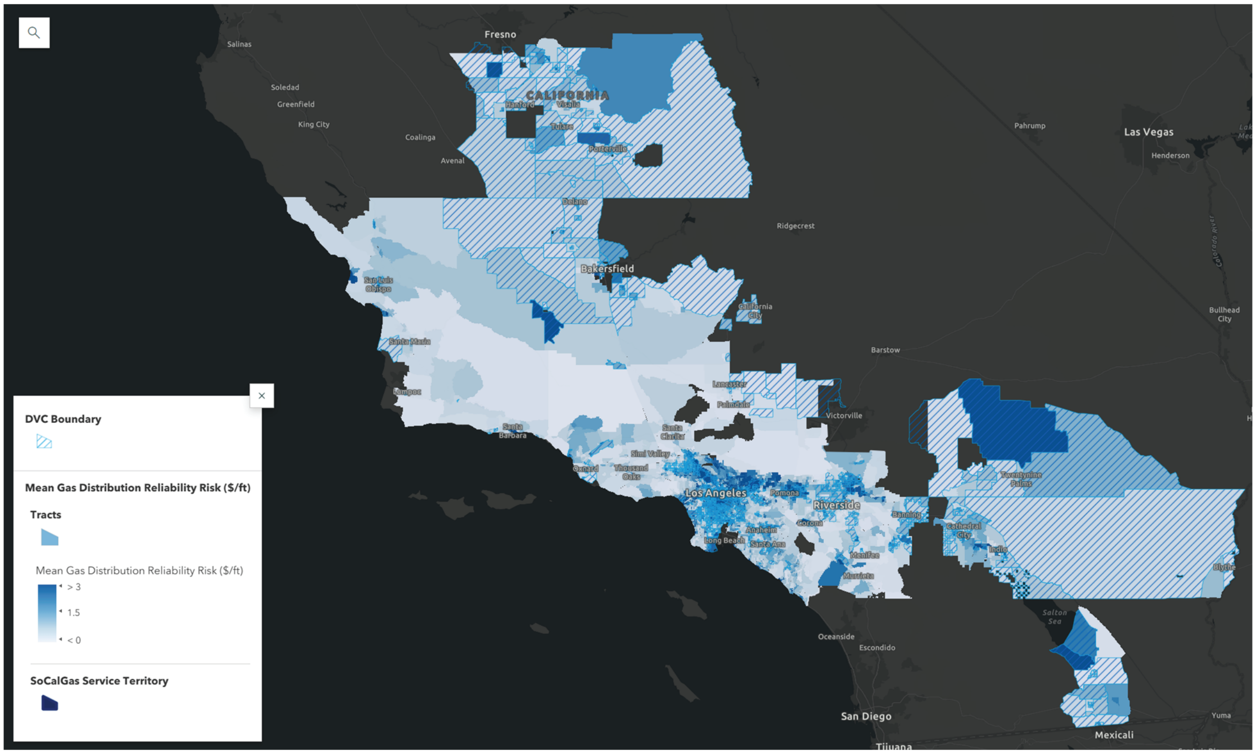
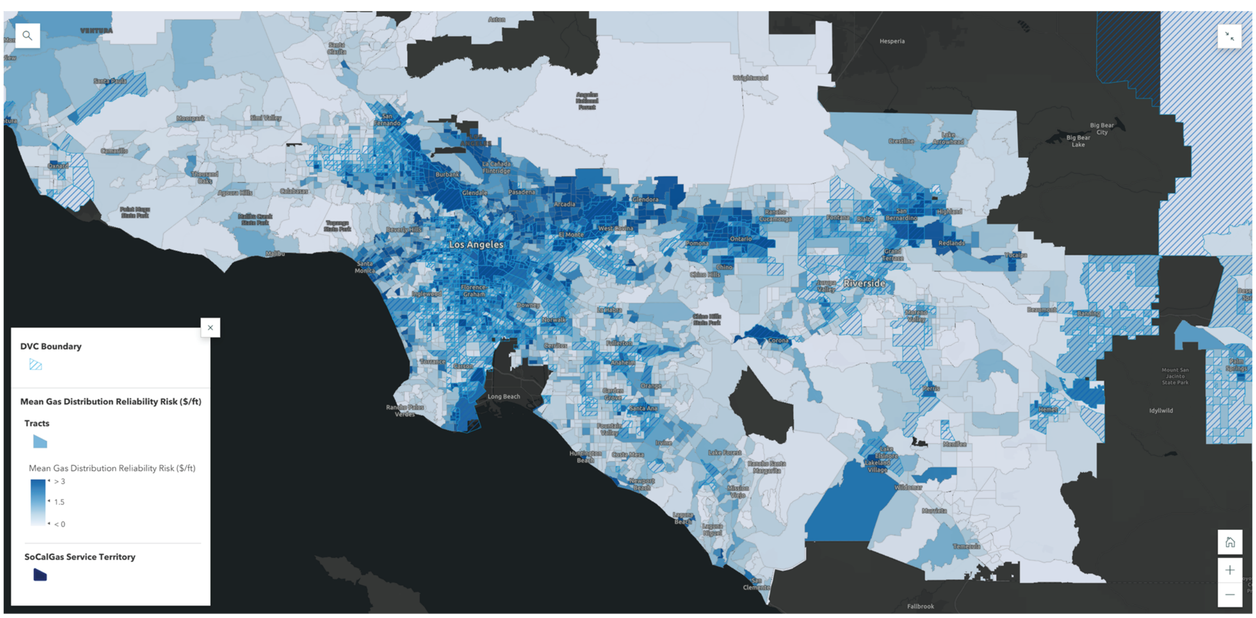


Figure 5b: Mean Medium Pressure Gas System Reliability Risk in DVCs and non-DVCs in Los Angeles Basin Area



Excavation Damage Risk

Figure 6a and 6b shows DVCs (purple shading) overlayed with clustered locations of excavation damages (red-yellow-green dots) on SoCalGas pipelines from 2019 – 2024. This analysis includes excavation damages on both medium pressure and high pressure pipelines across the SoCalGas service territory. Because excavation damages are primarily caused by outside factors such as third-parties accidentally hitting pipelines, locations of damages appear in a relatively unpredictable pattern.

Figure 6a: Map of Clustered Excavation Damages in DVCs and non-DVCs in the SoCalGas Service Territory

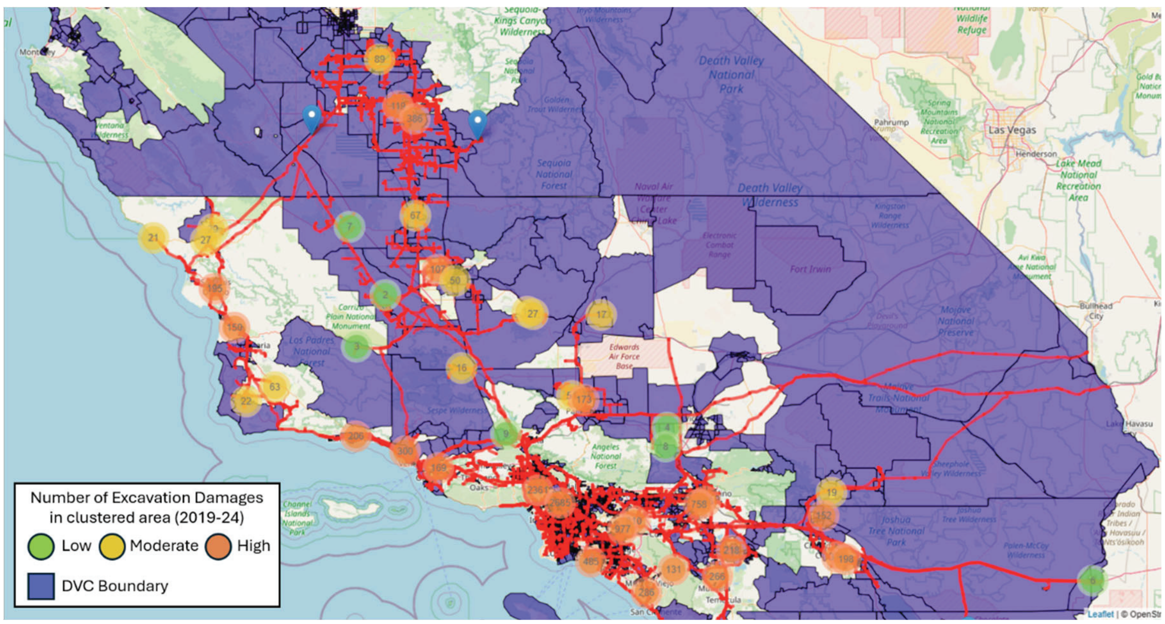


Figure 6b: Map of Clustered Excavation Damages in DVCs and non-DVCs in Los Angeles Basin Area

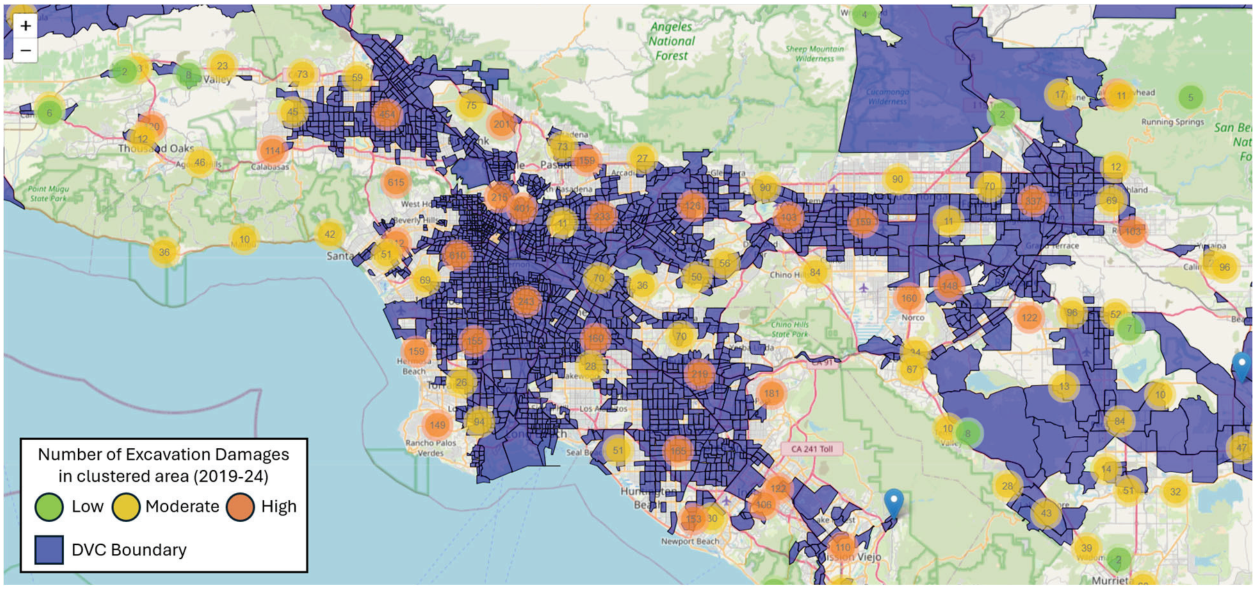
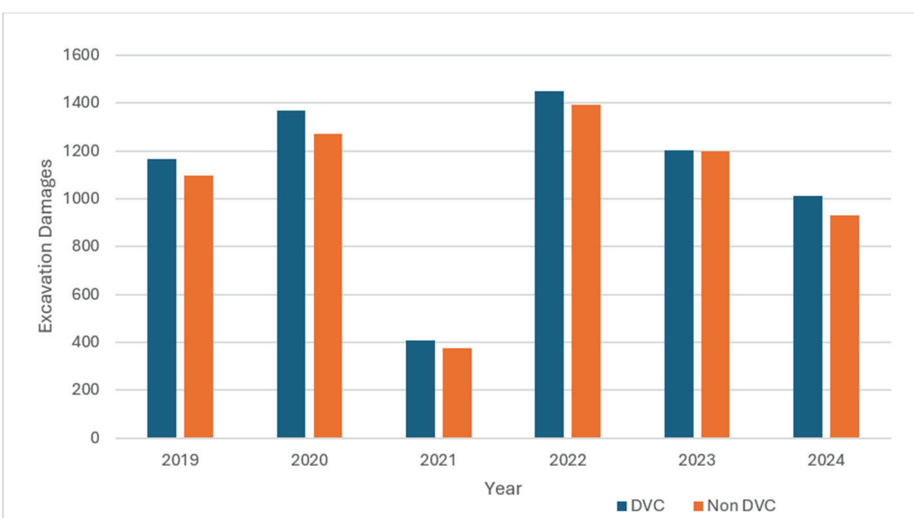


Figure 7 shows a year-by-year comparison of excavation damages across SoCalGas's service territory, categorized between DVC and non-DVC locations. This analysis indicates that the number of excavation damages in DVCs and the number of excavation damages in non-DVCs is relatively even each year. The total volume of excavation damages decreased by 70% in 2021, with the percentage of excavation damages in DVCs and non-DVCs comparable to other years. Based on the unpredictable trend of excavation damage locations mentioned above, SoCalGas did not find a direct relationship between excavation damage locations and DVC or non-DVC neighborhoods in its analysis.

Figure 7: Year-on-Year Comparison of Excavation Damages in DVCs and non-DVCs



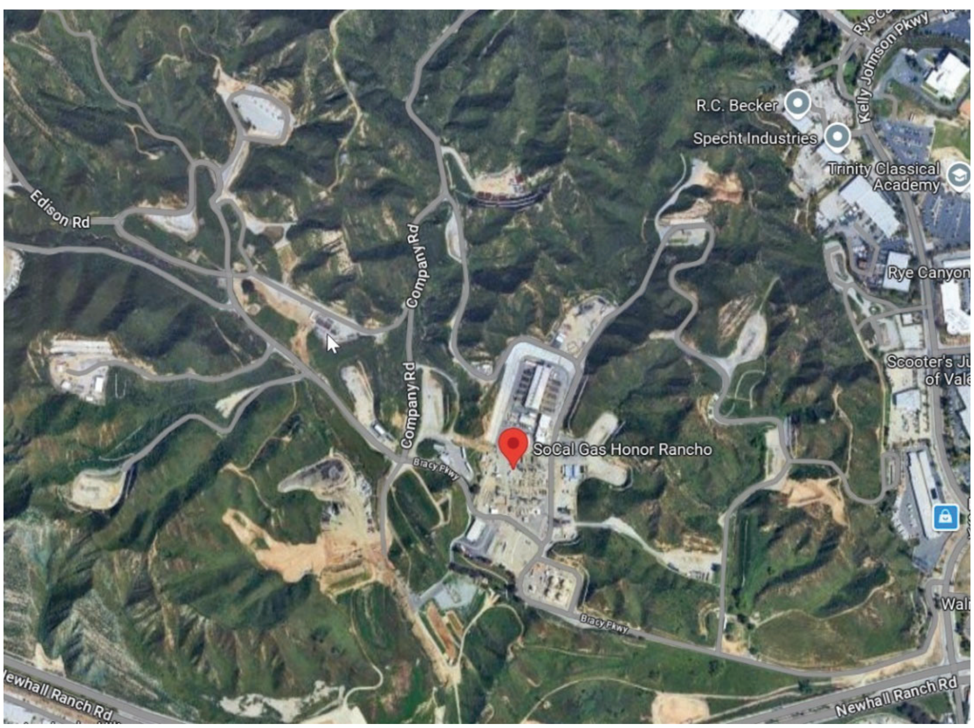
Action Item No. 2

Consider investments in clean energy resources in the RDF, as possible means to improve safety and reliability and mitigate risks in DVCs.

Honor Rancho Compressor Modernization Project[16]

The Honor Rancho Storage Field (Honor Rancho) is located approximately 40 miles north of downtown Los Angeles in the city of Santa Clarita. Honor Rancho has been operating safely since 1975, with 35 active wells with a working capacity of 27 billion standard cubic feet (BCF) designed for a maximum withdrawal capability of 1.0 BCF per day. Approximately 25% of SoCalGas's total firm injection capacity is currently provided by Honor Rancho, making this facility a critical part of SoCalGas's natural gas system including its role in providing electric generation resiliency for the greater Los Angeles area.

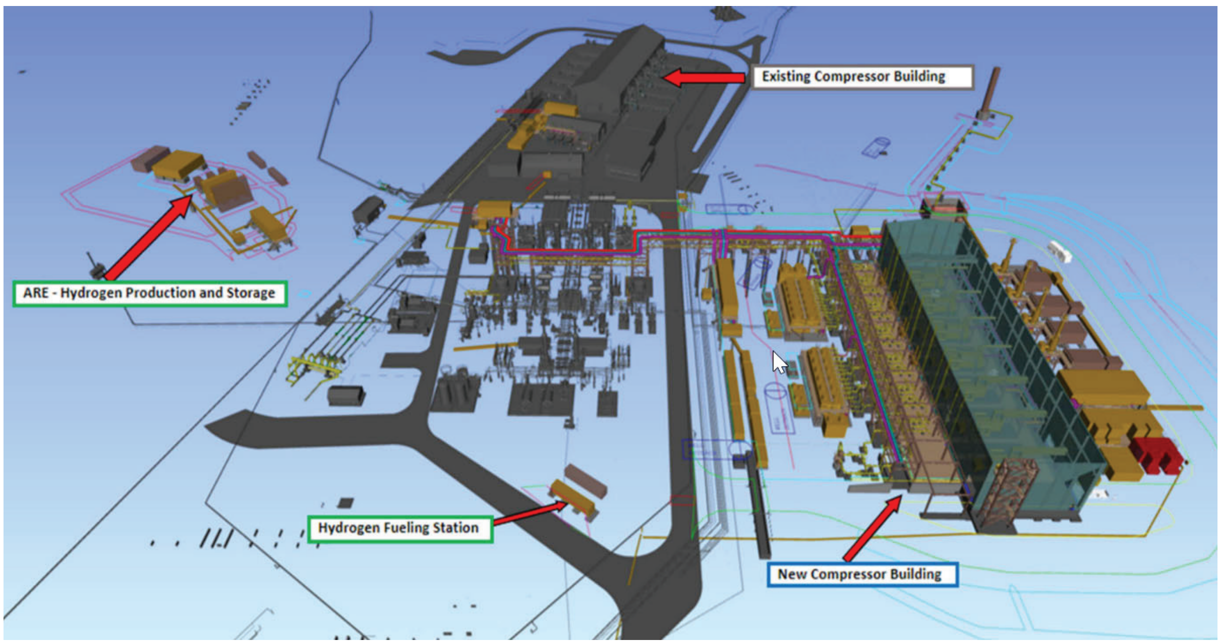
Figure 8: Honor Rancho Storage Field



16 The Honor Rancho Compressor Modernization Project (HRCM) was introduced in the 2019 GRC. In the 2024 GRC Decision (D. 24-12-074), the Commission recognized the importance of the project and the role of compressor stations in maintaining operational reliability and safety of the gas system.

To meet air quality compliance requirements of the South Coast Air Quality Management District (South Coast AQMD) and enhance reliability, the HRCM project will modernize the compressor station through the installation of a combination natural gas-fueled lean burn engines and zero-emission electric motor driven compressors. Specifically, five aging natural gas-fueled lean-burn engines driving five compressors will be replaced by a combination of four new natural gas-fired lean-burn engines equipped with selective catalytic reduction (SCR) and oxidation catalysts and two electric motors driving a total of six new compression units. Upon commissioning of the new compressor assets, SoCalGas will decommission the five existing engines and five compressors.

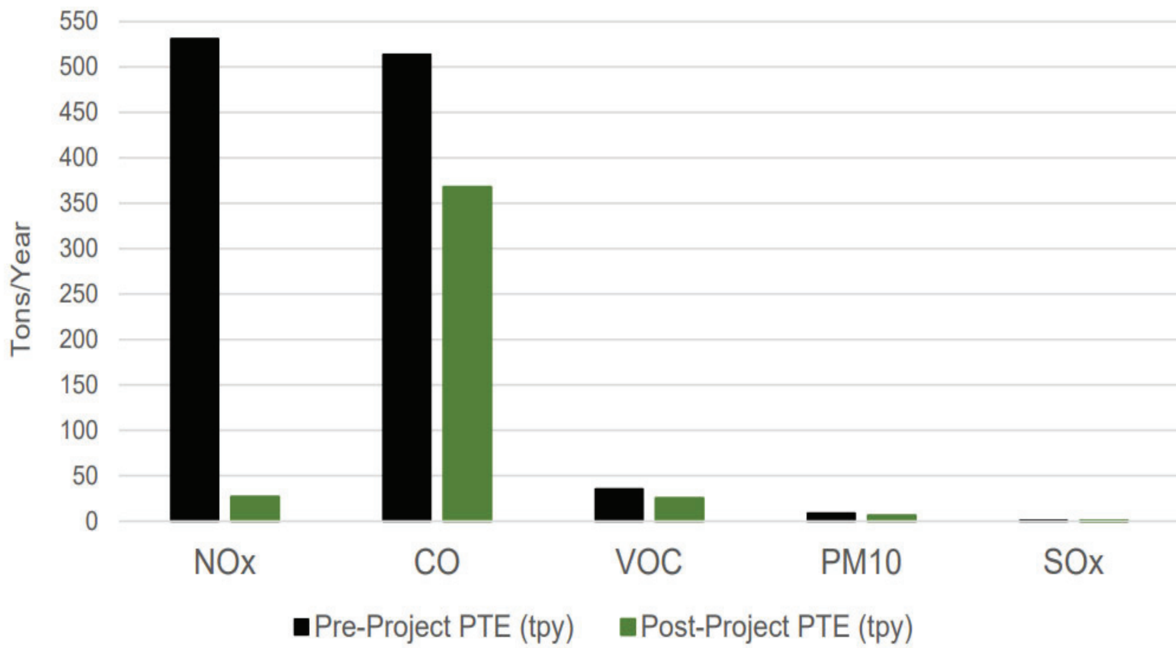
Figure 9: Honor Rancho Compressor Modernization Project Layout



The HRCM project estimates significant reductions in criteria air pollutants from the replacement of the compressor engines. The two new electric motors have zero combustion emissions, while the new lean-burn engines with SCR emissions control equipment are expected to achieve significant and measurable reductions in NOx emissions. Expected peak daily emissions of NOx during normal operations (i.e., not including startup emissions) are projected to decrease by approximately 95% from the existing actual levels, while CO, VOC, PM10, and SOx emissions are expected to decrease by approximately 30%. Projected emissions do not reflect further reductions in emissions from the preferential operation of the two new electric motors, with zero combustion emissions. The permitted NOx emissions (e.g. potential to emit

(PTE)) from the compressor engines at the facility is expected to decrease by up to 95% and the total horsepower (hp) of lean-burn engines is expected decrease from 27,500 hp to 20,000 hp, over 25%.[17]

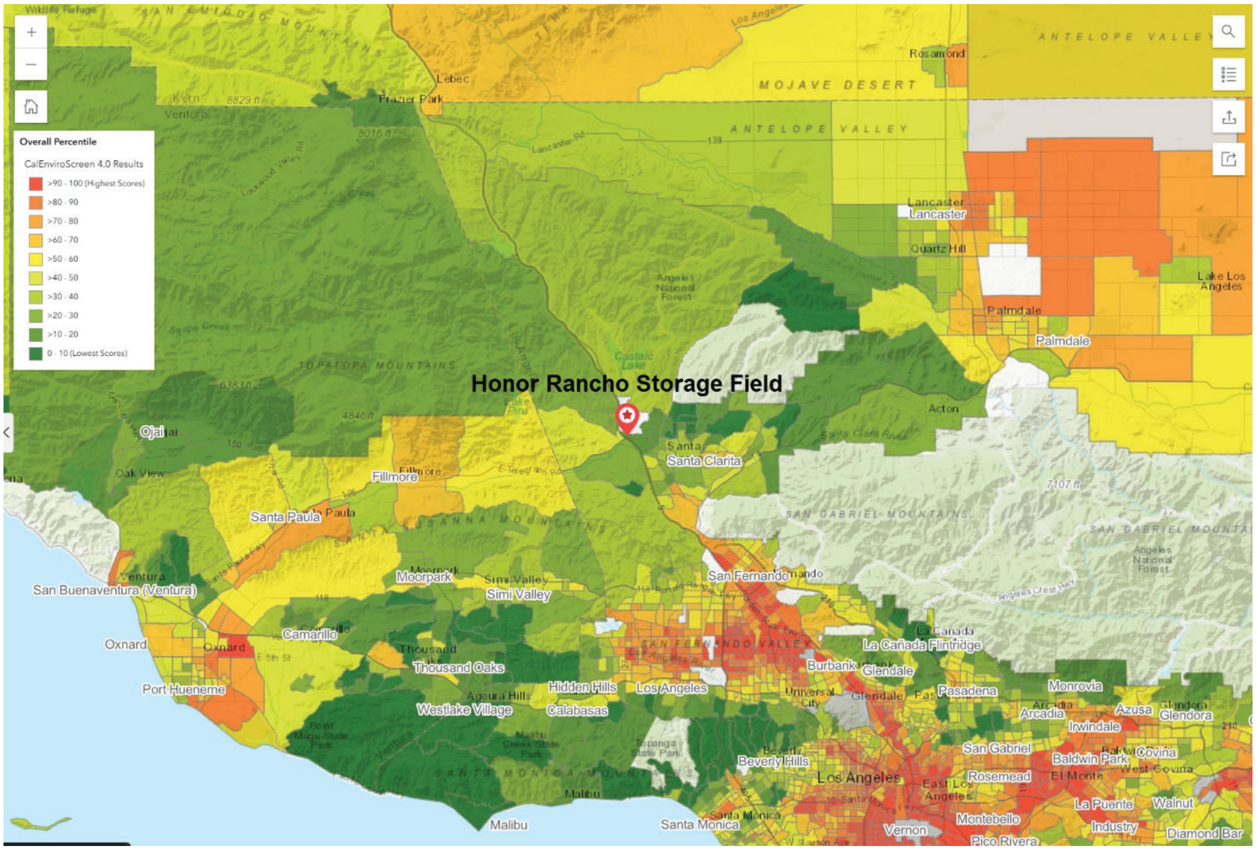
Figure 10: Pre and Post Project PTE for HRCM



The HRCM Project is expected to significantly improve regional air quality for surrounding communities and reduce emissions of criteria air pollutants including DVCs and non-DVCs by modernizing the facility with cleaner compressor engine technologies.

[17] 2024 GRC, Direct Testimony of SoCalGas Witnesses Larry T. Bittleston and Steve Hruby (Ex. SCG-10-R), Appendix E (Honor Rancho Compressor Modernization Supplemental Project Description) at Section II.

Figure 11: Honor Rancho Relative to DVCs



Action Item No. 3

Consider Mitigations that improve local air quality and public health in the RDF, including supporting data collection efforts associated with AB 617 regarding community air protection program.

Alternative Fuel Fleet Vehicles (AFVs) Program

SoCalGas's alternative fuel fleet vehicles (AFVs) program to convert existing natural gas-powered fleet vehicles to alternative fuels and the addition of more AFVs is described herein. Many of these vehicles are used in areas near SoCalGas facilities that are designated by the United States Environmental Protect Agency (EPA) as nonattainment areas for one or more National Ambient Air Quality Standards under the federal Clean Air Act.[18] SoCalGas adopted

[18] EPA, *Current Nonattainment Counties for All Criteria Pollutants*, *available at:* https://www3.epa.gov/airquality/greenbook/ancl.html.

the use of AFVs beginning in the 1980's with Compressed Natural Gas (CNG) vehicles and has continued to expand its AFV fleet with the adoption of additional alternative fuel vehicle technologies. AFVs facilitate SoCalGas's mission to deliver safe, reliable and affordable energy today and to be ready for the future by reducing vehicle emissions in the communities SoCalGas serves. SoCalGas's analysis evaluated AFV fleet data with an in-service date of 2004 to present day, focusing on their emissions data and location based on (1) AB 617 designated communities, (2) Consistently Nominated Communities as identified by the California Air Resources Board, and (3) DVCs identified by the Office of Environmental Health Hazard Assessment pursuant to Senate Bill 535[19].

SoCalGas AFVs include the following fuel types: renewable natural gas (RNG), non-plug-in hybrid, fuel cell electric, and battery electric. As of 2024, AFVs make up 43% of SoCalGas's total fleet with the majority being RNG vehicles.

Table 1: SoCalGas Alternative Fuel Fleet Vehicle Types

AFV Type	Total
RNG	1583
NON-PLUG-IN HYBRID	149
FUEL CELL ELECTRIC	50
BATTERY ELECTRIC	101
Grand Total	**1883**

SoCalGas's analysis shows that an estimated 96% of its AFV fleet operates within a DVC, AB 617, or Consistently Nominated Community. These vehicles are stationed at 92% of SoCalGas's facilities, with an estimated 76% of those facilities being in a DVC, AB 617 designated community, or Consistently Nominated Community.

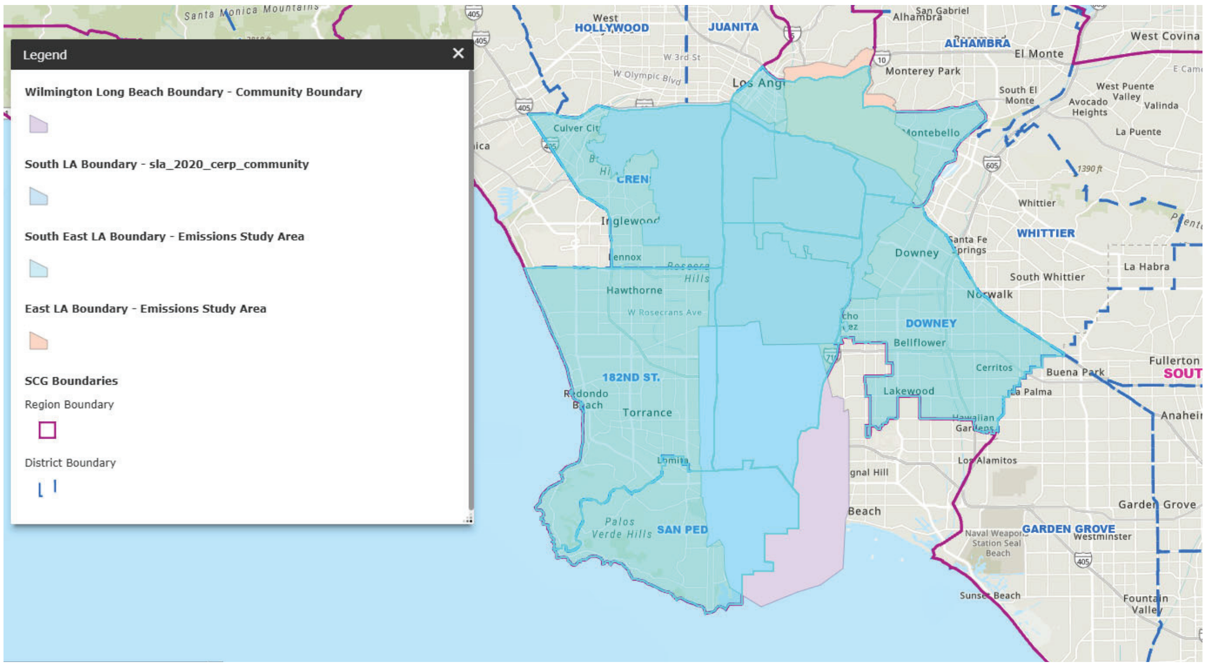
Table 2: AFV Fleet Data

Total AFV Count	**Total SCG Fleet Count**	**% of AFV in SCG Fleet**
1883	4415	43%
Total AFV that serves DVC, AB 617, or CNC	**Total AFV Count**	**% of AFV that serve DVC, AB 617 or CNC**
1806	1883	96%
Facilities that contain AFV	**Total SCG Facilities**	**% of Facilities that contain AFV**
65	71	92%
Facilities with AFV & serve DVC, AB 617, or CNC	**Total SCG Facilities**	**% of Facilities that contain AFV & serve DVC, AB 617, or CNC**
54	71	76%

19 OEHHA, *Disadvantaged Community Map*, *available at:* https://oehha.ca.gov/calenviroscreen/sb535.

SoCalGas's AFVs on average drive 54 miles per day. To provide an illustrative perspective Figure 13 shows a sample of SoCalGas facilities and their respective district boundaries within the Los Angeles area with AFVs (teal blue outline) and the AB 617 designated communities (solid-colored polygons) they serve.

Figure 12: LA Basin of AB 617 Designated Communities and SCG Facilities Boundaries[20]



SoCalGas's RNG vehicles make up most of the AFV fleet and translate to an estimated 15,000 metric tons of CO2 reduction per year which is equivalent to an estimated 13,000 passenger vehicles per year.[21] Additionally, EPA and the California Renewable Transportation Alliance (CRTA) have both identified the air quality benefits of RNG vehicles in addition to the associated reduction of CO2 emissions.[22] CRTA highlights the benefits of RNG vehicles not only as vehicles using a fuel with the lowest carbon intensity score of California fuels, but also

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20 District boundaries refer to SoCalGas operating facilities and are divided by SoCalGas regions.

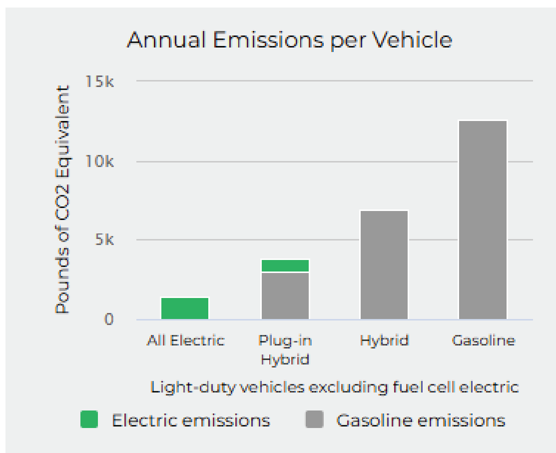
21 The calculation is based on every RNG service truck equates to 10 metric tons of reduced CO2 emissions. *See* SoCalGas, *SoCalGas to Convert 200 New Service Trucks to Run on RNG* (April 22, 2021), *available at:* https://www.socalgas.com/newsroom/stories/socalgas-to-convert-200-new-service-trucks-to-run-on-rng.

22 Refer local air quality improvement benefits of RNG discussed by the EPA, *see* EPA, *Renewable Natural Gas – Benefits, available at:* https://www.epa.gov/lmop/renewable-natural-gas#benefits; *see also* CTRA, *RNG = lower GHGs, cleaner air, healthier Californi*a, *available at:* https://ca-rta.org/renewable-transportation-fuels/renewable-fuel/.

their multiple air quality and climate goal benefits, the ease of use and benefits in the commercial waste use industry, and the available extensive fueling infrastructure for RNG vehicles.[23]

Non-plug-in hybrid, fuel cell electric, and battery electric AFVs further advance SoCalGas's efforts in supporting decarbonized energy and improved air quality. The chart below, cited from the United States Department of Energy (DOE), shows the estimated emissions per vehicle for electric, plug-in hybrid, non-plug-in hybrid, and gasoline. This chart illustrates the air quality benefits of AFVs compared to gasoline, specifically for non-plug-in hybrid and electric vehicles utilized by SoCalGas in its fleet.

Table 3: DOE State Averages[24]



Fuel cell electric AFVs powered by hydrogen (FCEVs) are also part of SoCalGas's AFV fleet and have been shown to have positive effects on reduced CO2 emissions as zero emissions vehicles and further expands technologies available for AFVs. The DOE and the EPA also recognize the substantial air quality benefits of FCEVs as zero emission vehicles.[25]

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23 CTRA, *RNG = lower GHGs, cleaner air, healthier Californi*a, *available at:* https://ca-rta.org/renewable-transportation-fuels/renewable-fuel/.

24 DOE, *Alternative Fuels Data Center - Emissions from Electric Vehicles, available at:* https://afdc.energy.gov/vehicles/electric-emissions.

25 DOE, *Alternative Fuels Data Center – Fuel Cell Electric Vehicle Emissions*, *available at:* https://afdc.energy.gov/vehicles/emissions-hydrogen.

Action Item No. 4

Evaluate how the selection of proposed mitigations in the RDF may impact climate resiliency in DVCs.

Medium Pressure Gas System Risk

Medium pressure pipeline risk exposure to wildfire, storm surge, and flood events was evaluated at part of this Action Item. As part of this evaluation, this risk was integrated with the SoCalGas service territory and DVC boundaries to understand the intersection of risk across communities and identify communities where mitigation efforts may increase climate resilience. Through this Pilot Study, SoCalGas's analysis indicated that wildfire, storm surge, and flood risk are higher in non-DVCs, as most DVCs are primarily located in non-coastal, dense urban areas, whereas non-DVCs are located more prevalently in mountainous regions of Southern California, with a higher wildfire risk, and along the coastline, which is highly impacted by storm surges and flooding. Since mitigation efforts occur in both DVCs and non-DVCs, SoCalGas's analysis indicated that pipeline replacements improve regional climate resilience. Impacts to climate resilience in DVCs are discussed below.

Figure 13: Wildfire Risk Exposure Baseline to 2050

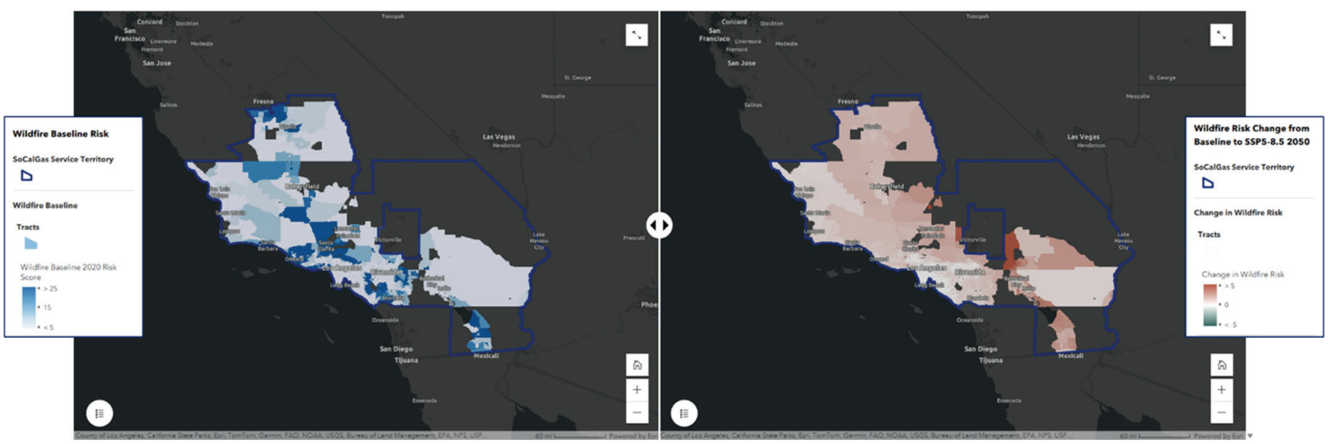

Figure 13 shows the baseline 2025 wildfire risk (left) and the future projected change in this risk in 2050 (right) under the IPCC's SSP5-8.5 high emissions scenario .[26] As reflected in the legends, areas with projected high baseline wildfire risk are shown with the blue gradient while

[26] Refer to IPCC's SSP5-8.5 climate scenarios, *see* ICCP, *IPCC Sixth Assessment Report - Chapter 8: Water Cycle Changes* (2021), *available at:* https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-8/.

areas where risk is expected to increase are shown with red gradient. Currently wildfire risk exposure in the SoCalGas service territory is predominantly concentrated in mountainous regions around Los Angeles. Wildfire risk is expected to increase in these mountainous regions more than the urban regions of the area.[27] For example, in San Bernardino County, projections indicate a 10% increase in the number of days with extreme wildfire conditions by 2050. Projections of increased wildfire exposure poses direct threats to pipeline infrastructure, potentially leading to weakened or melted infrastructure above ground, and soil instability underground.[28] An increase in projected future wildfire events can result in increased risk of leaks and service interruptions due to pressure and flow disruptions.[29]

The analysis of this Pilot Study indicated that non-DVCs are more prevalent in the mountainous regions of Southern California, contributing to a higher wildfire risk exposure for non-DVCs than DVCs, which are largely located in urban areas where wildfire risk is lower. This analysis also concluded that overall, wildfire risk exposure in non-DVCs is 11% higher than DVCs in 2050 under a high emissions scenario. Furthermore, in the mountainous San Bernardino County, 2050 wildfire risk is 33% higher in non-DVCs compared to DVCs under a high emissions scenario.

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[27] World Weather Attribution, *Climate change increased the likelihood of wildfire disaster in highly exposed Los Angeles area* (January 28, 2025), *available at:* https://www.worldweatherattribution.org/wp-content/uploads/WWA-scientific-report-LA-wildfires.pdf.

[28] IOPscience, Increasing exposure of energy infrastructure to compound hazards: cascading wildfires and extreme rainfall (October 19, 2019), *available at:* https://iopscience.iop.org/article/10.1088/1748-9326/ab41a6*; see also,* Advancing Earth and Space Sciences (AGU), *Interdependencies Between Wildfire-Induced Alterations in Soil Properties, Near-Surface Processes, and Geohazards* (January 3, 2024), *available at:* https://agupubs.onlinelibrary.wiley.com/doi/pdfdirect/10.1029/2023EA003498.

[29] ScienceDirect, *How vulnerable are US natural gas pipelines to electric outages?* (March-April 2023), *available at:* https://www.sciencedirect.com/science/article/pii/S1040619023000180?via%3Dihub.

Figure 14: Mitigation activities may improve wildfire resilience in affected tracts

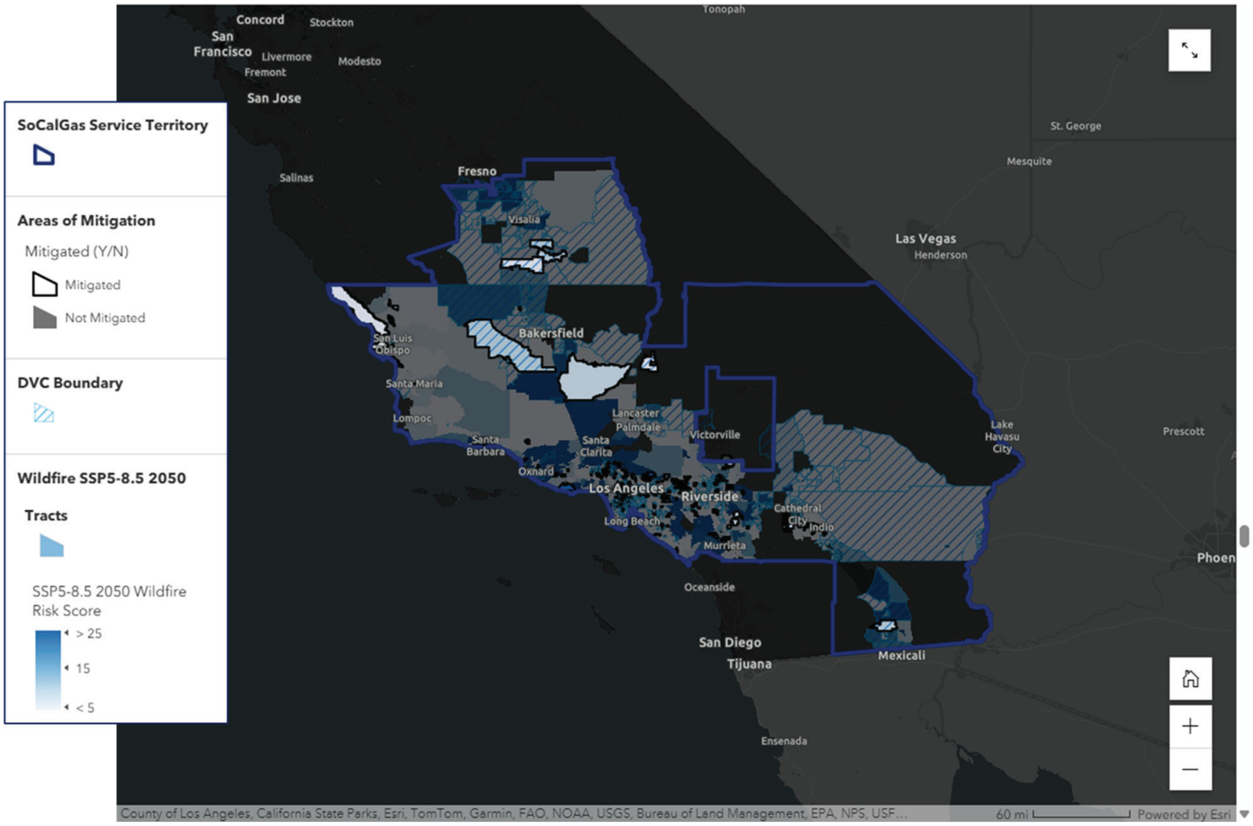

Figure 14 shows projected 2050 wildfire risk (blue shading) along with DVC boundaries (blue cross-hatching) and highlights tracts where mitigation efforts occurred (black outline). Both DVC and non-DVC tracts with projected higher wildfire risk exposure experienced pipe replacements, pipeline replacements may improve local infrastructure's resilience to post-wildfire soil instability.[30]

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[30] AGU, *Interdependencies Between Wildfire-Induced Alterations in Soil Properties, Near-Surface Processes, and Geohazards* (January 3, 2024), *available at:* https://agupubs.onlinelibrary.wiley.com/doi/pdfdirect/10.1029/2023EA003498.

Figure 15: Storm Surge Risk Exposure Baseline to 2050

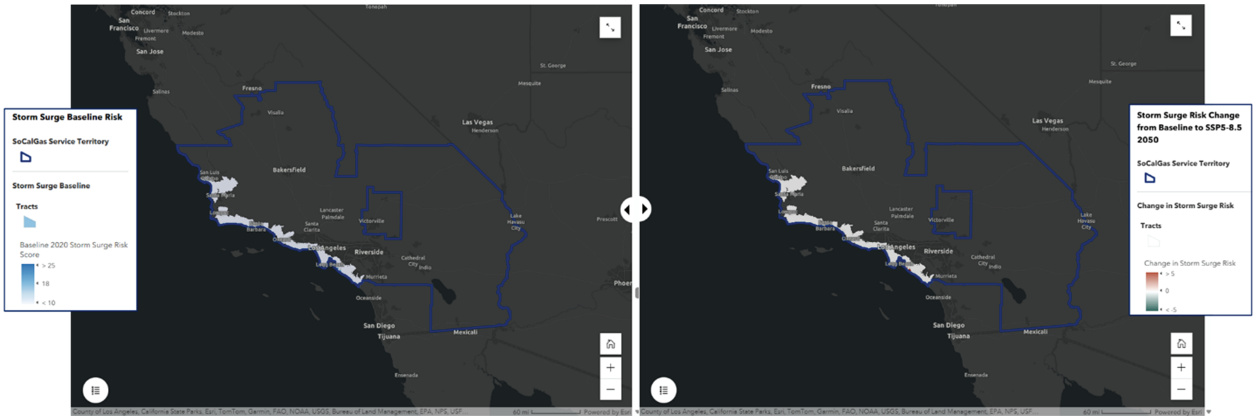


Figure 15 shows baseline 2025 storm surge risk (left) and the future projected change in 2050 (right) under the IPCC's SSP5-8.5 scenario. Areas with high baseline storm surge risk are shown with the blue gradient while areas where risk is expected to increase are shown with red gradient. Currently, projected storm surge risk is concentrated in coastal regions like Santa Barbara and Huntington Beach. Anticipated higher risk exposure in 2050 could be attributed to projected sea level rise and potential changes in the frequency and severity of tropical cyclones. For example, by 2050 the surge depths from a Category 1 or 2 Tropical Cyclone in Huntington Beach may increase by as much as six inches deeper under a high emissions scenario. As a result, increased flooding is also expected in this area. Storm surge events can lead to coastal incursion, exposing pipelines and making them more vulnerable to physical damage. Additionally, saturated ground can cause shifting or settling, potentially leading to cracks or gas leaks. Finally, exposure to salt water can contribute to corrosion, with older pipes being particularly susceptible to damage.[31] These impacts can result in malfunctions or short circuits in above ground infrastructure, causing service disruptions and safety concerns for local communities. Overall, storm surge risk exposure in non-DVCs is 12% higher than DVCs in 2050 under a high emissions scenario.

[31] NJP Clean Water, Analysis and ranking of corrosion causes for water pipelines: a critical review (September 15, 2023), *available at:* https://www.nature.com/articles/s41545-023-00275-5.

Figure 16: Mitigation activities do not target coastal communities with higher storm surge risk

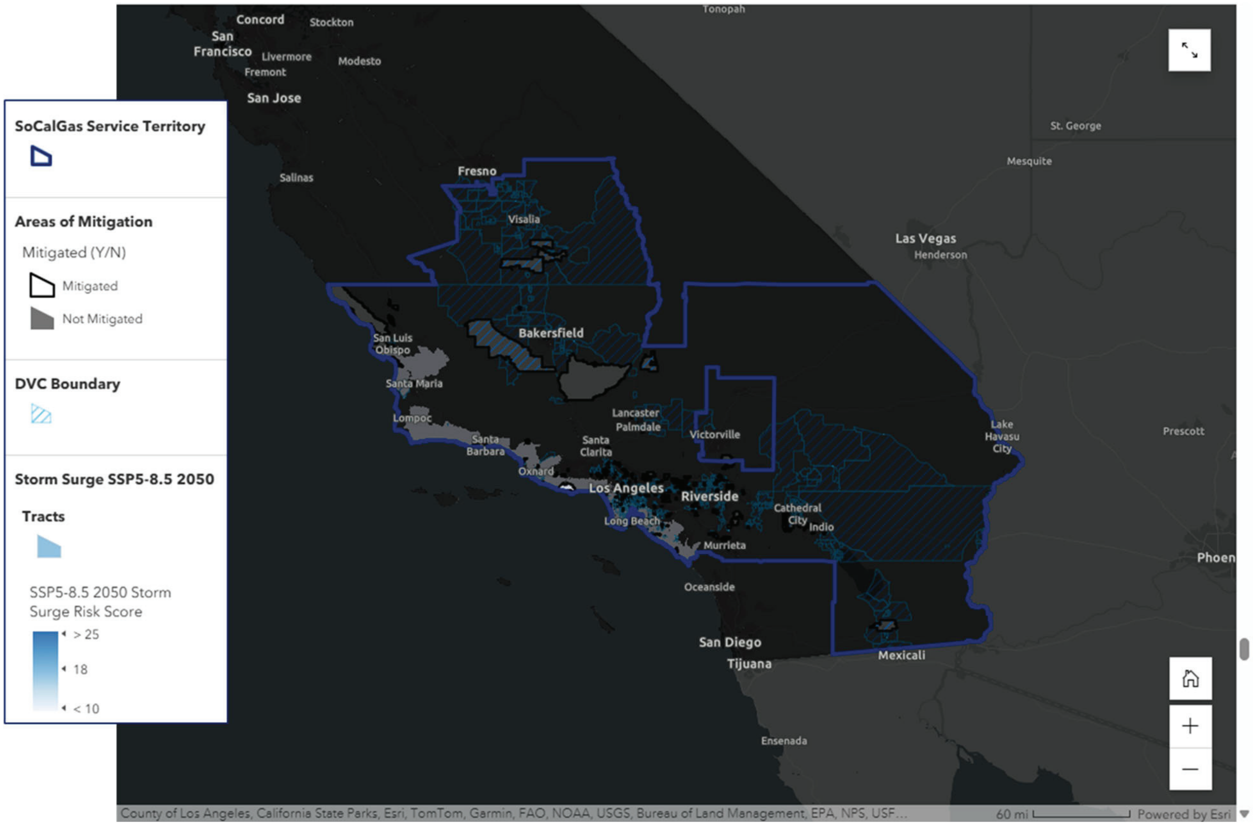


Figure 16 shows 2050 storm surge risk (blue shading) along with DVC boundaries (blue cross-hatching) and highlights tracts where mitigation efforts occurred (black outline). Across SoCalGas's service territory, this analysis indicates that mitigation activities appear to have minimal overlap with high storm surge risk regions. Among other mitigation efforts not evaluated in this Pilot study such as pipeline coating, wrapping cathodic protection, burial depth and backfill material targeting coastal regions, pipeline replacements in conjunction with these mitigations potentially improve climate resilience which could improve corrosion resistance.

Figure 17: Flood Risk Exposure Baseline to 2050

Figure 17 shows baseline 2025 flood risk (left) and the future projected change in 2050 (right) under the IPCC's SSP5-8.5 scenario. Areas with high baseline flood risk are shown with a blue gradient, while areas where risk is expected to increase are shown with a red gradient. Flood risk is currently distributed throughout larger census tracts north of Los Angeles, in addition to concentrated pockets within inlet regions like Long Beach. This analysis indicates that across the service territory flood risk is expected to increase northwest of Los Angeles and decrease east of Los Angeles by 2050. Flooding can lead to soil erosion and displacement, which may undermine the structural integrity of pipelines, resulting in potential leaks or ruptures. After an event, standing water can exacerbate corrosion processes, particularly in older or inadequately protected pipeline segments. Flood risk exposure varies by neighborhood, however, overall flood risk exposure in non-DVCs is estimated to be 9% higher than DVCs in 2050 under a high emissions scenario.

Figure 18: Mitigation activities may improve flood resilience in affected tracts

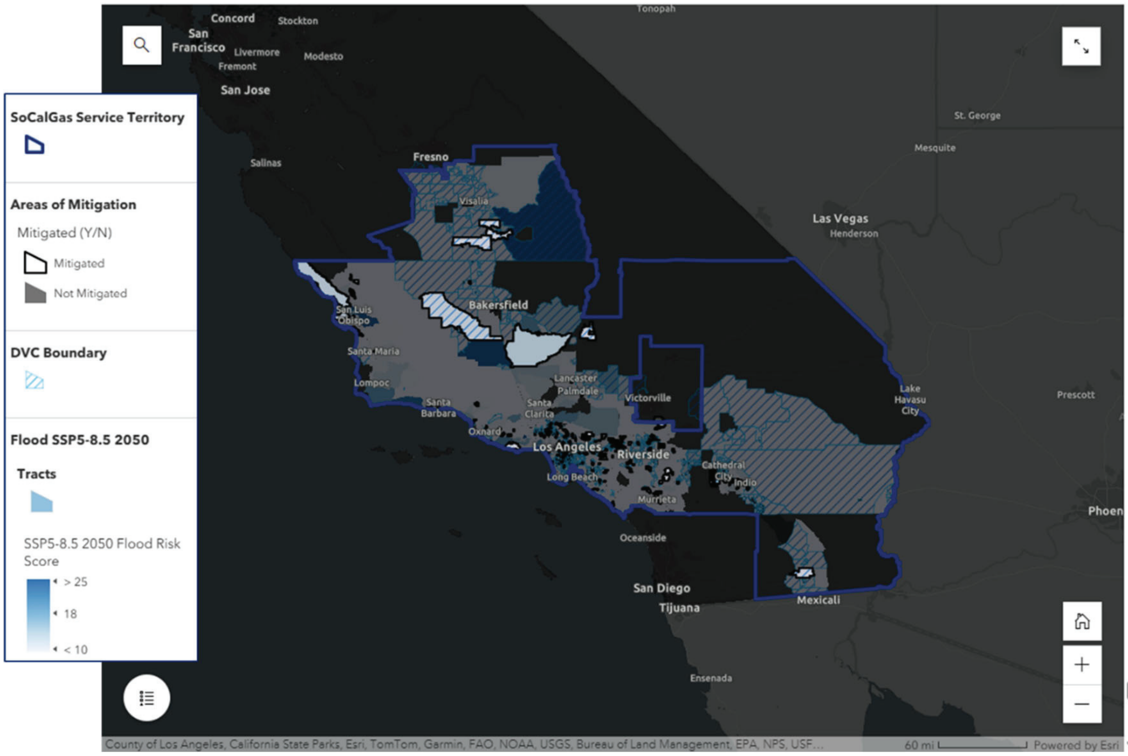


Figure 18 shows 2050 flood risk (blue shading) along with DVC boundaries (blue cross-hatching) and highlights tracts where mitigation efforts occurred (black outline). Both DVC and non-DVC tracts with relatively higher flood risk exposure are projected to experience pipe replacement, improving local infrastructure resilience to corrosion.

Excavation Damage Risk

Excavation Damage risk is primarily caused by third-parties failing to follow proper procedures such as calling 811 DigAlert prior to digging, or due to incorrect/unsafe excavation practices. As a result, there is no expected climate resilience impact from excavation damage mitigation activities. Perils such as wildfire, storm surge, and flooding would likewise not be expected to cause a significant impact on excavation damage risk to DVCs or non-DVCs in the future.

Examples of Other SoCalGas Mitigation Activities Not Evaluated for this Action Item

In addition to the mitigations evaluated in this Action Item, SoCalGas established the Climate Advisory group in 2020. As part of the Climate Advisory Group activities, SoCalGas regularly engages in partnerships with academic and research institutions to leverage innovative technologies and expertise to further advance climate resilience initiatives.[32] Highlighted in Volume 1, Chapter RAMP-5, is the Climate Change Adaptation Table, Controls and Mitigations that Align with Increasing Resilience to Climate Hazards. This table highlights the list of mitigations SoCalGas is undertaking which address climate hazards.

Action Item No. 5

Evaluate if estimated impacts of wildfire smoke included in the RDF disproportionately impact DVCs.

This Action Item does not apply to SoCalGas.

Action Item No. 6

Estimate the extent to which risk mitigation investments included in the RDF impact and benefit DVCs independently and in relation to non-DVCs in the IOU service territory.

Medium Pressure Gas System Risk

Figure 20 highlights the census tracts where at least one or more medium pressure pipe main replacements occurred across the SoCalGas service territory in 2024. Overall, an estimated 7% of census tracts experienced at least one medium pressure pipe main replacement in 2024, with approximately 114 miles of pipe replaced. Pipeline main replacement mitigation efforts[33] were primarily concentrated in urban areas and surrounding communities such as Los Angeles and Ontario.

Of the estimated 114 total miles of pipe replaced, 34 miles were replaced in DVCs and 80 miles were replaced in non-DVCs. Based on the total mileage of pipe in DVCs and non-DVCs, 0.25% of DVC pipeline was replaced compared to 0.23% of non-DVC pipeline. This represents an 8.7% higher rate of replacement in DVCs than non-DVCs on a per mile basis. There is a nominal

32 *See* Chapter SCG RAMP-5: Climate Change Adaptation at Section II.

33 Other mitigations which impact the Medium Pressure Gas System risk were not evaluated as part of this study, as described in the Approach and Methodology section.

difference of <1% which indicates almost an equal rate of safety risk reduction in DVCs and non-DVCs based on 2024 medium pressure pipe replacements.

Figure 19: Census Tracts with Medium Pressure Pipe Main Replacements in 2024

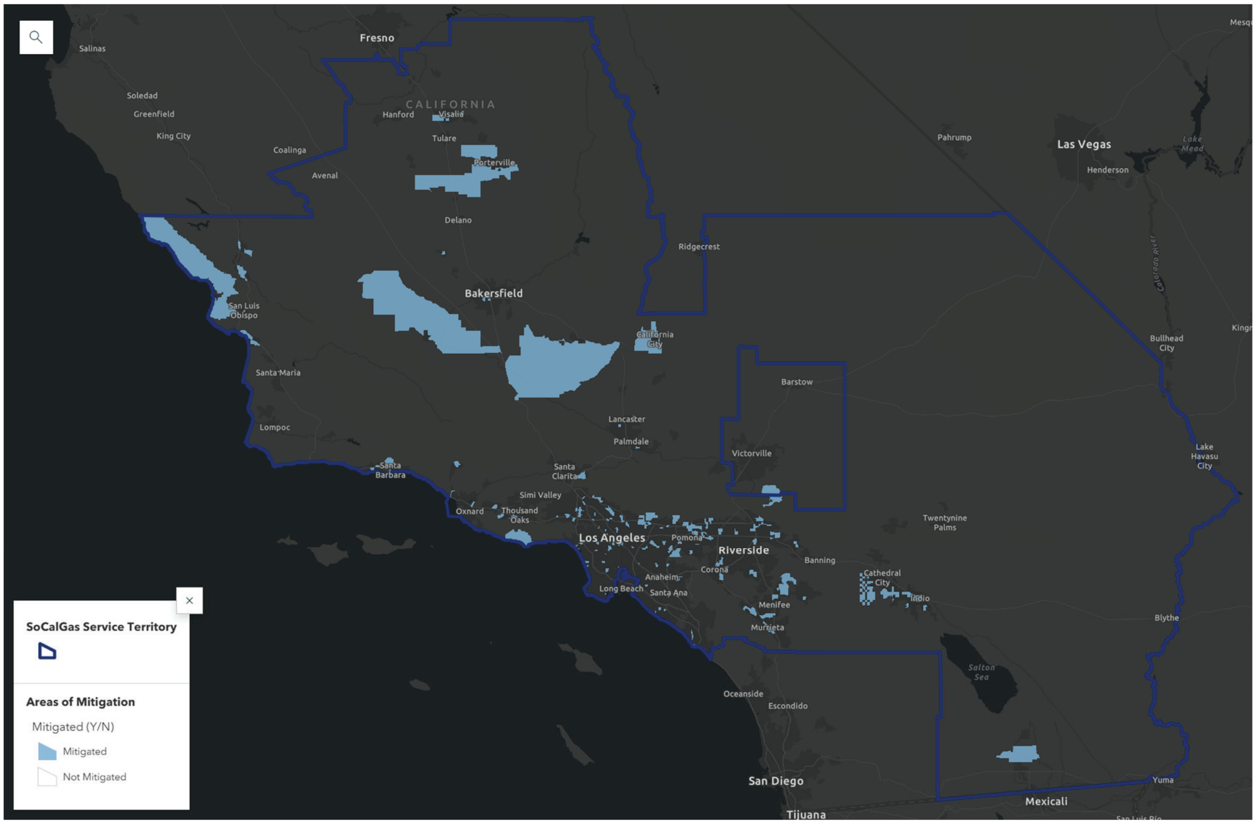


Figure 20a and 20b show changes in average safety risk per foot across medium pressure pipes where 2024 pipe main replacement efforts occurred in the SoCalGas service territory. Blue shaded areas on the map reflect improvements to relative safety risk. Pipe replacements across the SoCalGas service territory are projected to have reduced average safety risk per foot by 40% in the pipes where pipeline replacement mitigation efforts occurred.

Figure 20a: Change in Safety Risk by Medium Pressure Pipe Main Replacements

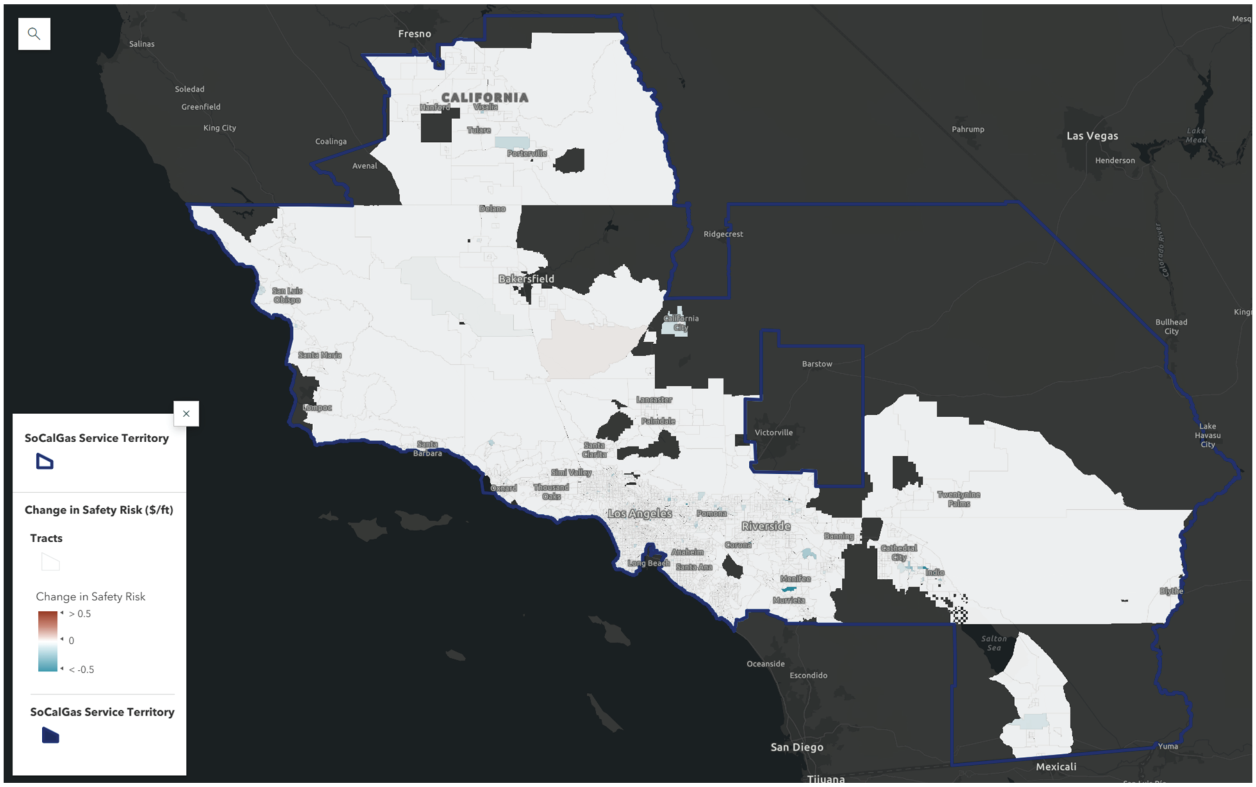


Figure 20b: Change in Safety Risk by Medium Pressure Pipe Main Replacements in Los Angeles Basin

Figure 21a and 21b show where census tract-level average safety risk per foot has changed, overlayed with DVC boundaries (blue cross-hatching). Pipe replacements located in DVCs are projected to have reduced average safety risk per foot by an estimated 40.0% in the pipes where mitigation efforts occurred, while pipe replacements located in non-DVCs reduced average safety risk per foot by an estimated 40.3%. This difference of <1% indicates a near equal rate of safety risk reduction in DVCs and non-DVCs based on 2024 medium pressure pipe replacements.

Figure 21a: Change in Safety Risk by Medium Pressure Pipe Main Replacements with DVC Overlay

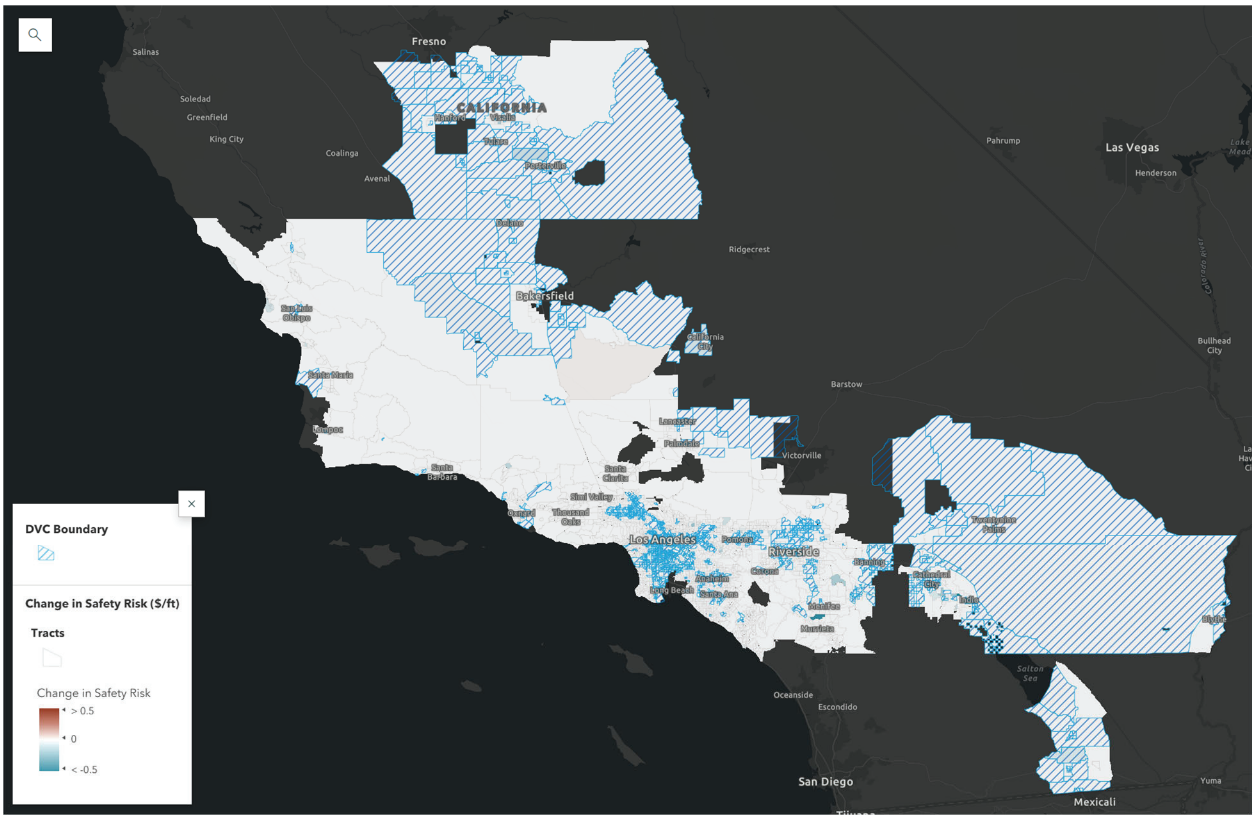


Figure 21b: Change in Safety Risk by Medium Pressure Pipe Main Replacements in LA Basin with DVC Overlay

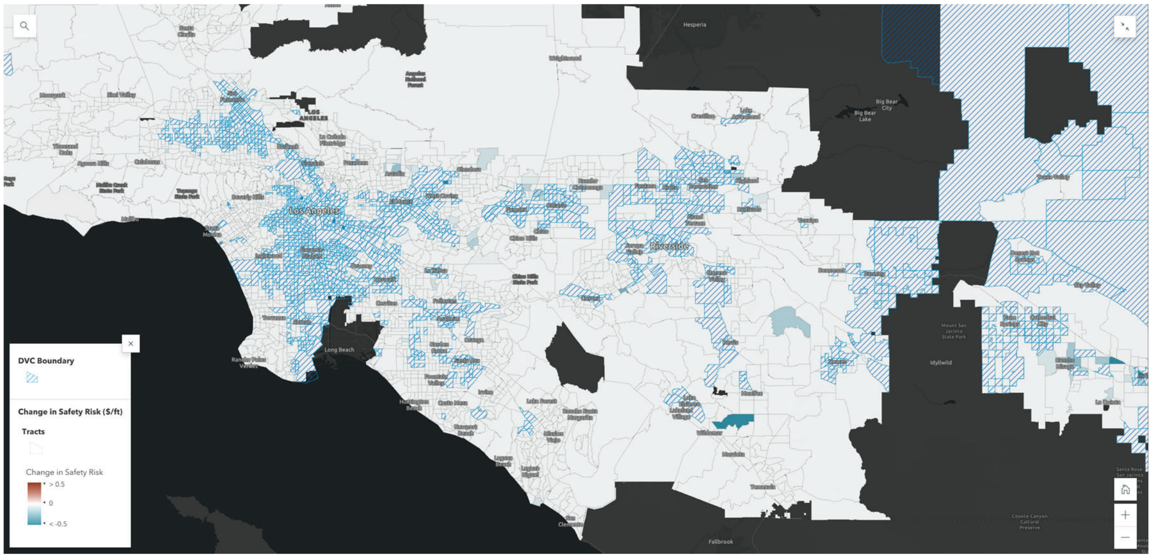


Figure 22 visualizes change in average reliability risk per foot across medium pressure pipes in SoCalGas's service territory. Blue shaded areas on the map reflect improvements to relative reliability risk. Pipe replacements across the SoCalGas service territory are projected to have reduced average reliability risk per foot by 47% in pipes where mitigation efforts occurred.

Figure 22: Change in Reliability Risk by Medium Pressure Pipe Main Replacements

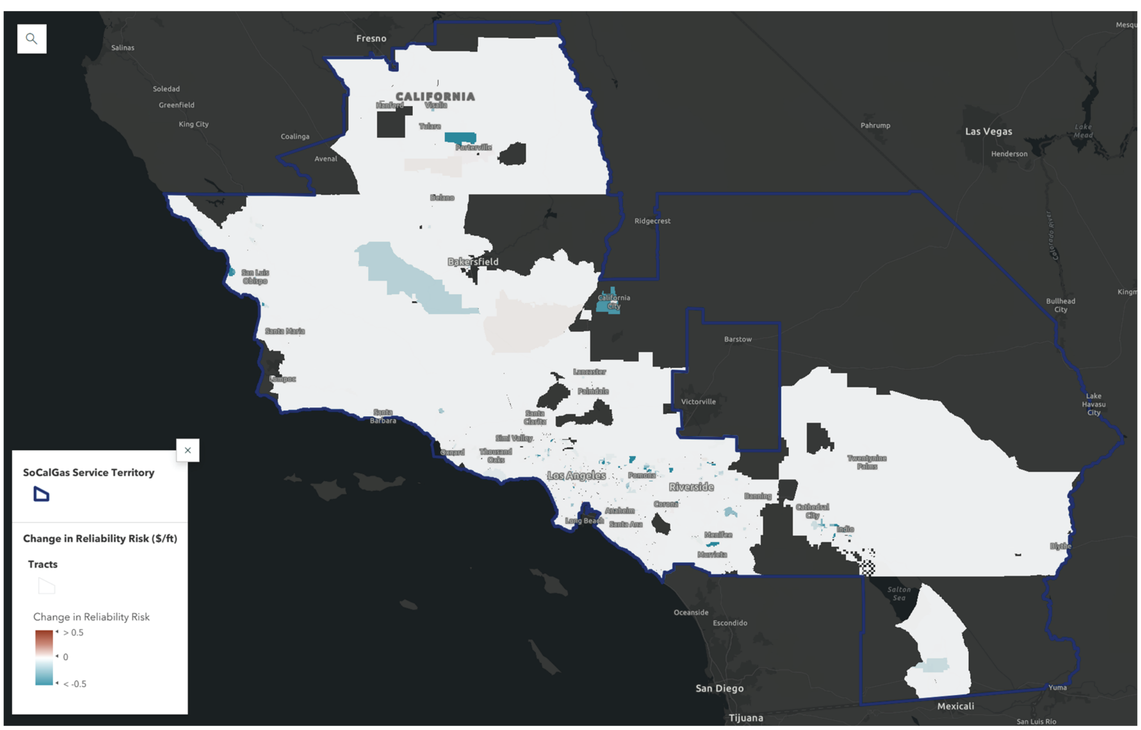


Figure 23a and 23b show where census tract-level average reliability risk per foot has changed, overlayed with DVC boundaries (blue cross-hatching). Pipe replacements located in DVCs reduced average reliability risk per foot by 50% in the pipes where mitigation efforts occurred, while pipe replacements located in non-DVCs reduced average reliability risk per foot by 44%. This indicates a reliability risk reduction in DVCs at a 1.13x rate compared to non-DVCs based on 2024 medium pressure pipe replacements.

Figure 23a: Change in Reliability Risk by Medium Pressure Pipe Main Replacements with DVC Overlay

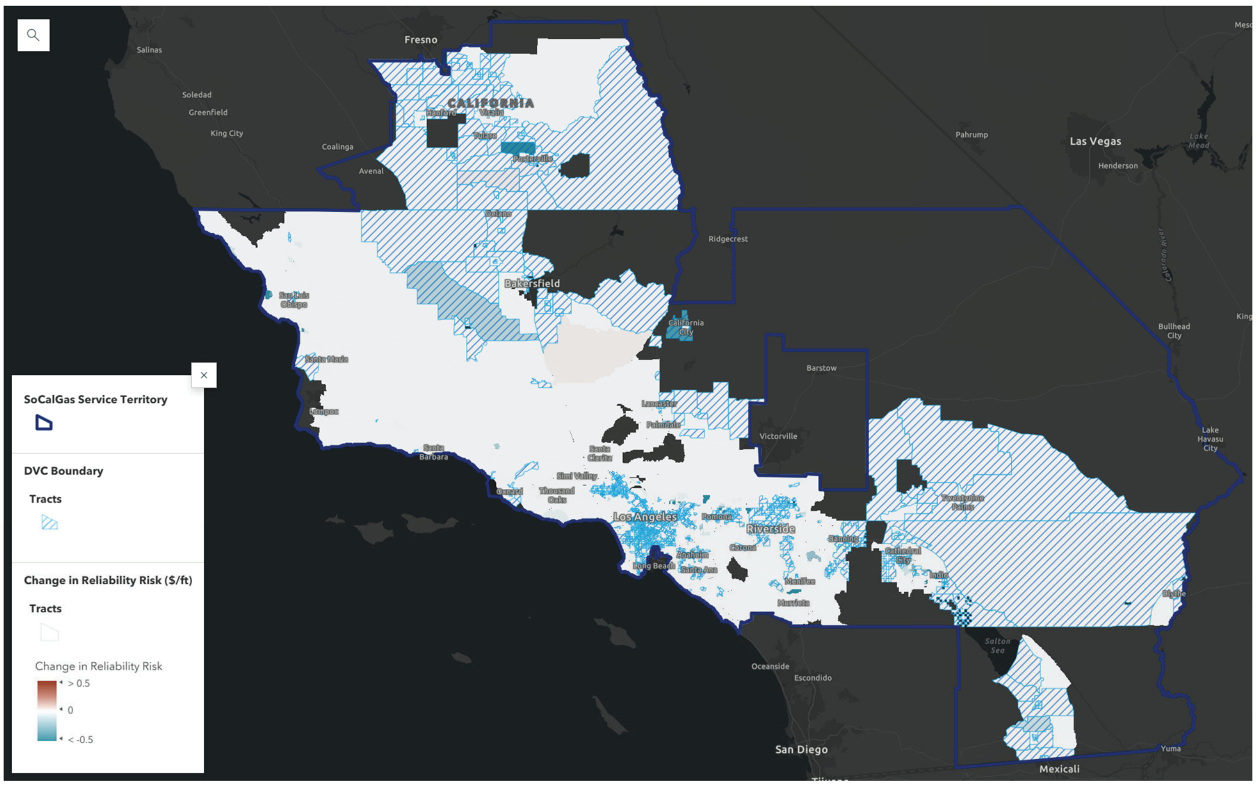
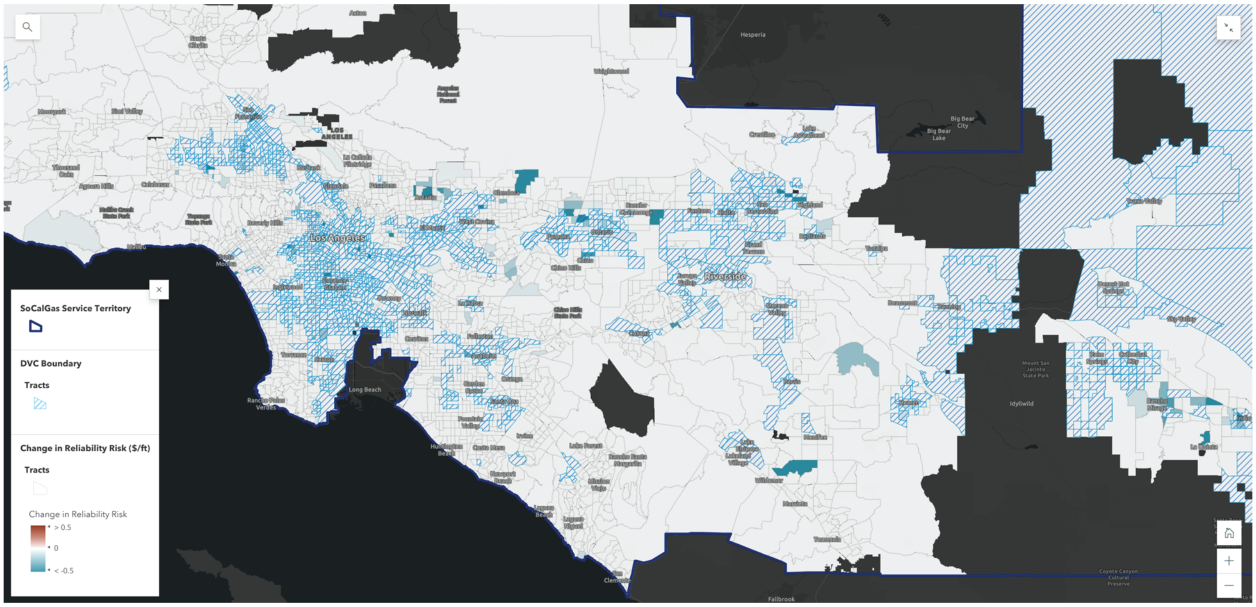


Figure 23b: Change in Reliability Risk by Medium Pressure Pipe Main Replacements in Los Angeles Basin with DVC Overlay



Excavation Damage Risk

One of SoCalGas's primary risk mitigation activities for Excavation Damage is Damage Prevention Activities, which includes Locate and Mark, the company's activities responding to 811 DigAlert ticket requests to mark subsurface facilities or confirming that no conflict exists in the proposed excavation area. Damage Prevention Activities are largely reactive in nature, as SoCalGas's ability to mitigate excavation damage is dependent upon third-parties making 811 DigAlert ticket requests, regardless of the location of the request. Due to the nature of how those orders are placed, the location data of 811 DigAlert ticket requests would not provide a full picture of mitigation impact between DVC and non-DVC areas. To quantify mitigation impact, further assessment of damage prevention quality and effectiveness between DVC and non-DVC areas would need to be analyzed, requiring incorporation of excavation damage data into a larger data system for better visibility. This integration will provide a broader view of high-pressure and medium-pressure asset information, including pipeline locations, recent damages, and other critical data, to continue advancing the mitigation of this risk. Those lessons learned and next steps will be documented in SoCalGas's ESJ White Paper.

Examples of Other SoCalGas Mitigation Activities Not Evaluated for this Action Item

Medium Pressure Gas System Risk

Other mitigation activities for the Medium Gas Pressure System risk include cathodic protection activities, leak survey, leak repair, pipeline monitoring, regulator station replacement and enhancement activities, several maintenance and inspection programs, as well as multiple infrastructure protection programs. While this Pilot Study focused on pipeline replacement and its significant contribution to risk mitigation in specific areas, the entire portfolio of medium pressure mitigation activities plays an important role in addressing this risk across the SoCalGas service territory.

Excavation Damage Risk

Other mitigation activities not evaluated as part of this Pilot Study include Damage Prevention Public Awareness which includes media advertising of 811 DigAlert announcements, as well as Damage Prevention Strategies advancing safe excavation practices in compliance with California State Excavation Law 4216, and Damage Prevention Mapping to enhance and continuously improve the quality of SoCalGas's subsurface facility mapping. These activities are proactive efforts by SoCalGas to advance damage prevention with employees, third-parties, and the public. As noted herein, no representative location data associated with these activities is available at this time, as this outreach work is applied across the SoCalGas service territory.

Action Item No. 7

Enhance outreach and public participation opportunities for DVCs to meaningfully participate in risk mitigation and climate adaptation activities consistent with D.20-08-046.

As part of this Pilot Study, SoCalGas enhanced participation opportunities for DVCs by expanding its existing outreach and engagement programs as detailed herein. For example, SoCalGas previously established four Regional Advisory Boards for its Climate Adaptation Vulnerability Assessment (CAVA) program, one in the Central Valley/Central Coast region, one in the Los Angeles region, one in the Orange County/Coastal region, and one in the south inland region. These groups were created to help assess the impacts of climate change on DVCs and prioritize investments to mitigate these impacts. These Regional Advisory Boards are made up of community-based organization leaders who provide direct services to DVCs. Additionally, leaders from labor groups, agricultural organizations, women's groups, youth groups, senior citizen groups, Americans with Disabilities Act (ADA), assisted living groups, housing organizations, environmental groups, homeless services, food banks, ethnic and cultural organizations, etc. were engaged to provide their perspectives on climate change risk and climate adaptation options.

To enhance this existing outreach and public participation program, the ESJ Pilot Study Plan team and the CAVA team worked closely together to integrate the Pilot Study and RAMP materials into SoCalGas's Climate Adaptation program. SoCalGas hosted four workshops with its Regional Advisory Boards in October through November 2024. In addition to discussing climate risks, each workshop included a segment to introduce RAMP and the ESJ Pilot Study Plan. This included an evaluation of the highest enterprise risks and the impact on DVCs.

Feedback from these workshops included a discussion around agricultural communities and the risk of third-party excavation damage. Advisory Board members expressed the desire to have continued outreach and engagement, in all appropriate languages and translations, to better disseminate 811 DigAlert announcements. Advisory Board members also stressed the importance of post-excavation damage. For instance, Advisory Board members highlighted communications with surrounding neighbors and areas about the third-party dig-in, describing what happened and how it can be avoided in the future. Finally, community members also asked about mapping availability and if anything could be downloaded or understood prior to calling 811.

SoCalGas enhanced opportunities for engagement as part of this Pilot Study by expanding its climate risk discussions to include SoCalGas's highest enterprise risks. This was a new opportunity for the Regional Advisory Boards to weigh in on third-party dig-in risks, especially in DVCs. It also served as an introduction to the RAMP process for many of SoCalGas's community stakeholders, further expanding their knowledge and opportunities to provide input on SoCalGas's risk mitigation activities.

The ESJ Pilot Study team continues to work with other internal stakeholders to increase outreach opportunities for DVCs through existing programs. These include Customer Programs, Public Affairs, Community Relations, Research & Development, and Sustainability. SoCalGas also developed training for various departments within SoCalGas that is specifically focused on engagement in DVCs, climate equity, available tools, and best practices.

Conclusion

The goal of the ESJ Pilot Study Plan was to evaluate the impact of selected risks and mitigation activities on Disadvantaged and Vulnerable Communities (DVCs) and how that compares to non-DVC areas. The analysis primarily focused on pipeline replacement for the Medium Pressure Gas System risk and Locate and Mark activities for the Excavation Damage risk. Initial findings highlighted pipe replacements had a difference of <1% (near equal rate) of safety risk reduction in DVCs and non-DVCs. Similarly, pipe replacements located in DVCs successfully reduced average reliability risk per foot by 50% in the pipes where mitigation efforts occurred, while pipe replacements located in non-DVCs reduced average reliability risk per foot by 44%. Further, SoCalGas evaluated projects where air quality benefits could be realized for the various communities across the service territory along with leveraging existing community outreach and engagement efforts. SoCalGas's ESJ White Paper, to be filed no later than July 15, 2025, will provide an opportunity to discuss in greater detail what challenges were faced in the execution of this Pilot Study along with possible improvements to target mitigations and their impact on DVCs.

2025 Risk Assessment Mitigation Phase

APPENDIX 5

Cost Benefit Ratio Ranking

May 15, 2025

APPENDIX 5

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Societal Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Cybersecurity	C803	Sensitive Data Protection	236.7
Cybersecurity	C804	Operational Technology (OT) Cybersecurity	220.1
Cybersecurity	C805	IT Infrastructure Modernization	197.0
Cybersecurity	C801	Perimeter Defenses	104.0
High Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	**50.2**
Cybersecurity	C802	Internal Defenses	33.7
High Pressure Gas System	**C123**	**Regulator Station Replacement**	**32.9**
High Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**21.4**
High Pressure Gas System	**C108**	**Cathodic Protection - Maintenance**	**21.0**
High Pressure Gas System	**C132**	**Pipeline Maintenance**	**18.8**
Excavation Damage	**C002**	**Damage Prevention Activities - Gas**	**18.2**
High Pressure Gas System	**C019**	**Storage HP Retrofits and Upgrades to Purification Equip**	**14.7**
High Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**12.8**
Medium Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**12.5**
Underground Gas Storage	**C408**	**Storage Field Maintenance - Underground Components**	**10.3**
Medium Pressure Gas System	**C135**	**EPM Installations & Replacements**	**8.7**
Medium Pressure Gas System	**C177**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**8.3**
Medium Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**7.3**
Medium Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	**6.6**
Underground Gas Storage	**C402**	**Well Abandonment/Replacement/Demo Verification and Monitor**	**4.0**
High Pressure Gas System	**C171**	**Integrity Assessments & Remediation**	**4.0**
High Pressure Gas System	**C135**	**EPM Installations & Replacements**	**3.8**
High Pressure Gas System	**C136**	**Compressor Stations - Capital**	**3.7**
High Pressure Gas System	**C104**	**Cathodic Protection - Capital**	**3.7**
High Pressure Gas System	**C113**	**Leak Repair**	**3.3**
High Pressure Gas System	**C177**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**2.8**
Medium Pressure Gas System	**C182**	**Distribution Risk Evaluation & Monitoring System (DREAMS)**	**2.3**
Medium Pressure Gas System	**C134**	**Pipeline Monitoring**	**1.9**
Excavation Damage	**C001**	**Damage Prevention Strategies**	**1.9**
High Pressure Gas System	**C105**	**SCADA Operations**	**1.8**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Societal Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Underground Gas Storage	**C401**	**Storage Integrity Management Program (SIMP)**	**1.8**
Contractor Safety	**C349**	**Contractor Safety Program**	**1.7**
High Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**1.5**
High Pressure Gas System	**C155**	**Measurement & Instrumentation Maintenance**	**1.5**
High Pressure Gas System	**C117**	**Leak Survey & Patrol**	**1.5**
High Pressure Gas System	C010	Pipeline Monitoring Technologies	1.5
Medium Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**1.4**
High Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**1.4**
High Pressure Gas System	**C157**	**PSEP Phase 1A**	**1.2**
Employee Safety	**C345**	**Safety & Health - Operations**	**1.0**
High Pressure Gas System	**C156**	**Quality Assurance Transmission Assets**	**1.0**
Employee Safety	**C342**	**Safety Technology & Analytics**	**1.0**
Employee Safety	**C347**	**Event Learning & Continuous Improvement**	**1.0**
Employee Safety	**C343**	**Safety Strategy**	**0.8**
High Pressure Gas System	**C151**	**Measurement & Regulation Station Capital**	**0.8**
Excavation Damage	**C003**	**Damage Prevention - Public Awareness**	**0.8**
Medium Pressure Gas System	**C106**	**Cathodic Protection- CP10 Activities**	**0.8**
Employee Safety	**C346**	**Safety & Health - Programs**	**0.8**
High Pressure Gas System	**C109**	**Control Room Monitoring Operation and Fatigue Management**	**0.7**
High Pressure Gas System	**C126**	**Shallow/Exposed Pipe Remediations**	**0.7**
High Pressure Gas System	**C134**	**Pipeline Monitoring**	**0.5**
High Pressure Gas System	**C185**	**PSEP Phase 1B**	**0.5**
Medium Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**0.5**
High Pressure Gas System	**C145**	**Class Location (Hydrotest)**	**0.5**
Employee Safety	**C312**	**Drug and Alcohol Testing Programs**	**0.4**
High Pressure Gas System	**C142**	**Compressor Station - Maintenance**	**0.4**
High Pressure Gas System	**C013**	**Gas Transmission Safety Rule - MAOP Reconfirmation**	**0.4**
High Pressure Gas System	**C014**	**Storage HP Field Maintenance – Aboveground Facilities**	**0.3**
High Pressure Gas System	**C016**	**Storage HP Field Maintenance – Aboveground Piping**	**0.3**
Medium Pressure Gas System	**C129**	**Cathodic Protection System Improvement**	**0.3**
High Pressure Gas System	**C118**	**Rupture Mitigation Valve Installation - Valve Rule**	**0.3**
High Pressure Gas System	**C186**	**PSEP Phase 2A**	**0.2**
Medium Pressure Gas System	**C159**	**Quality Assurance Gas Distribution Assets**	**0.2**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Societal Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
High Pressure Gas System	**C125**	**Pipeline Relocation/Replacement**	**0.2**
Medium Pressure Gas System	**C130**	**MSA Inspection and Maintenance**	**0.1**
Medium Pressure Gas System	**C123**	**Regulator Station Replacement**	**0.1**
Medium Pressure Gas System	**C120**	**Distribution Riser Inspection Program (DRIP)**	**0.1**
Medium Pressure Gas System	C124	Regulator Station Installation Replacement & Enhancement	0.1
High Pressure Gas System	**C160**	**Odorization**	**0.1**
Employee Safety	**C326**	**Workplace Violence Prevention Programs**	**0.0**
Excavation Damage	C004	Damage Prevention Mapping	0.0
Medium Pressure Gas System	**C175**	**Residential Meter Protection**	**0.0**
Medium Pressure Gas System	**C121**	**Gas Infrastructure Protection Program (GIPP)**	**0.0**
Medium Pressure Gas System	**C122**	**Sewer Lateral Inspection Project (SLIP)**	**0.0**

Bold *font indicates this control/mitigation includes mandated programs/activities.*

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Hybrid Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Cybersecurity	C803	Sensitive Data Protection	227.1
Cybersecurity	C804	Operational Technology (OT) Cybersecurity	213.2
Cybersecurity	C805	IT Infrastructure Modernization	182.0
Cybersecurity	C801	Perimeter Defenses	97.5
High Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	**50.1**
Cybersecurity	C802	Internal Defenses	32.5
High Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**22.6**
High Pressure Gas System	**C108**	**Cathodic Protection - Maintenance**	**22.4**
High Pressure Gas System	**C132**	**Pipeline Maintenance**	**19.8**
Excavation Damage	**C002**	**Damage Prevention Activities - Gas**	**19.5**
High Pressure Gas System	**C019**	**Storage HP Retrofits and Upgrades to Purification Equip**	**15.8**
High Pressure Gas System	**C123**	**Regulator Station Replacement**	**15.5**
Underground Gas Storage	**C408**	**Storage Field Maintenance - Underground Components**	**10.4**
Medium Pressure Gas System	**C135**	**EPM Installations & Replacements**	**8.7**
Medium Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**7.3**
Medium Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	**6.6**
High Pressure Gas System	**C104**	**Cathodic Protection - Capital**	**3.9**
High Pressure Gas System	**C135**	**EPM Installations & Replacements**	**3.9**
High Pressure Gas System	**C171**	**Integrity Assessments & Remediation**	**3.8**
High Pressure Gas System	**C113**	**Leak Repair**	**3.3**
Excavation Damage	**C001**	**Damage Prevention Strategies**	**2.0**
High Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**1.9**
Medium Pressure Gas System	**C134**	**Pipeline Monitoring**	**1.9**
High Pressure Gas System	**C105**	**SCADA Operations**	**1.9**
Contractor Safety	**C349**	**Contractor Safety Program**	**1.8**
High Pressure Gas System	**C136**	**Compressor Stations - Capital**	**1.7**
Underground Gas Storage	**C402**	**Well Abandonment/Replacement/Demo Verification and Monitor**	**1.7**
High Pressure Gas System	**C155**	**Measurement & Instrumentation Maintenance**	**1.6**
High Pressure Gas System	**C117**	**Leak Survey & Patrol**	**1.6**
High Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**1.5**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Hybrid Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Medium Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**1.4**
High Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**1.4**
Medium Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**1.4**
Employee Safety	**C345**	**Safety & Health - Operations**	**1.1**
High Pressure Gas System	C010	Pipeline Monitoring Technologies	1.1
High Pressure Gas System	**C156**	**Quality Assurance Transmission Assets**	**1.1**
Employee Safety	**C342**	**Safety Technology & Analytics**	**1.0**
Employee Safety	**C347**	**Event Learning & Continuous Improvement**	**1.0**
Employee Safety	**C343**	**Safety Strategy**	**1.0**
Excavation Damage	**C003**	**Damage Prevention - Public Awareness**	**0.9**
Medium Pressure Gas System	**C177**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**0.9**
Employee Safety	**C346**	**Safety & Health - Programs**	**0.8**
Medium Pressure Gas System	**C106**	**Cathodic Protection- CP10 Activities**	**0.8**
High Pressure Gas System	**C109**	**Control Room Monitoring Operation and Fatigue Management**	**0.8**
Underground Gas Storage	**C401**	**Storage Integrity Management Program (SIMP)**	**0.7**
High Pressure Gas System	**C134**	**Pipeline Monitoring**	**0.5**
High Pressure Gas System	**C145**	**Class Location (Hydrotest)**	**0.5**
Medium Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**0.5**
Employee Safety	**C312**	**Drug and Alcohol Testing Programs**	**0.5**
High Pressure Gas System	**C142**	**Compressor Station - Maintenance**	**0.4**
High Pressure Gas System	**C177**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**0.4**
High Pressure Gas System	**C014**	**Storage HP Field Maintenance – Aboveground Facilities**	**0.4**
High Pressure Gas System	**C016**	**Storage HP Field Maintenance – Aboveground Piping**	**0.3**
High Pressure Gas System	**C151**	**Measurement & Regulation Station Capital**	**0.3**
High Pressure Gas System	**C157**	**PSEP Phase 1A**	**0.3**
High Pressure Gas System	**C013**	**Gas Transmission Safety Rule - MAOP Reconfirmation**	**0.3**
Medium Pressure Gas System	**C182**	**Distribution Risk Evaluation & Monitoring System (DREAMS)**	**0.2**
Medium Pressure Gas System	**C159**	**Quality Assurance Gas Distribution Assets**	**0.2**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) Hybrid Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Medium Pressure Gas System	**C129**	**Cathodic Protection System Improvement**	**0.2**
Medium Pressure Gas System	**C130**	**MSA Inspection and Maintenance**	**0.2**
High Pressure Gas System	**C126**	**Shallow/Exposed Pipe Remediations**	**0.1**
High Pressure Gas System	**C185**	**PSEP Phase 1B**	**0.1**
High Pressure Gas System	**C125**	**Pipeline Relocation/Replacement**	**0.1**
High Pressure Gas System	**C118**	**Rupture Mitigation Valve Installation - Valve Rule**	**0.1**
High Pressure Gas System	**C160**	**Odorization**	**0.1**
Medium Pressure Gas System	**C123**	**Regulator Station Replacement**	**0.1**
High Pressure Gas System	**C186**	**PSEP Phase 2A**	**0.0**
Medium Pressure Gas System	C124	Regulator Station Installation Replacement & Enhancement	0.0
Employee Safety	**C326**	**Workplace Violence Prevention Programs**	**0.0**
Medium Pressure Gas System	**C120**	**Distribution Riser Inspection Program (DRIP)**	**0.0**
Medium Pressure Gas System	**C175**	**Residential Meter Protection**	**0.0**
Excavation Damage	C004	Damage Prevention Mapping	0.0
Medium Pressure Gas System	**C122**	**Sewer Lateral Inspection Project (SLIP)**	**0.0**
Medium Pressure Gas System	**C121**	**Gas Infrastructure Protection Program (GIPP)**	**0.0**

Bold *font indicates this control/mitigation includes mandated programs/activities.*

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) WACC Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Cybersecurity	C803	Sensitive Data Protection	204.6
Cybersecurity	C804	Operational Technology (OT) Cybersecurity	192.0
Cybersecurity	C805	IT Infrastructure Modernization	164.0
Cybersecurity	C801	Perimeter Defenses	87.8
High Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	50.0
Cybersecurity	C802	Internal Defenses	29.3
High Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**21.4**
High Pressure Gas System	**C108**	**Cathodic Protection - Maintenance**	**21.0**
High Pressure Gas System	**C132**	**Pipeline Maintenance**	**18.8**
Excavation Damage	**C002**	**Damage Prevention Activities - Gas**	**18.3**
High Pressure Gas System	**C019**	**Storage HP Retrofits and Upgrades to Purification Equip**	**14.7**
High Pressure Gas System	**C123**	**Regulator Station Replacement**	**12.0**
Underground Gas Storage	**C408**	**Storage Field Maintenance - Underground Components**	**10.4**
Medium Pressure Gas System	**C135**	**EPM Installations & Replacements**	**8.7**
Medium Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**7.2**
Medium Pressure Gas System	**C103**	**Cathodic Protection Base Activities**	**6.6**
High Pressure Gas System	**C135**	**EPM Installations & Replacements**	3.8
High Pressure Gas System	**C104**	**Cathodic Protection - Capital**	3.7
High Pressure Gas System	**C171**	**Integrity Assessments & Remediation**	**3.4**
High Pressure Gas System	**C113**	**Leak Repair**	3.3
High Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**1.9**
Medium Pressure Gas System	**C134**	**Pipeline Monitoring**	**1.9**
Excavation Damage	**C001**	**Damage Prevention Strategies**	**1.9**
High Pressure Gas System	**C105**	**SCADA Operations**	**1.9**
Contractor Safety	**C349**	**Contractor Safety Program**	**1.7**
Underground Gas Storage	**C402**	**Well Abandonment/Replacement/Demo Verification and Monitor**	**1.6**
High Pressure Gas System	**C170**	**CP Install/Replace Impressed Current Systems**	**1.5**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) WACC Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
High Pressure Gas System	**C155**	**Measurement & Instrumentation Maintenance**	**1.5**
High Pressure Gas System	**C117**	**Leak Survey & Patrol**	**1.5**
Medium Pressure Gas System	**C116**	**M&R Station and EPM Inspection and Maintenance**	**1.4**
High Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**1.4**
Medium Pressure Gas System	**C174**	**Service Replacements- Leakage Abnormal Op. Conditions CP Related**	**1.3**
High Pressure Gas System	**C136**	**Compressor Stations - Capital**	**1.3**
Employee Safety	**C345**	**Safety & Health - Operations**	**1.0**
High Pressure Gas System	**C156**	**Quality Assurance Transmission Assets**	**1.0**
Employee Safety	**C342**	**Safety Technology & Analytics**	**1.0**
Employee Safety	**C347**	**Event Learning & Continuous Improvement**	**1.0**
Employee Safety	**C343**	**Safety Strategy**	**0.9**
High Pressure Gas System	C010	Pipeline Monitoring Technologies	0.9
Excavation Damage	**C003**	**Damage Prevention - Public Awareness**	**0.8**
Medium Pressure Gas System	**C177**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**0.8**
Medium Pressure Gas System	**C106**	**Cathodic Protection- CP10 Activities**	**0.8**
Employee Safety	**C346**	**Safety & Health - Programs**	**0.8**
Underground Gas Storage	**C401**	**Storage Integrity Management Program (SIMP)**	**0.7**
High Pressure Gas System	**C109**	**Control Room Monitoring Operation and Fatigue Management**	**0.7**
High Pressure Gas System	**C134**	**Pipeline Monitoring**	**0.5**
Medium Pressure Gas System	**C179**	**Distribution Main & Service Leak Repair**	**0.5**
High Pressure Gas System	**C145**	**Class Location (Hydrotest)**	**0.5**
Employee Safety	**C312**	**Drug and Alcohol Testing Programs**	**0.4**
High Pressure Gas System	**C142**	**Main Replacements- Leakage Abnormal Op. Conditions CP Related**	**0.4**
High Pressure Gas System	**C142**	**Compressor Station - Maintenance**	**0.4**
High Pressure Gas System	**C014**	**Storage HP Field Maintenance – Aboveground Facilities**	**0.3**
High Pressure Gas System	**C016**	**Storage HP Field Maintenance – Aboveground Piping**	**0.3**
High Pressure Gas System	**C151**	**Measurement & Regulation Station Capital**	**0.2**

SoCalGas Mitigation Cost Benefit Ratios (2028-2031) WACC Discount Rate: CBRs Ranked Highest to Lowest			
RISK CHAPTER NAME	**ID**	**CONTROL/MITIGATION NAME**	**CBR**
Medium Pressure Gas System	**C159**	**Quality Assurance Gas Distribution Assets**	**0.2**
Medium Pressure Gas System	**C129**	**Cathodic Protection System Improvement**	**0.2**
High Pressure Gas System	**C013**	**Gas Transmission Safety Rule - MAOP Reconfirmation**	**0.2**
Medium Pressure Gas System	**C182**	**Distribution Risk Evaluation & Monitoring System (DREAMS)**	**0.2**
High Pressure Gas System	**C157**	**PSEP Phase 1A**	**0.2**
Medium Pressure Gas System	**C130**	**MSA Inspection and Maintenance**	**0.1**
High Pressure Gas System	**C126**	**Shallow/Exposed Pipe Remediations**	**0.1**
High Pressure Gas System	**C185**	**PSEP Phase 1B**	**0.1**
High Pressure Gas System	**C118**	**Rupture Mitigation Valve Installation - Valve Rule**	**0.1**
High Pressure Gas System	**C160**	**Odorization**	**0.1**
High Pressure Gas System	**C125**	**Pipeline Relocation/Replacement**	**0.1**
Medium Pressure Gas System	**C123**	**Regulator Station Replacement**	**0.1**
High Pressure Gas System	**C186**	**PSEP Phase 2A**	**0.0**
Medium Pressure Gas System	C124	Regulator Station Installation Replacement & Enhancement	0.0
Employee Safety	**C326**	**Workplace Violence Prevention Programs**	**0.0**
Medium Pressure Gas System	**C120**	**Distribution Riser Inspection Program (DRIP)**	**0.0**
Medium Pressure Gas System	**C175**	**Residential Meter Protection**	**0.0**
Excavation Damage	C004	Damage Prevention Mapping	0.0
Medium Pressure Gas System	**C122**	**Sewer Lateral Inspection Project (SLIP)**	**0.0**
Medium Pressure Gas System	**C121**	**Gas Infrastructure Protection Program (GIPP)**	**0.0**

Bold *font indicates this control/mitigation includes mandated programs/activities.*