

**CUE DATA REQUEST - 1**  
**SDG&E-SOCALGAS RAMP - I.16-10-015\_016**  
**SDG&E & SOCALGAS RESPONSE**  
**DATE RECEIVED: DECEMBER 16, 2016**  
**DATE RESPONDED: JANUARY 13, 2017**

1. Please provide any prepared work papers.

**Response 01:**

There are two sets of workpapers for SoCalGas' and SDG&E's Risk Assessment Mitigation Phase (RAMP) Report. One set supports the two cost tables, Baseline Risk Mitigation Plan and Proposed Risk Mitigation Plan, in the risk chapters. The second set supports the Risk Spend Efficiency (RSE) calculations. Each are further discussed below.

Cost Workpapers

Each RAMP risk chapter has cost workpapers with as many as four for a given chapter. These may include dedicated workpapers for: (1) Operations and Maintenance (O&M); (2) Capital; (3) General Rate Case (GRC) Total O&M; and (4) GRC Total Capital. The GRC Total workpapers support the amounts shown in the "GRC Total" column of the risk chapters' narrative tables. If all the costs were anticipated to be GRC jurisdictional, meaning no non-GRC costs were included, the GRC Total workpapers were omitted.

SoCalGas and SDG&E found some calculation errors in its filing, primarily related to the GRC Total columns of the tables. The workpapers reflect the corrected amounts and such instances have been explicitly noted. As such, the workpapers may not always tie to the numbers in the RAMP risk chapters due to the calculation errors as well as rounding.

It is also important to note that the purpose of RAMP is not to request funding. Any funding requests will be made in the GRC. The forecasts for mitigations are not for funding purposes, but are rather to provide a range for the future GRC filing. This range will be refined with supporting testimony in the GRC.

RSE Workpapers

The RSE workpapers include all supporting documentation for the calculation of the potential risk reduction of each mitigation group. Such calculations serve as the numerator of the RSE scores seen in each risk chapter of the RAMP filing.

Each file has a tab entitled "Analysis" which contains the calculations used to derive the potential risk reduction of each mitigation group. This potential risk reduction is quantified in a column entitled "Weighted New Score" or "Calibrated Weighted New Score." These are the figures used in the numerator of the RSE scores. In addition, the "Analysis" tab contains a sample RSE calculation with estimated cost figures to illustrate how the RSE can be calculated.

Some files may have additional worksheets which show supporting analysis or data for the results shown in the "Analysis" tab. The risk analysis team used this supplemental information to:

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**Response 01 Continued:**

- summarize the analysis;
- facilitate discussions with the subject matter experts and other stakeholders as the mitigations were being evaluated and analyzed;
- consolidate external data for internal use;
- document discussion notes or other data;
- parse complex calculations for the sake of clarity; and/or
- provide reference for baseline residual risk scores.

SoCalGas and SDG&E found one calculation error regarding the RSE in its filing in Chapter SDG&E-03 (Employee, Contractor and Public Safety). The RSE workpapers reflect the corrected values and such instances have been explicitly noted.

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2. Please provide the detailed calculations which underlie the quantification of “residual risk score” for each risk for which such a score was calculated.

**Response 02:**

As shown on page SDGE/SCG B-6, the algorithm of the risk score is:

$$\text{risk score} = \sum_{i=1}^n \text{weight}_i * \text{frequency}_i * 10^{\text{impact}_i}$$

Each impact category is assigned a weight as follows:

- 40% for Health, Safety & Environmental,
- 20% for Operational and Reliability,
- 20% for Regulatory, Legal & Compliance, and
- 20% for Financial.

Frequency ratings translate to certain values as shown in the table below:

<u>Frequency Rating</u>	<u>Value</u>
1	0.005
2	0.018
3	0.058
4	0.183
5	0.577
6	3.162
7	31.623

Thus, as an example, below is the calculation for wildfires:

<b>Residual Impact</b>				<b>Residual Frequency</b>	<b>Residual Risk Score</b>
<b>Health, Safety, Environmental</b>	<b>Operational &amp; Reliability</b>	<b>Regulatory, Legal, Compliance</b>	<b>Financial</b>		
<b>(40%)</b>	<b>(20%)</b>	<b>(20%)</b>	<b>(20%)</b>		
7	6	5	6	5	2,551,888

(Using frequency table, frequency 5 has value of 0.577)

$$\begin{aligned}
 &= 0.4 * 0.577 * 10^7 \text{ [safety]} + 0.2 * 0.577 * 10^6 \text{ [reliability]} + 0.2 * 0.577 * 10^5 \text{ [compliance]} \\
 &\quad + 0.2 * 0.577 * 10^6 \text{ [financial]} \\
 &= 2,309,401 \text{ [safety]} + 115,470 \text{ [reliability]} + 11,547 \text{ [compliance]} + 115,470 \text{ [financial]} \\
 &= 2,551,888
 \end{aligned}$$

All the other risk scores were calculated using the same methodology.

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3. Please explain why the “residual frequency” of a medium-pressure pipeline failure was set at 3 (once per 10-30 years; p. SCG 10-9) when the data shows 29 such failures in a 20-year period for California (p. SCG 10-10), and the Sempra companies provide gas service to approximately half of all Californians (p. SCG 10-4).

**Response 03:**

The residual frequency score of 3 developed by subject matter experts (SMEs) is based on the reasonable worst case scenario, described in Section 4.1 (see p. SCG 10-8).

The PHMSA data set provides (p. SCG 10-10) the number of “Serious Incidents” that have occurred in California over the last 30 years, not the number of failures. Per PHMSA, ““Serious Incidents’ include a fatality or injury requiring in-patient hospitalization. Gas distribution incidents caused by a nearby fire or explosion that impacted the pipeline system are excluded from this definition.”<sup>1</sup> On the other hand, a failure is considered to occur when the medium pressure pipeline can no longer function as intended, which is why the reasonable worst-case scenario includes the inability to serve customers for at least 24 hours. Accordingly, the data from PHMSA is not intended to be a one to one comparison to the reasonable worst-case scenario. Rather, the PHMSA data set was provided only as a comparison tool. The residual frequency score was based on the SMEs’ knowledge and experience.

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<sup>1</sup> <http://phmsa.dot.gov/pipeline/library/data-stats/performance-measures>.

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4. Please provide a list of each medium pressure pipeline failure that has occurred on the Sempra and/or SDG&E gas systems in the last 30 years, and quantify its impacts in terms of each of the six consequences listed on p. SCG 10-7.

**Response 04:**

SoCal Gas & SDG&E 30-yr Data				
<u>Company</u>	<u>Date</u>	<u>Cause</u>	<u>Cause Detail</u>	<u>Applicable to Reasonable Worst Case Scenario?</u>
SOUTHERN CALIFORNIA GAS CO	4/23/1993	DAMAGE BY OUTSIDE FORCES	BACKHOE HIT AND RUPTURED PLASTIC MAIN	No
SOUTHERN CALIFORNIA GAS CO	9/27/1996	CONSTRUCTION/ OPERATING ERROR	PIPELINE RUPTURED DURING NITROGEN TEST	No
SOUTHERN CALIFORNIA GAS CO	5/20/2004	EXCAVATION DAMAGE	THIRD PARTY EXCAVATION DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	5/10/2004	EXCAVATION DAMAGE	THIRD PARTY EXCAVATION DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	7/5/2004	OTHER OUTSIDE FORCE DAMAGE	FIRE/EXPLOSION	No
SOUTHERN CALIFORNIA GAS CO	9/9/2004	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	9/16/2004	OTHER OUTSIDE FORCE DAMAGE	FIRE/EXPLOSION	No
SOUTHERN CALIFORNIA GAS COMPANY	6/1/2005	NATURAL FORCES	EARTH MOVEMENT	No
SOUTHERN CALIFORNIA GAS COMPANY	6/11/2005	EXCAVATION DAMAGE	THIRD PARTY EXCAVATION DAMAGE	No
SOUTHERN CALIFORNIA GAS	8/26/2005	EXCAVATION DAMAGE	THIRD PARTY EXCAVATION DAMAGE	No

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COMPANY				
SOUTHERN CALIFORNIA GAS COMPANY	1/23/2006	OTHER	MISCELLANEOUS	No
SOUTHERN CALIFORNIA GAS COMPANY	4/11/2005	OTHER OUTSIDE FORCE DAMAGE	CAR, TRUCK OR OTHER VEHICLE NOT RELATED TO EXCAVATION ACTIVITY	No
SOUTHERN CALIFORNIA GAS COMPANY	4/26/2003	OTHER OUTSIDE FORCE DAMAGE	CAR, TRUCK OR OTHER VEHICLE NOT RELATED TO EXCAVATION ACTIVITY	No
SOUTHERN CALIFORNIA GAS COMPANY	11/8/2005	MATERIAL AND/OR WELD FAILURES	JOINT	No
SOUTHERN CALIFORNIA GAS COMPANY	9/9/2006	EXCAVATION DAMAGE	THIRD PARTY EXCAVATION DAMAGE	No
SOUTHERN CALIFORNIA GAS COMPANY	7/21/2007	OTHER	MISCELLANEOUS	No
SOUTHERN CALIFORNIA GAS COMPANY	7/23/2007	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	1/17/2008	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SAN DIEGO GAS & ELECTRIC CO	1/17/2008	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SAN DIEGO GAS & ELECTRIC CO	7/17/2008	INCORRECT OPERATION	INCORRECT OPERATION	No
SOUTHERN CALIFORNIA GAS CO	9/12/2008	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	9/16/2008	OTHER OUTSIDE FORCE DAMAGE	FIRE/EXPLOSION	No

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SOUTHERN CALIFORNIA GAS CO	11/3/2008	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SOUTHERN CALIFORNIA GAS CO	8/4/2009	OTHER OUTSIDE FORCE DAMAGE	FIRE/EXPLOSION	No
SOUTHERN CALIFORNIA GAS CO	10/2/2009	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No
SAN DIEGO GAS & ELECTRIC CO	8/11/2010	OTHER OUTSIDE FORCE DAMAGE	VEHICLE DAMAGE	No

As discussed in Question 3, a failure can be considered to occur when a pipeline can no longer function as intended regardless of cause. Therefore, utilizing the incident data provided by PHMSA,<sup>2</sup> the table lists incidents that may be considered to be failures in last the 30 years on the SoCalGas and SDG&E gas system.

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*<http://phmsa.dot.gov/portal/site/PHMSA/menuitem.6f23687cf7b00b0f22e4c6962d9c8789/?vgnextoid=fdd2dfa122a1d110VgnVCM1000009ed07898RCRD&vgnnextchannel=3430fb649a2dc110VgnVCM1000009ed07898RCRD&vgnnextfmt=print>*

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5. Please indicate whether and how the data provided in response to the previous question was utilized in the analysis underlying chapter SCG 10 of the RAMP report.

**Response 05:**

The data in the previous question was not used when the SME was determining residual frequency scores. Residual frequency scores were based on the reasonable worst case scenario according to (SCG 10-8). Please see response to question 3.



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6. For residual risk scores for different risks,

a. Please indicate whether the residual risk scores for different risks (e.g. 2344 for medium-pressure pipeline failures (p. SCG 10-8) and 233,365 for 3<sup>rd</sup>-part dig-ins (p. SDGE 2-11)) are comparable, and can be used as measures of relative risk (e.g., dig-ins have a relative risk about 100 times as large as medium-pressure pipe failures).

b. If residual risk scores are not comparable across risks, please indicate how Sempra's RAMP analysis provides any guidance as to relative spending levels that are appropriate for reducing different risks.

**Response 06:**

- a. The residual risk score is a measure of expected impact/value. It is a widely- accepted measure derived from two components – impact and frequency. The impact and frequency of a risk are assessed using a reasonable worst case scenario. Thus, yes, the residual risk scores for different risks generally are comparable because they are indications of the expected impact for those scenarios. In the example above, the expected impact (accounting for frequency) for 3<sup>rd</sup> party dig-ins under the reasonable worst case scenario is estimated to be roughly 100 times as large as expected impact for medium-pressure pipeline failures. The risk evaluation presented in the RAMP is largely based on subject matter expertise at this time. As such, the risk evaluation is one component considered by SoCalGas and SDG&E for decision-making purposes, not the sole factor. As recognized by the CPUC, the approach used by SoCalGas and SDG&E to develop risk scores continues to evolve over time.

When assessing comparability of residual risk scores across risks, it is important to consider that subject matter experts used judgement and informed opinion to develop the worst reasonable case scenarios. So, it is important to be mindful of assuming a level of precision that may be false, as the accuracy of determining the reasonable worst case scenarios cannot be wholly known.

Reasonable worst case scenarios are not necessarily precise but are themselves a matter of judgment and informed opinion (by subject matter experts) and accordingly a ratio between different risk scores can be calculated (as suggested in the question), but at some risk of false precision. I.e., the suggested conclusion that dig-ins have a relative risk about 100 times as large as medium-pressure pipe failures is dependent on the accuracy of the worst case scenarios, which can in reality never be known.

- b. N/A

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7. Please indicate what units the risk spend efficiency charts are using on their vertical axes (e.g., dollars per change of 1 in residual risk score; or change in residual risk score per thousands of dollars spent; or some other units).

**Response 07:**

The units on the vertical, or “y” axis on the Risk Spend Efficiency (RSE) charts represent the change in risk score (residual risk score – new risk score) per thousand dollars spent.

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8. For risk spend efficiencies (RSEs) for different risks,
- a. Please indicate whether risk spend efficiencies for different risks are comparable (e.g., does the RSE of 14.5 – 16 for current dig-in prevention measures (p. SDG&E 2-25) and the RSE of 0.6-0.7 for current Distribution Integrity Management Program (DIMP) spending (p. SCG 10-24) mean that current spending on dig-in prevention is 20-25 times as effective in reducing risks as current DIMP spending?
  
  - b. If RSEs for different risks are not comparable, as suggested by footnote 32 (p. SCG 4-27), please indicate if and how the RSE analyses provide any guidance as to relative spending levels that are appropriate for reducing different risks.

**Response 08:**

- a. The RSEs for different risks are not comparable at this time. Mitigations often affect more than one risk, some of which may not be included within the scope of the RAMP submission. In these situations, only the benefit associated with the risk included in the RAMP submission was included in the RSE calculation, not the aggregation of all the benefits for all the applicable risks. As such, the RSE is an indication only of the relative effectiveness of the mitigation as applied to a specific risk.

Also, as stated in the RAMP Report of SoCalGas and SDG&E, the risk event used for purposes of the analysis is the reasonable worst case scenario. These scenarios were developed based on judgements and informed opinions (by subject matter experts). This process, by its nature, would lead to a false sense of precision, when trying to compare RSEs across risks.

- b. In its current state of maturity, the RSE does not provide guidance as to relative spend efficiency across risks; however, the RSE can provide guidance about the relative spend efficiency of multiple mitigations within an individual risk. For example, for the Catastrophic Damage Involving a High-Pressure Gas Pipeline Failure risk (Chapter SCG-4), the RSE can be used to show the relative spend-effectiveness between the Gas Transmission Integrity Management Program (TIMP) and Pipeline Safety Enhancement Plan (PSEP) mitigations. Also, the RSE can indicate how much a risk score can increase should a mitigation not be funded.

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9. Please provide any quantitative analysis, including but not limited to (a) impact on residual risk scores, (b) incremental cost, and (c) RSE quantification, which Sempra performed for the various alternatives considered but rejected throughout the RAMP filing (e.g., the two alternatives on p. SCG 10-25).

**Response 09:**

Generally, SoCalGas and SDG&E did not perform quantitative analysis for the various alternatives presented in the RAMP Report. That being said, three chapters completed cost estimates for one or both of the included alternatives: Chapters SCG-10 (Catastrophic Damage Involving a Medium-Pressure Pipeline Failure); SCG-11 (Catastrophic Event Related to Storage Well Integrity); and SDG&E-1 (Wildfires Caused by SDG&E Equipment (Including Third Party Pole Attachments)). Cost information for the three chapters' alternatives is provided in the attached spreadsheet "CUE DR-01\_Q9.xlsx". However, these chapters did not quantify the impact on residual risk scores or a risk spend efficiency for the alternatives.

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10. With regard to the “reasonable worst case” descriptions that occur throughout the RAMP filing,

a. Please explain if and how the RAMP analysis considers the impacts of mitigation alternatives on events that are smaller in consequence but more frequent in occurrence than the “reasonable worst case” considered for each risk (e.g., ~6 “significant” dig-in incidents in California per year versus the one “catastrophic” incident per 1-3 years rate used in the Sempra dig-in analysis (p. SCG 1-12)).

b. For each risk category analyzed, is the risk mitigation quantification and subsequent RSE quantification based on anything other than the expected reduction in scope and/or frequency of the “reasonable worst case”?

c. If so, please explain for each risk type which outcomes other than the “reasonable worst case” were considered in evaluating current and/or incremental mitigation measures.

**Response 10:**

- a. The reasonable worst case represents a point on a curve of likelihood and outcomes and is used to limit the complexity of the analysis. Mitigations such as the Gas Distribution Integrity Management Program (DIMP) generally address all impact levels and likelihoods and are not tailored to the worst case scenario, however their effectiveness is currently evaluated using this one scenario in the analysis.
- b. The risk score is a measure of expected impact/value (which is a widely accepted methodology) derived from two components – impact and frequency. Thus, in order for a mitigation to have a RSE value, the mitigation must be able to either reduce the potential impact or frequency of the risk event.
- c. Currently the risk score is evaluated using a single scenario, not a distribution. As SDG&E evolves toward probabilistic modeling in certain areas, SDG&E would be able to consider the entire distribution when calculating the RSE.

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11. Please describe, for each risk analyzed in the RAMP filing, how Sempra decided which incremental measures to include and which additional measures to consider.

**Response 11:**

SoCalGas' and SDG&E's proposed plans consist of both continued baseline activities as well as incremental and additional measures. Subject Matter Experts (SMEs) took into account many factors in determining incremental measures, including but not limited to: baseline activities, compliance obligations, future business needs, changing or anticipated changes in regulatory or legal requirements, and the balance of affordability with further risk reduction. Proposed plans were considered and reviewed by SMEs throughout the companies as well as SoCalGas' and SDG&E's senior management teams. Broad SME and senior management engagement contributed to the overall evaluation and review of incremental and additional measures for each risk.

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12. Please describe any minimum standards for RSE level, either absolute or relative to the RSE level(s) of existing measures, which Sempra used to determine when a risk-reduction measure should be adopted or rejected (e.g., why is Sempra proposing measures on p. SDGE 6-25 which are only 1/800 to 1/1000 as efficient at reducing risk as the existing measures?).

**Response 12:**

The purpose of the RSE analysis in this cycle of the RAMP process was to show the relative spend efficiency among current and incremental mitigations (as identified through the process described in Question 11). As this process is not designed to request funding, SoCalGas and SDG&E did not establish standards or thresholds for determining which mitigations should be continued or adopted. Furthermore, even though some incremental mitigation measures may not be as efficient as existing measures, they will still be effective at further reducing the safety risk that is identified. Continuing to improve safety is consistent with the goals of SoCalGas, SDG&E and the CPUC.

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13. Please explain why major SDG&E-caused wildfires are estimated to occur every 1-3 years (p. SDGE-1-13) when the text describes only 3 wildfires since 2000, or one per 5 years.

**Response 13:**

Frequency estimates for the risk of Wildfires are not based solely on historical data, but also changes in climate and other factors. Reasonable worst case scenarios and frequency estimates are both based on subject matter expertise and utilizing available data.



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14. For each instance in which a risk spend efficiency (RSE) range is reported for current activities that comprise more than one activity, please provide the individual RSEs for the individual activities that have been lumped together.

**Response 14:**

The RSE has been calculated only for the mitigation groupings, not for individual activities. Mitigations were bundled or combined for analysis for several reasons:

- To organize often large numbers of individual mitigation measures (e.g., projects, programs, activities) into manageable groups for analysis;
- To address the limited availability or scarcity of data to appropriately analyze an individual mitigation;
- To support mitigations that are closely, or inextricably linked (i.e., either would not be meaningful if addressed separately, such as public awareness to call before digging and the locate & mark activity, or purchasing software and training on that software); and/or
- For mitigations when, taken individually, may not be material enough to allow the subject matter expert to determine risk reduction at a measurable level.

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15. Comparing the residual risks quantified on pp. SDGE 3-7 and SDGE 4-9, please explain why two risks that differ in two of the four residual impact categories have residual risk scores that differ by less than one percent (73,139 vs. 73,796).

**Response 15:**

As shown on page SDGE/SCG B-6, the algorithm of the risk score is:

$$\text{risk score} = \sum_{i=1}^n \text{weight}_i * \text{frequency}_i * 10^{\text{impact}_i}$$

Each impact category is assigned a weight as follows:

- 40% for Health, Safety & Environmental,
- 20% for Operational and Reliability,
- 20% for Regulatory, Legal & Compliance, and
- 20% for Financial.

Frequency ratings translate to certain values as shown in the table below:

<u>Frequency Rating</u>	<u>Value</u>
1	0.005
2	0.018
3	0.058
4	0.183
5	0.577
6	3.162
7	31.623

Thus, the calculations for the two risks are as follows:

On page SDGE 3-7,

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
6	4	4	3	4	73,796

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(Using frequency table, frequency 4 has value of 0.183)  
 $= 0.4 * 0.183 * 10^6$  [safety] +  $0.2 * 0.183 * 10^4$  [reliability] +  $0.2 * 0.183 * 10^4$  [compliance]  
+  $0.2 * 0.183 * 10^3$  [financial]  
 $= 73,030$  [safety] +  $365$  [reliability] +  $365$  [compliance] +  $36$  [financial]  
 $= 73,796$

On page SDGE 4-9,

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
6	3	3	3	4	73,139

(Using frequency table, frequency 4 has value of 0.183)  
 $= 0.4 * 0.183 * 10^6$  [safety] +  $0.2 * 0.183 * 10^3$  [reliability] +  $0.2 * 0.183 * 10^3$  [compliance]  
+  $0.2 * 0.183 * 10^3$  [financial]  
 $= 73,030$  [safety] +  $36$  [reliability] +  $36$  [compliance] +  $36$  [financial]  
 $= 73,139$

Thus, the majority of both risk scores came from the safety component since it had an impact level of 6.

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16. Comparing the residual risks quantified on pp. SDGE 5-7 and SDGE 6-9, please explain why two risks that differ in none of the four residual impact categories, and have the same frequency of occurrence, have residual risk scores that differ. There would appear to be a typo – if so indicate which page is correct and which is in error.

**Response 16:**

This is due to a typo on page SDGE 5-7. The residual risk score is 44,548 (the same as shown on page SDGE 6-9).

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17. Comparing the residual risks quantified on pp. SCG 5-6 and SCG 6-7, please explain why two risks that differ in all four residual impact categories have identical residual risk scores of 23,107.

**Response 17:**

This is due to a typo on page SCG 6-7. The residual risk score for SCG-6 (Physical Security of Critical Gas Infrastructure) is 14,087. The residual risk score in SCG-5 (Workplace Violence) is correct; 23,107.

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18. Comparing the residual risks quantified on pp. SDGE 8-11 and SCG 6-7, please explain why two risks that differ in all four residual impact categories have residual risk scores of 23,107 and 23,108, a difference of under .005%.

**Response 18:**

The risk score shown on page SCG 6-7 (Physical Security of Critical Gas Infrastructure) is a typo; the correct value is 14,087. The residual risk score presented in SDG&E-8 (Aviation Incident) is correct.

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19. Comparing the residual risks quantified on pp. SCG 5-6 and SDGE 8-11, please explain why two changing the “Operational and Reliability” risk from “1” to “2” but leaving all other risk impact categories the same causes the residual risk scores to go up by just 1, from 23,107.to 23,108.

**Response 19:**

All impact scores apply themselves to the total residual risk score as a factor of 10 multiplied by the frequency (please refer to the response to question 2 for the algorithm of the risk score). With a frequency score of 3 for both of these risks, and the Operations & Reliability scores being 2 and 1, the resulting difference between the two Operations & Reliability component scores is 1, which matches the difference in the total residual risk scores (23,108 minus 23,107).

Below is the calculation for SCG-5 and SDG&E-8:

On page SCG 5-6,

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
6	1	2	3	3	23,107

(Using frequency table, frequency 3 has value of 0.058)

$$\begin{aligned}
 &= 0.4 * 0.058 * 10^6 \text{ [safety]} + 0.2 * 0.058 * 10^1 \text{ [reliability]} + 0.2 * 0.058 * 10^2 \text{ [compliance]} \\
 &\quad + 0.2 * 0.058 * 10^3 \text{ [financial]} \\
 &= 23,094 \text{ [safety]} + 0 \text{ [reliability]} + 1 \text{ [compliance]} + 12 \text{ [financial]} \\
 &= 23,107
 \end{aligned}$$

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On page SDGE 8-11,

Residual Impact				Residual Frequency	Residual Risk Score
Health, Safety, Environmental (40%)	Operational & Reliability (20%)	Regulatory, Legal, Compliance (20%)	Financial (20%)		
6	2	2	3	3	23,108

(Using frequency table, frequency 3 has value of 0.058)

$$\begin{aligned}
 &= 0.4 * 0.058 * 10^6 \text{ [safety]} + 0.2 * 0.058 * 10^2 \text{ [reliability]} + 0.2 * 0.058 * 10^2 \text{ [compliance]} \\
 &\quad + 0.2 * 0.058 * 10^3 \text{ [financial]} \\
 &= 23,094 \text{ [safety]} + 1 \text{ [reliability]} + 1 \text{ [compliance]} + 12 \text{ [financial]} \\
 &= 23,108
 \end{aligned}$$



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20. Comparing the proposed mitigation measures and costs on pp. SDGE 5-17 and SDGE 6-17, please confirm that the exact same measures are being proposed for the two different risks discussed in chapters SDG&E-5 and SDG&E-6. If not, explain why the costs are exactly the same in the two chapters.

**Response 20:**

Only one proposed measure, “Modernization of Grid Control Centers”, is the same and appears in both chapters SDG&E-5 and SDG&E-6. All other proposed measures are specific to each risk and only appears in one of the chapters at a time. The list of the proposed mitigations and their total costs (sum of 2019 O&M and 2017-2019 capital) are listed below:

<b>SDG&amp;E-5</b>	<b>SDG&amp;E-6</b>
Upgrades and Installation of New Transmission Facilities	South Grid Blackstart Project
Modernization of Grid Control Centers	Modernization of Grid Control Centers
Advance Readiness	Substation Backup Power Enhancements (Fuel Cells)
Monitoring and Control of the Bulk Electric System	Maintenance, Certification, and Testing of Existing Blackstart Facilities
	Blackstart Training and Procedure Development
<b>Mitigation Total* : \$411,080 - 499,080</b>	<b>Mitigation Total* : \$19,360 - 22,440</b>

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

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21. Comparing chapters SCG-4 and SDG&E-10, please:

- a. Confirm that both chapters are addressing the same risk, high pressure gas pipeline failure, albeit for different operating companies.
- b. Confirm that the residual risk measure after accounting for existing risk reduction measures is identical for both SDG&E and SCG (36,950, as shown on pp. SCG 4-11 and SDG&E 10-10).
- c. Explain why the proposed GRC-level mitigation costs in the two chapters are different by more than a factor of 100 (\$386-651 million for SCG vs. under \$3 million for SDG&E).

**Response 21:**

- a. Confirmed; both of these chapters address the same risk: Catastrophic Damage Involving a High-Pressure Gas Pipeline Failure. That being said, the risk evaluation is specific to each company, which includes inherent differences (i.e., service territory, size, asset portfolio, topography, etc.). As such, there are variations within the chapters (SCG-4 and SDG&E-10).
- b. Confirmed; both of these chapters have the residual risk score with the exact same explanation of the scores.
- c. For ID #6 on Table 6 (PSEP), as referenced on Page SDGE 10-14, there is no SDG&E Phase 2A (pipelines in less populated areas) PSEP pipeline work, which accounts for the difference in the ID# 6 amounts for SDG&E and SoCalGas under the “GRC” Total column. Additionally, as explained on SCG 4-17, PSEP is transitioning into the GRC process as directed by D.16-08-003. As such, some activities that were once non-GRC are anticipated to be GRC-jurisdictional in the forecast years.

ID #5 on Tables 5 and 6 (Gas Transmission Pipeline Integrity Management) of SDG&E-10 was also identified as including some costs that were typically not included in a GRC. Those activities are part of the Transmission Integrity Management Program (TIMP). TIMP, while it is transmission, is GRC-jurisdictional. Therefore, this was a calculation error and has been corrected as part of the workpapers submitted in response to question 1.

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22. Comparing chapters SCG-9 and SDG&E-14, please:

- a. Confirm that both chapters are addressing the same risk, climate change adaptation, albeit for different operating companies.
- b. Confirm that the residual risk measure after accounting for existing risk reduction measures is identical for both SDG&E and SCG (2,656, as shown on pp. SCG 9-11 and SDG&E 14-6).
- c. Explain why the proposed GRC-level mitigation costs in the two chapters are different by more than a factor of 29 (\$15-19 million for SCG vs. under \$0.6 million for SDG&E).

**Response 22:**

- a. Confirmed; both of these chapters address the same risk: Climate Change Adaptation. That being said, the risk evaluation is specific to each company, which includes inherent differences (i.e., service territory, size, asset portfolio, topography, etc.). As such, there are variations within the chapters (SCG-9 and SDG&E-14).
- b. In 2015, Climate Change Adaptation was not a risk included in the risk register of SoCalGas. However, Climate Change Adaptation does pose a risk to SoCalGas and is considered to have potential safety implications. Therefore, for purposes of the RAMP, SoCalGas adopted the risk assessment conducted by SDG&E in 2015.
- c. The proposed GRC-level mitigation costs in the two chapters are different because the costs in the SoCalGas chapter (SCG-9) are primarily capital investments related to hillside soil erosion and slope stability projects in gas storage fields. SDG&E does not own or operate natural gas storage fields. In addition, the SDG&E climate change adaptation cost encompasses Operating and Maintenance related to Meteorology, and the capital investments related, in part, to climate change mitigation are included in the other risk mitigation chapters.

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23. Comparing chapters SCG-7 and SDG&E-17, please:

- a. Confirm that both chapters are addressing the same risk, workforce planning, albeit for different operating companies.
- b. Confirm that both chapters analyze the same reasonable worst case scenario, in which an injury results from an inadequately trained employee (pp. SDGE 17-12 and SCG 7-9).
- c. Explain why the expected frequency of occurrence is 10 times higher for SCG (once per 1-3 years; p. SCG 7-11) than for SDG&E (once per 10-30 years; p. SDGE 17-14).

**Response 23:**

- a. Both utilities address the same risk of workforce planning. A fairly consistent approach was taken across both utilities while also recognizing unique organizational needs. While the utilities' scope, potential drivers, and activities associated with this risk share similarities, there are variations across the utilities. High-level variations are explained below.

**SOCALGAS:**

SoCalGas scoped their risk in a broader fashion by identifying their risk as not having a workforce with the right skills to meet their business necessities due to attrition and changing business needs - whether through retirements, increased turnover or internal movements. SoCalGas controls and mitigations are centered on this broader risk to safety-critical positions and are inclusive of the leadership levels that influence employee safe work practices.

See Sections 4 and 5 of SoCalGas' RAMP Report for the scope of SoCalGas' workforce planning controls and mitigations. The assumptions are that the risk is at an organizational level and that in addition to technical skills, leadership skills are necessary to enable a fully engaged, competent workforce that performs the work safely.

SoCalGas also included training specific to Gas Operations and Customer Services. At SoCalGas, internal alignment of critical roles is still in process. Consequently, skills trainings already identified in other operational RAMP risks are leveraged as the "critical" trainings applicable to workforce planning from a safety perspective.

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**SDG&E:**

SDG&E scoped its workforce planning risk more narrowly as the risk of not having a workforce with the right skills to meet their business necessities due to retirements and internal movements. SDG&E's assessment focused on safety-related critical roles that have a high retirement expectation for experienced personnel, including leadership (working foremen, supervisors, and managers), technical (engineers and transmission/substation designers), and field positions in Operations. SDG&E has identified and quantified the retirement expectation by creating a three-year historical analysis and three-year future projected attrition and headcount timeline, so that we are prepared to mitigate this risk.

See Sections 5 and 6 of SDG&E's RAMP Report for the scope of SDG&E's workforce planning controls and mitigations.

In response to this anticipated higher volume of retirements, SDG&E's focus is to assess current processes and programs, propose new and modified programs if necessary, and scale-up and accelerate the comprehensive, time-tested programs already in place to adequately train its workforce to safely operate and maintain SDG&E's gas and electric systems. The related controls and mitigations focus on what is needed to replenish a highly experienced workforce, in the identified safety-related critical roles, with less experienced employees, while maintaining the skills and knowledge necessary to work safely and effectively.

- b. The reasonable worst case scenario for each Workforce Planning chapter is similar, but not identical. The premise of both chapters' reasonable worst case scenario is an employee with minimal experience performs work that results in negative events/impacts.
- c. Subject matter experts (SMEs) consider many factors when scoring the frequency of a risk. Such factors include historical information, industry data, potential new laws, and perceived or anticipated events or changes that may affect the risk.

Considering these many factors, as explained on page SCG 7-11, SoCalGas assigned Workforce Planning a frequency score of 5 because an event caused by a less experienced employee could occur every 1-3 years. This score is based on current knowledge of the business and historical experience, especially given the potential high turnover of over 36% of its employees in a five-year period. While SoCalGas has many existing training and safety programs in place, they cannot keep pace with this potential high turnover rate.

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SDG&E, on the other hand, assigned its Workforce Planning risk a score of 3, the potential to occur once every 10-30 years (see page SDG&E 17-14). This score was given after considering the current controls in place as well as SDG&E's strong existing training and safety programs.

Another potential consideration when reviewing the frequency scores of both Workforce Planning risk chapters is size differences. SoCalGas has over 8,500 employees and a larger service territory, thus increasing the number of potential incidents that can occur. SoCalGas delivers energy to 21.6 million consumers through 5.9 million meters in more than 500 communities in a 20,000 square-mile service area, while SDG&E has over 4,200 employees and delivers energy to 1.4 million business and residential accounts in a 4,100 square-mile service area spanning 2 counties and 25 communities.

