

Attachment A
Settlement Agreement

SETTLEMENT AGREEMENT AMONG PACIFIC GAS AND ELECTRIC COMPANY, SOUTHERN CALIFORNIA EDISON COMPANY, SOUTHERN CALIFORNIA GAS COMPANY, SAN DIEGO GAS & ELECTRIC COMPANY, THE UTILITY REFORM NETWORK, ENERGY PRODUCERS AND USERS COALITION, INDICATED SHIPPERS, AND THE OFFICE OF RATEPAYER ADVOCATES

Pacific Gas & Electric Company, Southern California Edison Company, Southern California Gas Company, and San Diego Gas & Electric Company (jointly, the “Joint Utilities”), and The Utility Reform Network (“TURN”), Energy Producers and Users Coalition, and Indicated Shippers (with TURN, the “Joint Intervenors”), and the Office of Ratepayer Advocates (all collectively, the “Settling Parties”) hereby agree to settle and resolve certain issues, as specified in Section I.B below, within Phase 2 of the Safety Model Assessment Proceeding, Applications (A.)15-05-002 and Related Matters (A.) 15-05-003, 15-05-004, and 15-05-005 (“Proceeding” or “SMAP”).

I. AGREEMENT

A. Utilities’ Risk and Mitigation Analysis

Attached to this Settlement Agreement as Appendix A is the Agreement of Settling Parties Regarding Required Elements for Risk and Mitigation Analysis in the Risk Assessment Mitigation Phase (RAMP) and General Rate Case (GRC) Pursuant to Phase 2 of the Safety Model Assessment Proceeding (A.15-05-002). Appendix A is hereby incorporated by reference in this Settlement Agreement, so that the entirety of Appendix A should be deemed to be a part of this Settlement Agreement.

The provisions of Appendix A constitute minimum required elements agreed to by the Settling Parties applicable to risk and risk mitigation analysis in RAMP and GRC proceedings, as described in Appendix A. As set forth in Appendix A, the minimum required elements apply to the following steps in the risk and mitigation analysis for RAMP and GRC proceedings:

- Building a Multi-Attribute Value Function (MAVF) – Step 1A in Appendix A
- Identifying Risks for the Enterprise Risk Register – Step 1B in Appendix A
- Risk Assessment and Risk Ranking in Preparation for RAMP – Step 2A in Appendix A
- Selecting Enterprise Risks for RAMP - Step 2B in Appendix A
- Mitigation Analysis for Risks in RAMP – Step 3 in Appendix A

Appendix A also includes several “Global Items” setting forth additional minimum requirements applicable to the risk and mitigation analysis addressed in Appendix A. In addition, Row 28 of Appendix A sets forth the conditions under which each of the Joint Utilities will engage in the “Step 3” Mitigation Analysis for certain programs (as delineated in Appendix A) proposed in the utility’s GRC to mitigate safety or reliability risks not otherwise addressed in the utility’s RAMP submission.

Nothing in Appendix A prevents any of the Joint Utilities from engaging in additional risk analysis activities with respect to the RAMP and GRC beyond the required elements set forth in Appendix A. Nothing in Appendix A requires any of the Joint Utilities to perform any of the required elements set forth in Appendix A other than in those situations specifically identified in Appendix A; however, each of the Settling Parties reserves the right to advocate, in any situation to which this Settlement Agreement and Appendix A do not apply, that analysis of the type set forth in Appendix A could or should have been used by a utility as a matter of sound risk and mitigation analysis. Other than documents, information, or analysis required to be provided by Appendix A, nothing in Appendix A requires any of the Joint Utilities to make any new formal filings with the California Public Utilities Commission ("Commission") beyond what the Commission otherwise already requires in the RAMP and GRC proceedings.

B. Phase 2 Issues Addressed in the Settlement

The Settling Parties agree that the Settlement Agreement addresses the issues identified in the *Scoping Memo and Ruling of Assigned Commissioner*, dated December 13, 2016, in Phase 2 of SMAP ("Phase 2 Scoping Ruling"), as follows:

- (1) The Settling Parties intend the Settlement Agreement to be a complete resolution of Issue 3.1 ("Should the JIA be adopted as a uniform approach?") and Issue 3.2 ("Should any of the Utilities' Alternative Approaches be adopted as a Uniform Approach?").
- (2) With respect to Issue 3.3 ("How should other issues presented in the Interim Decision be addressed?"), the Settling Parties agree that the Settlement Agreement addresses the following headings (and only these headings) in that section of the Phase 2 Scoping Ruling:
 - Ongoing RAMP Evaluation,
 - Lexicon,
 - Benchmarking/Identify Industry-Wide Practices, and
 - Interim and Long-Term Action Plan.

The Settling Parties agree that it would be appropriate for the Commission to view this Settlement Agreement as sufficiently addressing these issues for purposes of this SMAP proceeding. However, subject to I.D below, the Settling Parties do not take the position that the Settlement Agreement precludes further record development through comments by parties and further action by the Commission on these issues if the Commission so desires.

C. Record Supporting Agreement

The Settling Parties agree that the record supporting this Settlement Agreement includes, but is not limited to, the documents listed in Appendix B, attached hereto, which have been previously served on the service list of A.15-05-002 et al. The Settling Parties request that the Commission enter into the record of A.15-05-002 et al., the documents listed in Appendix B that have not already been filed or otherwise entered into the record, which are marked by an asterisk (*). This agreement that the documents listed in Appendix B are part of the record supporting this Settlement Agreement does not constitute an admission by any of the Settling Parties that did not submit a particular document regarding the content of such document.

D. Implementation Timeline and Importance of Prompt Commission Action on Settlement Agreement

This Settlement Agreement shall become effective upon issuance by the Commission of a decision adopting the Settlement Agreement.

The timeline for the implementation of the required elements in Appendix A shall be as set forth in Row 32 of Appendix A. Row 32 provides in part that Southern California Gas Company and San Diego Gas and Electric Company will implement the provisions of Appendix A in their RAMP to be submitted by November 30, 2019, provided that the Commission issues a final decision adopting this Settlement Agreement by January 31, 2019. The Settling Parties are mindful of this timeline and believe that adoption of the Settlement Agreement, while not resolving all issues in Phase 2, would resolve the central, resource-intensive issues in Phase 2. Accordingly, the Settling Parties recommend that the Commission issue a standalone decision on just this Settlement Agreement and that such decision should be issued without undue delay and prior to any other decision addressing Phase 2 issues.

E. Future Matters

- (1) The Settling Parties agree that the requirements set forth in Row 28 of Appendix A should apply unless modified by a future Commission decision. The Settling Parties recommend that, in a future SMAP or other appropriate proceeding, there should be a formal review process of lessons learned to determine appropriate changes and refinements to the agreed upon terms in Row 28.
- (2) The Joint Intervenors recommend that the following issues be addressed in the next SMAP proceeding:
 - (a) Whether the processes described in Steps 1B, 2A, and 2B of row 28 of Appendix A concerning identifying and ranking risks for purposes of selecting risks to be assessed in RAMP should be modified in either or both of the following ways:
 - i. Consistently using Risk Events (as defined in Appendix A) to define the identified risks.

- ii. Using the “Step 3” methodology (i.e. rows 13-25 of Appendix A) for identification and ranking of pre-mitigation Risk Events.

The Joint Utilities reserve the right to challenge the inclusion of any of these issues in the next SMAP proceeding.

II. OTHER MATTERS

A. Regulatory Approval

The Settling Parties agree to seek prompt approval of this Settlement Agreement and to use their reasonable best efforts to secure Commission approval of it without change, including by filing a joint motion seeking approval of this Settlement Agreement and any written filings, appearances, and other means as may be necessary to secure Commission approval. The Settling Parties agree to actively and mutually defend this Settlement Agreement if its adoption is opposed by any other party in proceedings before the Commission.

Should any Proposed Decision (PD) or Alternate Proposed Decision (APD) seek a material modification to this Settlement Agreement, and should any Settling Party be unwilling to accept such modification, that Settling Party shall so notify the other Settling Parties within five business days of issuance of the PD or APD. The Settling Parties shall thereafter promptly discuss the modification and negotiate in good faith to achieve a resolution acceptable to the Settling Parties, and shall promptly seek Commission approval of the resolution so achieved. The Settling Parties agree to oppose any modification of this Agreement proposed in a PD or APD not agreed to by all Parties.

Any party signing this Agreement may withdraw from this Agreement if the Commission issues a final decision that materially modifies, deletes from, or adds to the disposition of the matters settled herein, except for resolutions of modifications agreed to by the Settling Parties as discussed in the previous paragraph. However, the Settling Parties agree to negotiate in good faith with regard to any Commission-ordered changes, in order to restore the balance of benefits and burdens, and to exercise the right to withdraw only if such negotiations are unsuccessful. To accommodate the interests related to various issues, the Settling Parties acknowledge that changes, concessions or compromises by one or more Settling Parties in one section of this Agreement could result in changes, concessions or compromises by one or more Settling Parties in other sections of this Agreement.

Notwithstanding Section I.D, the provisions of this Section II.A. shall impose obligations on the Settling Parties immediately upon the execution of this Settlement Agreement.

B. Incorporation of Complete Agreement

This Settlement Agreement embodies the entire understanding and agreement of the Parties with respect to the matters described herein, and, except as described herein, supersedes and cancels any and all prior oral or written agreements, principles, negotiations, statements, representations or understandings among the Settling Parties. This Settlement Agreement is to be treated as a complete package and not as a collection of separate agreements on discrete issues.

C. Unified Agreement

The Settling Parties have bargained in good faith to reach the agreement set forth herein. The Settling Parties intend the Settlement Agreement, to be interpreted as a unified, interrelated agreement. The Settling Parties agree that no provision of this Settlement Agreement shall be construed against any Settling Party because a particular party or its counsel drafted the provision.

D. Successors and Assigns

The rights conferred and obligations imposed on any of the Settling Parties by this Settlement Agreement shall inure to the benefit of or be binding on that Settling Party's successors in interest or assignees as if such successor or assignee was itself a party to this Settlement Agreement.

E. Disputes Regarding Agreement

Should any dispute arise among the Settling Parties regarding the manner in which this Settlement Agreement or any term shall be implemented, the Settling Parties agree, prior to initiation of any other remedy, to work in good faith to resolve such differences in a manner consistent with both the express language and the intent of the Settling Parties in entering into this Settlement Agreement. The terms and conditions of the Settlement Agreement may only be modified in writing subscribed to by the Settling Parties.

F. Non-Precedential

The Settling Parties hereby agree that this Settlement Agreement is entered into as a compromise of disputed issues in order to minimize the time, expense, and uncertainty of continued litigation in the Proceeding. This Settlement Agreement should not be considered precedent in any future proceeding before this Commission unless the Commission expressly provides otherwise, as set forth in Rule 12.5 of the Commission's Rules of Practice and Procedure. In the event that this Settlement Agreement is rejected by the Commission, each Settling Party expressly reserves its right to advocate, in other current and future proceedings, or in this proceeding, positions, principles, assumptions, arguments and methodologies which may be different from those set forth in this Settlement Agreement.

G. Non-Waiver

None of the provisions of this Settlement Agreement shall be considered waived by any Settling Party unless such waiver is given in writing. The failure of a Settling Party to insist in any one or more instances upon strict performance of any provision of this Settlement Agreement or to take advantage of any of its rights hereunder shall not be construed as a waiver of any such provision or the relinquishment of any such rights for the future, and the Settlement Agreement shall continue and remain in full force and effect.

H. Governing Law

This Agreement shall be interpreted, governed and construed under the laws of the State of California, including Commission decisions, orders, and rulings, as if executed and to be performed wholly within the State of California.


I. Captions and Paragraph Headings

Captions and paragraph headings used herein are for convenience only and are not a part of this Agreement and shall not be used in construing it.

J. Signatures


This Settlement Agreement may be executed in counterparts. The representatives of the Settling Parties signing this Settlement Agreement are fully authorized to enter into this Settlement Agreement.

IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company	By: Stephen Cairns Chief Risk Officer 	Date: <u>30</u> , April, 2018
Entity: Southern California Edison Company	By: Caroline Choi SVP of Regulatory Affairs	Date: __, April, 2018
Entity: Southern California Gas Company	By: Diana Day VP Enterprise Risk Management & Compliance	Date: __, April, 2018
Entity: San Diego Gas & Electric Company	By: Diana Day VP Enterprise Risk Management & Compliance	Date: __, April, 2018
Entity: The Utility Reform Network	By: Thomas J. Long Legal Director	Date: __, April, 2018
Entity: Energy Producers and Users Coalition	By: Katy Morsony Counsel	Date: __, April, 2018
Entity: Indicated Shippers	By: Katy Morsony Counsel	Date: __, April, 2018
Entity: The Office of Ratepayer Advocates	By: Elizabeth Echols Director	Date: __, April, 2018

IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company By: Stephen Cairns
Chief Risk Officer Date: __, April, 2018

Entity: Southern California Edison Company By:  Caroline Choi
SVP of Regulatory Affairs Date: 25 April, 2018

Entity: Southern California Gas Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: San Diego Gas & Electric Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: The Utility Reform Network By: Thomas J. Long
Legal Director Date: __, April, 2018

Entity: Energy Producers and Users Coalition By: Katy Morsony
Counsel Date: __, April, 2018


Entity: Indicated Shippers By: Katy Morsony
Counsel Date: __, April, 2018


Entity: The Office of Ratepayer Advocates By: Elizabeth Echols
Director Date: __, April, 2018

IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company By: Stephen Cairns Chief Risk Officer Date: __, April, 2018

Entity: Southern California Edison Company By: Caroline Choi SVP of Regulatory Affairs Date: __, April, 2018

Entity: Southern California Gas Company By:  Diana Day VP Enterprise Risk Management & Compliance Date: 30, April, 2018

Entity: San Diego Gas & Electric Company By:  Diana Day VP Enterprise Risk Management & Compliance Date: 30 April, 2018

Entity: The Utility Reform Network By: Thomas J. Long Legal Director Date: __, April, 2018

Entity: Energy Producers and Users Coalition By: Katy Morsony Counsel Date: __, April, 2018

Entity: Indicated Shippers By: Katy Morsony Counsel Date: __, April, 2018

Entity: The Office of Ratepayer Advocates By: Elizabeth Echols Director Date: __, April, 2018

IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company By: Stephen Cairns
Chief Risk Officer Date: __, April, 2018

Entity: Southern California Edison Company By: Caroline Choi
SVP of Regulatory Affairs Date: __, April, 2018

Entity: Southern California Gas Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: San Diego Gas & Electric Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: The Utility Reform Network By: Thomas J. Long
Legal Director Date: __, April, 2018

Entity: Energy Producers and Users Coalition By: Katy Morsony
Counsel Date: __, April, 2018

Entity: Indicated Shippers By: Katy Morsony
Counsel Date: __, April, 2018

Entity: The Office of Ratepayer Advocates By: Elizabeth Echols
Director Date: 25, April, 2018



IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company By: Stephen Cairns
Chief Risk Officer Date: __, April, 2018

Entity: Southern California Edison Company By: Caroline Choi
SVP of Regulatory Affairs Date: __, April, 2018

Entity: Southern California Gas Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: San Diego Gas & Electric Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: The Utility Reform Network By: Thomas J. Long
Legal Director Date: __, April, 2018

Entity: Energy Producers and Users Coalition By: 
Katy Morsony
Counsel Date: __, April, 2018

Entity: Indicated Shippers By: 
Katy Morsony
Counsel Date: __, April, 2018

Entity: The Office of Ratepayer Advocates By: Elizabeth Echols
Director Date: __, April, 2018

IN WITNESS WHEREOF, the Settling Parties hereto have duly executed this Settlement Agreement.

Entity: Pacific Gas & Electric Company By: Stephen Cairns
Chief Risk Officer Date: __, April, 2018

Entity: Southern California Edison Company By: Caroline Choi
SVP of Regulatory Affairs Date: __, April, 2018

Entity: Southern California Gas Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: San Diego Gas & Electric Company By: Diana Day
VP Enterprise Risk Management & Compliance Date: __, April, 2018

Entity: The Utility Reform Network By: Thomas J. Long
Legal Director Date: 27, April, 2018

Entity: Energy Producers and Users Coalition By: Katy Morsony
Counsel Date: __, April, 2018

Entity: Indicated Shippers By: Katy Morsony
Counsel Date: __, April, 2018

Entity: The Office of Ratepayer Advocates By: Elizabeth Echols
Director Date: __, April, 2018

Appendix A

**Agreement of Settling Parties Regarding
Required Elements for Risk and Mitigation Analysis
in the Risk Assessment Mitigation Phase (RAMP) and General Rate Case (GRC)
Pursuant to Phase 2 of the Safety Model Assessment Proceeding (A.15-05-002 et al.)**

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Definitions

- Attribute: an observable aspect of a risky situation that has value or reflects a utility objective, such as safety or reliability. Changes in the levels of attributes are used to determine the consequences of a Risk Event. The attributes in an MAVF should cover the reasons that a utility would undertake risk mitigation activities.
- Bow Tie: a tool that consists of the Risk Event in the center, a listing of drivers on the left side that potentially lead to the Risk Event occurring, and a listing of Consequences on the right side that show the potential outcomes if the Risk Event occurs.
- Consequence (or Impact): the effect of the occurrence of a Risk Event. Consequences affect Attributes of an MAVF.
- CoRE: Consequences of a Risk Event.
- CPUC: California Public Utilities Commission.
- Driver: a factor that could influence the likelihood of occurrence of a Risk Event. A driver may include external events or characteristics inherent to the asset or system.
- Enterprise Risk Register (also referred to as “risk registry” or “ERR”): an inventory of enterprise risks at a snapshot in time that summarizes (for a utility’s management and/or stakeholders such as the CPUC) risks that a utility may face. The ERR is not intended to be static as risks are dynamic in nature. As such, the ERR must be refreshed on a regular basis and can reflect the changing nature of a risk; for example, risks that were consolidated together may be separated, new risks may be added, and the level of risks may change over time.
- Exposure: the measure that indicates the scope of the risk, e.g., miles of transmission pipeline, number of employees, miles of overhead distribution lines, etc. Exposure defines the context of the risk, i.e., specifies whether the risk is associated with the entire system, or focused on a part of it.
- Frequency: the number of events generally defined per unit of time. (Frequency is not synonymous with probability or likelihood.)
- General Rate Case (GRC): a CPUC proceeding that is denominated a general rate case, as well as PG&E’s Gas Transmission and Storage (GT&S) rate proceeding.
- Likelihood or Probability: the relative possibility that an event will occur, quantified as a number between 0% and 100% (where 0% indicates impossibility and 100% indicates certainty). The higher the probability of an event, the more certain we are that the event will occur.

- LoRE: Likelihood of a Risk Event.
- Multi-Attribute Value Function (MAVF): a tool for combining all potential consequences of the occurrence of a risk event, and creates a single measurement of value.
- Natural Unit of an Attribute: the way the level of an attribute is measured or expressed. For example, the natural unit of a financial attribute may be dollars. Natural units are chosen for convenience and ease of communication and are distinct from scaled units.
- Range of the Natural Unit: part of the specification of an Attribute. For an Attribute with a numerical natural unit, such as dollars, the smallest observable value of the Attribute is the low end of the range and the largest observable value is the high end of the range. Therefore, any Attribute level that results as a consequence of an event, or a risk mitigation action, or of doing nothing should be found within the range. For weighting purposes, the range of the natural units of an Attribute should be able to describe any actual situation that can be mitigated and the result of implementing any mitigation action. For an Attribute with a categorical natural unit, such as corporate image, the range of the Attribute is from the least desirable level to the most desirable level.
- Risk Event: an occurrence or change of a particular set of circumstances that may have potentially adverse consequences and may require action to address. In particular, the occurrence of a Risk Event changes the levels of some or all of the Attributes of a risky situation.
- Scaled Unit of an Attribute: a value that varies from 0 to 100. The scaled unit is set to 0 for the most desirable level of natural unit in the range of natural units. The scaled unit is set to 100 for the least desirable level of natural unit in the range of natural units. For any level of the attribute between the most desirable and least desirable levels, the scaled unit is between 0 and 100. The benefit achieved by changing the level of an Attribute in natural units is measured by the corresponding difference in scaled units. In the special case of moving from the least desirable level to the most desirable level, the benefit is equal to 100 scaled units.
- Settlement Agreement: the entirety of the agreement between Pacific Gas & Electric Company, Southern California Edison Company, Southern California Gas Company, and San Diego Gas & Electric Company, The Utility Reform Network, Energy Producers and Users Coalition, Indicated Shippers, and the Office of Ratepayer Advocates, which includes the agreement and appendices A and B.
- Settling Parties: Pacific Gas & Electric Company (PG&E), Southern California Edison Company (SCE), Southern California Gas Company (SoCalGas), and San Diego Gas & Electric Company (SDG&E), The Utility Reform Network, Energy Producers and Users Coalition, Indicated Shippers, and the Office of Ratepayer Advocates.

- Tranche: a logical disaggregation of a group of assets (physical or human) or systems into subgroups with like characteristics for purposes of risk assessment.

Summary

The provisions of this document, Appendix A of the Settlement Agreement, constitute the minimum required elements agreed to by the Settling Parties applicable to risk and risk mitigation analysis in RAMP and GRC proceedings. The minimum required elements apply to the following steps in the risk and mitigation analysis for RAMP and GRC proceedings, which are set forth in detail in this Appendix:

- Building a Multi-Attribute Value Function (MAVF) – Step 1A
- Identifying Risks for the Enterprise Risk Register – Step 1B
- Risk Assessment and Risk Ranking in Preparation for RAMP – Step 2A
- Selecting Enterprise Risks for RAMP – Step 2B
- Mitigation Analysis for Risks in RAMP – Step 3

Also included herein are several “Global Items” setting forth additional minimum requirements applicable to the risk and mitigation analysis addressed herein. In addition, Row 28 of this Appendix sets forth the conditions under which each of the Joint Utilities will engage in the “Step 3” Mitigation Analysis for certain programs (as delineated herein) proposed in the utility’s GRC to mitigate safety or reliability risks not otherwise addressed in the utility’s RAMP submission.

Step 1A – Building a Multi-Attribute Value Function

No.	Element Name	Element Description and Requirements
1.	MAVF	<p>A utility's MAVF should be constructed by following these six principles (see Rows 2-7, below).</p> <p>The MAVF is required to be built once but the utility may adjust its MAVF over time. Any changes to the MAVF must adhere to the principles of construction set forth in Rows 2 through 7 below.</p>
2.	MAVF Principle 1 – Attribute Hierarchy	Attributes are combined in a hierarchy, such that the top-level Attributes are typically labels or categories and the lower-level Attributes are observable and measurable.
3.	MAVF Principle 2 – Measured Observations	Each lower-level Attribute has its own range (minimum and maximum) expressed in natural units that are observable during ordinary operations and as a consequence of the occurrence of a risk event.
4.	MAVF Principle 3 – Comparison	<p>Use a measurable proxy for an Attribute that is logically necessary but not directly measurable.</p> <p>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.</p>
5.	MAVF Principle 4 – Risk Assessment	<p>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.</p> <p>Monte Carlo simulations or other similar simulations (including calibrated subject expertise modeling), among other tools, may be used to satisfy this principle.</p>
6.	MAVF Principle 5 – Scaled Units	Construct a scale that converts the range of natural units (from Row 3) to scaled units to specify the relative value of changes within the range, including capturing aversion to extreme outcomes or indifference over a range of outcomes.

		<p>The scaling function can be linear or non-linear. For example, the scale is linear if the value of avoiding a given change in Attribute level does not depend on the Attribute level. Alternatively, the scale is non-linear if the value of avoiding a given change in Attribute level differs by the Attribute level.</p>
<p>7.</p>	<p>MAVF Principle 6 – Relative Importance</p>	<p>Each Attribute in the MAVF should be assigned a weight reflecting its relative importance to other Attributes identified in the MAVF. Weights are assigned based on the relative value of moving each Attribute from its least desirable to its most desirable level, considering the entire range of the Attribute. One means of incorporating a weighting process was presented in the February 17, 2017 Report of Joint Intervenor Test Drive Step 1 Results, “Specifying the Multi-Attribute Value Function,” by Drs. Feinstein and Lesser.¹</p> <p>Weights are assigned based on actual Attribute measurement ranges, not a fixed weight arbitrarily assigned to an Attribute.</p> <p><i>However, given the Commission’s focus on safety, a minimum 40% safety weight is established unless the Utilities can justify a lower weight based on their respective analyses. This requirement supersedes the other specifications stated above.</i></p> <p>For example, the Attribute weights will reflect the relative importance of moving the safety outcomes from the least to the most desirable levels as compared with moving financial outcomes from the least to the most desirable levels in a risky situation.</p>

¹ Reference to this document is not intended to indicate that the settling parties are requiring the exact process specified in this report be followed.

Step 1B – Identify Risks for the Enterprise Risk Register

No.	Element Name	Element Description and Requirements
8.	Risk Identification and Definition	<p>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.</p> <p>The RAMP will consider risks using the same risk definitions as in the ERR.</p> <p>Each RAMP filing will highlight any changes to the ERR from the previous RAMP or GRC filings.</p>

Step 2A – Risk Assessment and Risk Ranking in Preparation for RAMP

No.	Element Name	Element Description and Requirements
9.	Risk Assessment	<p>Using the MAVF developed in accordance with Step 1A, for each risk included in the Enterprise Risk Register, the utility will compute a Safety Risk Score using only the Safety Attribute. The utility will sort its ERR risks in descending order by the Safety Risk Score. For the top 40% of ERR risks with a Safety Risk Score greater than zero, the utility will compute a Multi-Attribute Risk Score using at least the Safety, Reliability and Financial Attributes to determine the output for Step 2A. Whenever the full set of MAVF Attributes developed in accordance with Step 1A is not used to compute a set of scores, the weights for that set of scores will be re-calibrated to reflect only the Attributes that are used.</p> <p>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.</p> <p>The Risk Assessment in preparation for RAMP will follow the steps in Rows 10 and 11.</p>
10.	Identification of Potential Consequences of Risk Event	<p>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 MAVF 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.</p>
11.	Identification of the Frequency of the Risk Event	<p>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</p>

	<p>expected to be implemented prior to the GRC period under review in the RAMP submission.</p> <p>The utility will take into account all known relevant drivers when specifying the Frequency of a Risk Event.</p> <p>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.</p>
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Step 2B – Selecting Enterprise Risks for RAMP

No.	Element Name	Element Description and Requirements
12.	Risk Selection Process for RAMP	<p>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 and Enforcement Division (SED), to gather input from SED, 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 SED and interested parties at least the following information: (1) its preliminary list of RAMP risks; and (2) the Safety Risk Score for each risk in the ERR and the Multi-Attribute Risk Score 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.</p> <p>Based on input received from SED, 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.</p>

Step 3 – Mitigation Analysis for Risks in RAMP

No.	Element Name	Element Description and 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 weighted sum of the scaled values of the levels of the individual Attributes using the utility's full MAVF.
14.	Definition of Risk Events and Tranches	<p>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.</p> <p>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.</p> <p>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.</p> <p>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).</p>
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 accordance with this Step 3 for all mitigations subject to this Step 3 analysis.
17.	Determination of Pre-Mitigation 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 Pre-Mitigation CoRE	The pre-mitigation CoRE is the weighted sum of the scaled values of the pre-mitigation levels of the individual Attributes using the utility's full MAVF. The CoRE is calculated using the full MAVF tool constructed consistent with Step 1A above.
19.	Measurement of Pre-Mitigation Risk Score	The pre-mitigation risk score 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 Post-Mitigation 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 Post-Mitigation 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 weighted sum of the scaled values of the post-mitigation levels of the individual Attributes using the utility's full MAVF.
22.	Measurement of Post-Mitigation Risk Score	The post-mitigation risk score 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 pre-mitigation risk score and the post-mitigation risk score.
24.	Use of Expected Value for CoRE;	The utility will use expected value for the MAVF-based measurements and calculations of CoRE in Rows 13, 18, 19, 21, 22, and 23. If a utility chooses to present alternative calculations of pre- and post-mitigation CoRE using a computation in addition to the expected value of the

	Supplemental Calculations	MAVF, such as tail value, it does so without prejudice to the right of parties to the RAMP or GRC to challenge such alternative calculations.
25.	Risk Spend Efficiency (RSE) Calculation	RSE should be calculated by dividing the mitigation risk reduction 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 risk reduction 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.

Global Items

No.	Element Name	Element Description and Requirements
26.	Mitigation Strategy Presentation in the RAMP and GRC	<p>The utility's RAMP filing will provide a ranking of all RAMP mitigations by RSE.</p> <p>In the GRC, the utility will provide a ranking of mitigations by RSE, as follows: (1) For mitigations addressed in the RAMP, the utility will use risk reduction estimates, including any updates, and updated costs to calculate RSE 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 RSE, calculated in accordance with Step 3, in the ranking of mitigations by RSE.</p> <p>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 RSE ranking.</p> <p>Mitigation selection can be influenced by other factors including funding, labor resources, technology, planning and construction lead time, compliance requirements, and operational and execution considerations. In the GRC, the utility will explain whether and how any such factors affected the utility's mitigation selections.</p>
27.	Dynamic Analysis	<p>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 incorporated into the calculation of pre- and post-mitigation risk scores and RSE. 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.</p>
28.	Step 3 Supplemental Analysis in the GRC	<p>(1) Except as provided in (2), the utility will conduct a Step 3 analysis in the GRC of any program included in the GRC Application that meets all of the following criteria:</p> <ul style="list-style-type: none"> (a) the program was not addressed in the RAMP; (b) the utility justifies the program primarily on the basis of reducing a safety or reliability risk; (c) the program is associated with the portion of the electric system under CPUC jurisdiction ("Electric Operations") or with

the natural gas transmission or distribution pipeline system or storage facilities (“Gas Operations”); and

(d) the CPUC jurisdictional forecast cost of the program in the GRC equals or exceeds the following thresholds:

(i) For PG&E, SCE, and SoCalGas: cumulative \$75 million over three years for capital programs, and \$15 million in the test year for expense programs;

(ii) For SDG&E, cumulative \$37.5 million over three years for capital programs and \$7.5 million in the test year for expense programs.

(2) A Step 3 analysis is not required for the following:

(a) administrative and general programs;

(b) work requested by others programs;

(c) a program that meets a compliance obligation under applicable law, or regulation, (including but not limited to any general orders), provided that this exclusion shall not apply if the utility chooses to exceed the minimum requirements of the compliance obligation or if the terms of the compliance obligation allow the utility to exercise discretion regarding the pace or scope of the program to meet the obligation;

(d) a program that is justified solely or primarily as necessary to satisfy the utility’s obligation to serve or to fulfill a mandatory customer request or load growth, provided that this exclusion shall not apply if the utility chooses to exceed the obligation to serve or customer request or if the terms of the obligation or customer request give the utility discretion regarding the pace or scope of the program to meet the obligation to serve; or

(e) an expense program that is associated with routine operations and maintenance or restoring service after events such as emergency conditions, storms, and unplanned outages.

(3) For any program for which a Step 3 analysis is required under the foregoing provisions, the results of the analysis will be provided in the utility’s GRC showing.

(4) For purposes of determining whether a program in the GRC falls below the dollar thresholds in (1)(d), the utility shall not break up the program into component parts in order to avoid performance of the Step 3 analysis.

(5) For purposes of this row, “program” is defined as a CPUC jurisdictional effort within Electric Operations or Gas Operations consisting of projects, activities, and/or functions with a defined scope

that is intended to meet a specific objective or outcome. Program will be specifically defined for each utility as follows:

- **PG&E:** For PG&E's gas operations and electric distribution operations, programs are defined at the Maintenance Activity Type (MAT) level and not at levels that further subdivide activities within the MAT. For example, if the MAT includes two sets of activities, both activities together comprise a program for purposes of Row 28. Any existing MAT codes for a capital or expense program are subject to change as new programs or projects are developed and previous programs or projects are discontinued or modified.
- **SCE:** Programs are defined at the GRC Activity and Work Breakdown Structure (WBS) levels for expense and capital, respectively, as shown in pages 1 to 19 in the workpapers for SCE-01 in its 2018 GRC Application, A.16-09-001, and not at levels that further subdivide activities within the GRC Activity code and the WBS level. For example, if the GRC Activity code or WBS includes two sets of activities, both activities together comprise a program for purposes of Row 28. The activities in each GRC may be different from the ones noted here as new programs or projects are developed and previous programs or projects are discontinued or modified.
- **SoCalGas/SDG&E:**
 - **Capital Programs:** Capital programs are defined at the budget code level and not at levels that further subdivide activities within the budget code. For example, if the budget code includes two sets of activities, both activities together comprise a program for purposes of Row 28. Sometimes a capital program is presented as a series of budget codes. If a capital program is represented by multiple budget codes, SoCalGas and SDG&E will add the sum total of the budget codes for each of the respective capital programs to determine applicability under the capital program dollar threshold in Row 28.
 - **Expense Programs:** An expense program is presented by workpaper, which typically contains a single cost center or a group of cost centers. For purposes of determining applicability under Row 28 for an expense program, SoCalGas and SDG&E will respectively review the Test Year request for each workpaper for each utility and if the total expense for the workpaper meets the applicable expense

		<p>threshold in Row 28, SoCalGas and SDG&E will then determine whether any amounts within the selected workpaper relate to activities that are not required to undergo Step 3 analysis in accordance with the exclusions in Row 28. Such amounts will be deducted from the total Test Year costs for the workpaper for purposes of determining whether the dollar threshold in Row 28 is met.</p> <ul style="list-style-type: none"> ▪ General: Any existing budget codes or workpapers for a capital or expense program are subject to change as new programs or projects are developed and previous programs or projects are discontinued or modified.
<p>29.</p>	<p>Transparency in RAMP and GRC – Results can be understood</p>	<p>Inputs and computations for the Steps described in this document should be clearly stated and defined in RAMP and, when applicable, the GRC.</p> <p>The sources of inputs should be clearly specified. When SME judgment is used, the process that the SMEs undertook to provide their judgment should be described. Any questionnaire or document used to solicit SME judgment will be made available to the CPUC and parties upon request.</p> <p>The utility should specify all information and assumptions that are used to determine both pre- and post-mitigation risk scores.</p> <p>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.</p>
<p>30.</p>	<p>Sensitivity Analysis</p>	<p>The utility will identify critical parameters and assumptions made in performing the risk analysis and explain why such parameters are critical.</p> <p>The utility will be prepared to complete a sensitivity analysis of its results when requested. Intervenors may request sensitivity analyses via the discovery process.</p>

31.	Data Support and Data Sources	<p>All estimates should be based on data whenever practical and appropriate. However, the available data should not restrict the application of the risk assessment methodologies. SME judgment should be used if the methodologies require use of data that is not available. Over time, SME judgment should be increasingly supplemented by data analysis as the methodologies mature.</p> <p>Data can include company-specific data or industry data. Whether use of a type of data is appropriate depends on the issue under consideration. If a utility relies on industry data, the utility will provide justification for applying those data to the specific circumstances of the utility.</p> <p>Data can be combined with SME judgment to provide inputs to the risk methodology.</p> <p>Data can be information derived from, but not limited to, observations, models, records, analysis, or measurements.</p>
32.	Implementation of Settlement	<p>The methodology and agreed-upon items herein will be implemented by the utilities within one year following a final CPUC decision. The settling parties agree that SoCalGas and SDG&E will implement these provisions in the RAMP to be submitted by November 30, 2019, provided that the CPUC issues a decision by January 31, 2019.</p>
33.	Minimum Requirements	<p>This document outlines the minimum requirements for the RAMP and the mitigations presented in the GRC for which Step 3 analysis is required under Row 28. The utilities may provide additional data and information as they see fit and/or view as necessary to justify their GRC request. Parties reserve the right to challenge the sufficiency of the justification for risk-justified projects or programs proposed in the GRC for which the utility elects not to conduct a quantitative analysis of risk reduction and RSE.</p>

Appendix B

Minimum Set of Documents that Form the Record for the Settlement Agreement

As set forth in Section I.C of the Settlement Agreement, the Settling Parties agree that the record supporting this Settlement Agreement includes, but is not limited to, the following documents (* denotes documents that have not yet been entered into the formal record of A.15-05-002 *et al.*):

- *Joint Intervenor Slide Presentation at October 21, 2016 Workshop #1 in Phase 2, “Applying the Joint Intervenor Approach to Utility Risk Management” and accompanying paper by Joint Intervenor consultants Drs. Feinstein and Lesser, “Joint Intervenor Multi-Attribute Model: Defining and Evaluating the “Test-Drive” (both documents distributed to service list on October 20, 2016)
- *Joint Intervenor Slide Presentation at December 6, 2016 Test Drive Working Group Session, “Applying the Joint Intervenor Approach to Utility Risk Management: Constructing a Multi-Attribute Value Function” (distributed to service list on December 6, 2016)
- *Joint Intervenor Slide Presentation at January 31, 2017 Test Drive Working Group Session, “Applying the Joint Intervenor Approach to Utility Risk Management: Optimal Risk Reduction Methodology” (distributed to service list on January 30, 2017)
- *Joint Utilities Slide Presentation at February 15, 2017 Workshop #2 in Phase 2, “Joint Utilities Uniform & Probabilistic Risk Assessment Methodology” (distributed to service list on February 13, 2017)
- *Report of Joint Intervenor Test Drive Step 1 Results, “Specifying the Multi-Attribute Value Function,” by Drs. Feinstein and Lesser (distributed to service list on February 17, 2017)
- Staff Report on Workshop 2 in Phase 2 of SMAP, dated April 3, 2017, entered into record by April 7, 2017 Administrative Law Judge Ruling, and parties’ comments on the Staff Report filed on April 25, 2017
- (Revised) Staff Report on Workshop 2 in Phase 2 of SMAP, dated May 16, 2017, entered into record by October 5, 2017 Administrative Law Judge Ruling
- Joint Status Report, filed July 21, 2017
- Joint Status Report of Pacific Gas and Electric Company, Southern California Edison Company, Southern California Gas Company, San Diego Gas & Electric Company, The Utility Reform Network, and Energy Producers and Users Coalition and Indicated Shippers, filed August 11, 2017
- Submission of JUA Safety Attribute Input Files, filed September 1, 2017
- *Updated Summary Report on the Joint Utilities’ Approach Safety Attribute Test Drive Results (distributed to service list on September 8, 2017)
- Input and Source Documents of Pacific Gas and Electric Company, Southern California Edison Company, Southern California Gas Company, and San Diego Gas and Electric Company, filed September 29, 2017

- Joint Utilities Report on JUA Multi-Attribute Function Test Drive, filed October 13, 2017
- *Joint Intervenor Test Drive Report (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive: Detailed Report on SCE Overhead Conductor Test Drive Problem (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive: Detailed Report on Sempra Pipeline Test Drive Problem (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive: Detailed Report on San Diego Gas & Electric Workplace Violence Test Drive Problem (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive: Detailed Report on PG&E Workforce Adequacy Test Drive Problem (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive: Detailed Report on PG&E Pipeline Test Drive Problem (distributed to service list on October 13, 2017)
- *Joint Intervenor Test Drive Results Slide Presentation for November 6-7, 2017 Workshop in Phase 2 (distributed to service list on November 2, 2017)
- *Joint Utilities Approach (JUA) to Risk Assessment, Slide Presentation for November 6-7, 2017 Workshop in Phase 2 (distributed to service list on November 2, 2017).