ALJ/CF1/sgu 6/4/2021

FILED
06/04/21
01:45 PM

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Further Develop A Risk-Based Decision-Making Framework for Electric and Gas Utilities.	Rulemaking 20-07-013

ADMINISTRATIVE LAW JUDGE'S RULING PROVIDING STAFF RECOMMENDATIONS FOR COMMENT

This ruling provides Phase I Track 1 and Phase I Track 2 Staff recommendations for party comment. Parties shall file and serve opening comments on Staff's recommendations no later than June 24, 2021 and shall file and serve reply comments no later than June 29, 2021.

In their comments, parties shall address whether they support, oppose, or support with modifications the below Staff recommendations. Where a party proposes modifications, please provide the specific suggested substitute language.

<u>Track 1:</u>

1. Mitigations and Controls (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, pages 10-11)
    a. Application of uniform methodologies to establish risk baselines for existing controls and/or mitigations when evaluating risks and the associated costs and risk reduction benefits.
    b. Type A Baseline Measures;
    c. Type B Baseline Measures;
    d. Type C Baseline Measures;

   e. Identification of controls or mitigation measure costs in utility Risk Spending Accountability Reports; and,

   f. Examination of risk profiling and mapping in Phase II of this proceeding.

2. Foundational Programs (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, page 15)

   a. Definition;

   b. Application of threshold test to foundational program cost; and,

   c. Apportionment of foundational program costs to mitigations.

3. Treatment of Public Safety Power Shutoff events in the Risk-Based Decision-Making Framework (RDF) (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, page 17)

   a. Staff proposes to continue studying and discussing this issue, and to further address in Phase II of this proceeding.

4. Best practices for modeling wildfire risk in the Multi-Attribute Value Function (MAVF) (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, pages 21-22)

   a. Staff proposes to continue studying and discussing this issue, and to further address in Phase II of this proceeding.

5. Climate change impacts (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, page 28)

   a. Staff propose the Commission considers refining the RDF to develop a framework for assessing risks and identifying mitigation measures associated with climate change impacts on utility electric and natural gas infrastructure and operation, and customer impacts in Phase II of this proceeding; and,

b. Staff propose the Commission considers refining the RDF to measure and track the effectiveness of electric and gas utilities' mitigation measures and activities to combat climate impacts on utilities' infrastructure in Phase II of this proceeding.

6. Data transparency (Refer to Appendix A, Staff Recommendations on Phase I, Track 1, page 36, and Appendix E, Pacific Gas and Electric Company (PG&E) Proposal to Address Transparency and Uncertainty in RDF Filings Transparency Guidelines Proposal)

   a. Update PG&E's Transparency Guidelines proposal to include reporting of risk values at the upper and lower bounds of a parameter, with the lower bound set at the 10^{th} percentile and the upper bound at the 90^{th} percentile of the parameter;

   b. Test PG&E's Transparency Guidelines as so updated as part of Southern California Edison's 2022 Risk Assessment and Mitigation Phase (RAMP) application.

Track 2:

1. Proposed Safety and Operational Metrics for Pacific Gas and Electric Company (Refer to Appendix C, Summary Table of Staff Proposed Safety and Operational Metrics, and Appendix B, Part I for background on Staff's proposal);

2. Proposed modifications and additions to Safety Performance Metrics, for PG&E, Southern California Edison Company, Southern California Gas Company, and San Diego Gas & Electric Company (Refer to Appendix D, Summary Table of Staff Recommended Modifications/Additions to Safety Performance Metrics Developed Pursuant to D.19-04-020, and Appendix B, Part II, pages 81-88, for background on Staff's proposal).

Attached to this ruling are the following documents:

- Staff Recommendations on Phase I, Track 1 (Appendix A);

- Staff Proposal on Safety and Operational Metrics (Appendix B);
- Summary Table of Staff Proposed Safety and Operational Metrics (Appendix C);
- Summary Table of Staff Recommended Modifications/Additions to Safety Performance Metrics Developed Pursuant to D.19-04-020 (Appendix D);
- PG&E Proposal to Address Transparency and Uncertainty in RDF Filings, discussed in the Phase I, Track 1 Staff Proposal (Appendix E).

IT IS RULED that Parties shall file and serve opening comments on the Phase I, Track 1 and Phase I, Track 2 Staff recommendations no later than June 24, 2021 and shall file and serve reply comments no later than June 29, 2021.

Dated June 4, 2021, at San Francisco, California.

/s/ CATHLEEN A. FOGEL
Cathleen A. Fogel
Administrative Law Judge

APPENDIX A

STAFF RECOMMENDATIONS ON PHASE I TRACK 1

Issues Outlined in the November 2, 2020 Assigned Commissioner's Scoping Memo and Ruling Issued in the Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (R. 20-07-013) Refinements and Clarifications on the Risk-based Decision-making Framework

Safety Policy Division

Risk Assessment and Safety Analytics Section

Steve Haine, P.E.

Fred Hanes, P.E.

Marty Kurtovich, P.E.

Arnold Son

Shayla Funk

RASA_Email@cpuc.ca.gov

Table of Contents

.

I. Executive Summary

The November 2, 2020 Assigned Commissioner's Scoping Memo and Ruling (Scoping Memo) outlined issues to be considered in the Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (RDF Proceeding).[1] The Scoping Memo posed several questions to clarify technical aspects of the Risk-Based Decision-Making Framework (RDF) requirements, including lexicon and methodologies pertaining to mitigation measures, the treatment of public safety power shutoffs, and the development of the Multi-Attribute Value Function (MAVF) in the RDF Proceeding.

The Scoping Memo also asked for any other needed clarifications that should be addressed in the short-term under the scope of Track 1. Phase I Track 1 Technical Working Group (TWG) members expressed interest in further discussing the topic of data and methodological transparency in utility RDF filings. Subsequently, Pacific Gas and Electric Company (PG&E) volunteered to draft a proposal to address transparency for TWG members' consideration.

Concurrently, the Safety Policy Division (SPD) staff (Staff) drafted and circulated a memo to the TWG with preliminary recommendations addressing the Track 1 Scoping Memo issues, based on discussions with the Track 1 TWG. Staff obtained feedback from parties during a TWG meeting on its preliminary recommendations. Based on parties' feedback, Staff identified issues to be further addressed in Phase II of this proceeding due to their complexity requiring more time and deliberation with parties.

In Phase II, Staff recommends that the RDF adopted in Decision (D.)18-12-014 be further refined to include the development of:

1. Guidelines on the treatment of Public Safety Power Shutoff (PSPS) events;
2. RDF MAVF approach including the appropriate application of power law functions or other alternative functions that accurately model risks and consequences; and
3. A framework for identifying and quantifying risk drivers associated with climate change impacts, incorporating uncertainties associated with climate change as a risk driver, and estimating potential risk reductions that could result from implementing mitigation measures and/or activities.

Staff also recommends that, in Phase II of this proceeding, the California Public Utilities Commission (Commission) consider examining how risk profiling and mapping, utilizing tools such as digital mapping, or geographic information system (GIS), could be incorporated into future Risk Assessment and Mitigation Phase (RAMP) applications to further improve transparency and accountability.

[1] *Assigned Commissioner's Scoping Memo and Ruling* (Scoping Memo), Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (R.20-07-013), issued on November 02, 2020, at 4-5.

Staff recommends that investor-owned utilities (IOUs) apply uniform methodologies to establish risk baselines for existing controls and/or mitigations when evaluating risks and the associated costs and risk reduction benefits.

To prevent potential errors and inconsistent treatment in evaluating risks across utilities, including but not limited to the calculation of Risk Spend Efficiency (RSE) and risk scores, in utilities' RAMP applications, Staff recommends that utilities apply the following requirements:

- Type A Baseline Measures: For all controls and mitigation measures and/or activities that a utility plans to implement prior to the beginning of the upcoming General Rate Case (GRC) test-year, utilities accounts for all actual and forecasted risk reduction benefits in the baseline associated with those measures and/or activities that *have been approved* in the prior and/or current GRC cycles.
- Type B Baseline Measures: Account for all actual and forecasted risk reduction benefits in the baseline associated with all controls and mitigation measures and/or activities, that have *not been funded by ratepayers, and/or exceed the original approved scope and/or funding* in the prior and/or current GRC cycles. In other words, incremental costs (above what was approved for funding in prior GRCs) associated with these measures are excluded from the RSE calculations; however, utilities should account for risk reduction benefits associated with these measures.
- Type C Baseline Measures: Exclude from the baseline forecasted risk reduction benefits for all mitigation measures and/or activities (that have been approved in the prior and/or current GRC cycles), which the utilities do not plan to implement prior to the beginning of the upcoming GRC test-year.
- Utilities should identify in their annual Risk Spending Accountability Reports the costs for controls and/or mitigation measures and/or activities that were approved in prior GRC cycles but not implemented, as applicable.

In addition, Staff suggests that the Commission consider adopting the following definition of *foundational programs or activities* in a future decision in this proceeding.

Foundational programs and/or activities are initiatives that support multiple mitigation programs but do not directly reduce the consequences or reduce the likelihood of risk events

Examples of foundational programs or activities include software and computer hardware resources, and situational awareness initiatives such as weather modeling. Staff is currently working with the TWG to develop guidelines on the treatment of costs associated with foundational elements.

The definition of *foundational programs or activities* is being discussed in upcoming TWG meetings and may be further refined based on those discussions.

On the issue of data transparency in IOUs RDF related filings, Staff recommend adopting PG&E's *Proposal to Address Transparency and Uncertainty in IOU's Risk-Based Filings* (Transparency Guidelines), which provides a streamlined approach to presenting data associated with RAMP applications. PG&E's proposed Transparency Guidelines recommends two new elements for inclusion in future RAMP reports: the first is a set of standard workpaper templates, and the second is a set of criteria for assessing the quality of data estimates used in the RAMP applications.[2] In addition, Staff recommends, based on a Mussey Grade Road Alliance (MGRA) suggestion, that the proposed Transparency Guidelines could be tested in Southern California Edison's (SCE) RAMP application in 2022, to allow additional feedback and analysis prior to being required in future IOU RAMP and GRC filings.

Next Steps

Staff has planned the following activities to take place in the summer of 2021, ahead of next year's Phase II of this proceeding:

- TWG discussions focused on Transparency Guidelines, anticipated in June of 2021.
- TWG discussions focused on scope setting for PSPS related topics in the RDF, anticipated in July of 2021. The TWG will work to identify existing requirements, data, and tools and researchable questions to scope the issues that need to be further addressed. It will also identify knowledge gaps where additional research is needed ahead of Phase II of this proceeding.
- PG&E is planning to examine the application of power law distribution function in modeling wildfire risk consequences and share its findings with the TWG in August of 2021.

Staff is planning to work with parties in this proceeding to further refine the RDF and identify guiding principles, best practices, aspirational characteristics, and minimum requirements to improve future RAMP requirements. Staff recommends that parties continue to collaborate with Staff to validate different methodologies that appropriately estimate the risk of extreme events to capture maximum loss, consistent with wildfire risk behavior.

[2] Refer to Appendix E for PG&E's Proposal to "Address Transparency and Uncertainty in IOU's Risk-Based Filings."

1 Introduction

The November 2, 2020 Scoping Memo posed several issues in Phase I Track 1 for further refinements and clarifications regarding RDF requirements.[3]

The Phase I Track 1 December 15, 2020 Workshop addressed discrete technical questions regarding the RDF adopted in Decision (D.) 18-12-014 that the Commission should clarify in the short term. Staff invited presenters (intervenors and utilities) to address issues that were outlined in the Phase I Track 1 Scoping Memo in the following categories: Mitigations versus Controls, PSPS Events, Utility Safety Risk Analytics and Modeling, and miscellaneous issues which included how the foundational elements be estimated or measured in the RDF, treatment of transmission assets in the RDF, and additional technical clarifications needed in Track 1. After the workshop, Staff requested informal comments from participants to prioritize the issues to be addressed in Phase I Track 1.

The Staff hosted a TWG meeting on February 3, 2021 that initiated the discussion of the following topics: using power law probability distribution to model wildfire risk and identifying uncertainties in the RDF filings; and identifying gaps in data transparency in RDF filings. During this meeting, MGRA representative Dr. Joseph Mitchell presented a MGRA White Paper, *Wildfire Statistics and the Use of Power Laws for Power Line Fire Prevention*. Staff provided an opportunity for the TWG members to provide their feedback on these two topics through a TWG Working Document circulated on February 5, 2021.

The next TWG Meeting was held on March 10, 2021 to discuss transparency guidelines for the RDF filings assumptions and estimates. The Utility Reform Network (TURN) presented an overview of the issue and discussion that led to the development of a TWG Sub-Group to further address transparency guidelines. Staff requested and noted TWG members who were interested in participating in the TWG Sub-Group. PG&E volunteered to draft a proposal of new reporting transparency guidelines to be circulated to the Sub-Group.

The TWG Sub-Group met on April 14, 2021, where PG&E shared a draft proposal on Transparency Guidelines, discussed the draft with parties, and documented feedback from the TWG Sub-Group. PG&E revised its proposal incorporating feedback from the TWG Sub-Group and submitted a proposal on Transparency Guidelines Framework on April 24, 2021 to the TWG for informal comments. The TWG informal written comments were circulated to the TWG on May 7, 2021.

On May 6, 2021, Staff hosted a TWG meeting to present Staff's preliminary recommendations on the Phase I Track 1 issues outlined in the Scoping Memo, and to obtain feedback from the TWG members. TWG members had the opportunity to provide oral feedback and share their opinions on Staff's preliminary recommendations on the Phase I Track 1 issues. Staff did not request informal written feedback on the memo.

[3] Scoping Memo at 4-5.

The following sections of this document include Staff's recommendations, incorporating feedback from the TWG, on the following Phase I Track 1 Scoping Memo issues:[4]

- Issue (a.): Do the terms "mitigations" and "controls" need to be defined? Should "mitigations" and "controls" be treated in the RDF using the same methodology?
- Issue (d.): How should the mitigation impact of data gathering (inspections and patrols) or foundational elements (technology tools) be estimated or measured in the RDF?
- Issue (b.): How should public safety power shutoff events and other utility activities with high customer impacts be treated in the RDF?
- Issue (c.): Should the Commission identify any guiding principles, best practices, aspirational characteristics, and/or minimum requirements for developing an RDF Multi-attribute Value Function?
- Issue (f): Other related clarifications as needed.

Staff incorporated two additional topics under the Scoping Memo issue (f):

- Transparency Guidelines
- Consideration of Treatment of Climate Change Impacts in the RDF Proceeding.

[4] Scoping Memo at 4-5.

2 Mitigations and Controls

The Scoping Memo asks whether there is a need to further define the terms "mitigations" and "controls" as well as whether there is a need to clarify the methodologies used in assessing "mitigations" and "controls" in the RDF Proceeding.[5]

An essential element of D.18-12-014 (Settlement Agreement Decision) is the requirement for utilities to provide RSE calculations for all mitigations included in RAMP applications.[6] Since RSE scores are used in ranking and selecting proposed RAMP mitigation options, they are an integral part of RAMP applications.

D.16-08-018, adopted in Application (A.) 15-05-002, the Safety Model Assessment or S-MAP Proceeding, defined key terms in utility risk modeling and mitigation assessment.[7] The Settlement Agreement Decision defined additional key terms. The combined result was the "2018 S-MAP Revised Lexicon,"[8] which distinguishes between definitions of "controls" and "mitigations." RSE calculations are required for all "mitigations."[9]

The term "control" was first defined in the original Lexicon in D.16-08-018 as a "[c]urrently established measure that is modifying risk."[10] The 2018 S-MAP Revised Lexicon retained this definition. The Settlement Agreement Decision defined "mitigation" as "a measure or activity proposed or in process designed to reduce the impact/consequences and/or likelihood/probability of an event."[11]

The term "controls" was not mentioned in the Settlement Agreement.[12] The Settlement Agreement requires the calculation of pre- and post-mitigation risks. The Settlement Agreement specifies that the risk reduction resulting from a risk mitigation will be measured as the difference between the values of the pre-mitigation risk score and the post-mitigation risk score. The RSE should be calculated by dividing the mitigation risk reduction benefit by the mitigation costs estimate.[13]

---

[5] Scoping Memo, Issue (a.) at 4.

[6] *S-MAP Settlement Agreement with Modifications*, (D.18.12-014), Application (A.) 15-05-002 *et al*

[7] *Interim Decision Adopting the Multi-Attribute Approach (Or Utility Equivalent Features) and Directing Utilities to Take Steps Toward a More Uniform Risk Management Framework*, issued August 29, 2016, at 25.

[8] D.18-12-014 at 16-17.

[9] D.18-12-014, Attachment A at A-13.

[10] D.16-08-018 at 25.

[11] D.18-12-014 at 16-17.

[12] "Settlement Agreement" refers to Attachment A to D.18-12-014.

[13] D.18-12-014 Attachment A at A-13.

2.1 Discussion

In their RAMP applications, utilities have used "controls" to refer to measures "currently established" or "in place" that are modifying risk. However, utilities applied further categorization to distinguish between the various types of controls. Some utilities distinguish "control" from "mitigation" measures by determining whether the measure is required by law, such as in General Order (GO) 95 or GO 165, or whether it is an existing program that the utility is currently implementing (in process). For instance, SCE grouped compliance controls, and controls that are not required by law/regulation, under two different categories.[14] San Diego Gas and Electric (SDG&E) and Southern California and Gas (SoCalGas) ("Sempra") defined controls as existing prior to the RAMP filing calendar year.[15] Table 1 outlines the different applications of these terms, demonstrating the need for additional guidance on interpretation of these terms.

TABLE 1: DEFINITIONS OF MITIGATIONS AND CONTROLS AS USED IN THEIR RAMP APPLICATIONS

	Mitigation	Control
Commission Adopted Revised Lexicon per the Settlement Agreement Decision	A measure or activity proposed or in process designed to reduce the impact/consequences and/or likelihood/probability of an event	A currently established measure that is modifying risk
SCE	New or incremental measure that will modify or reduce risk.[16]	Compliance Control: currently established activities that modify or reduce risk, and that are required by law or regulations; and, Control: a currently established measure that is modifying or reducing risk, which is <u>not required</u> by law or regulation. [17]
Sempra	"Proposed mitigations" as incremental activities to be proposed.[18]	Existing risk mitigations.

[14] *Southern California Edison's Company's (U 338-E) 2018 Risk Assessment and Mitigation Phase Report*, November 15, 2018, (SCE's 2018 RAMP Application).

[15] *Risk Assessment and Mitigation Phase Report of San Diego Gas & Electric and Southern California Gas Company*, November 30, 2016, (Sempra's 2016 RAMP Application) at A-4 - A-6.

[16] SCE's 2018 RAMP Application at 1-5.

[17] SCE's 2018 RAMP Application at 1-5.

[18] Sempra's 2016 RAMP Application at A-4.

	Mitigation	Control
		Sempra states, "the Company generally considered Controls to be activities in place as of the end of 2018."[19]
PG&E	Same as adopted Lexicon[20]	Controls are currently established measures that modify risk.[21] Controls include operations, plans and standards, emergency response procedures and other programs required by law or policy to operate our LOBs [lines of business]. They are often associated with compliance requirements.[22]

In its 2018 RAMP, SCE described "controls currently in place, and potential new mitigations to address each risk."[23] SCE developed three broad groups of activities, which it used to establish "which activities are included in the baseline residual risk, and which activities are measured to reduce that baseline risk."[24] The three broad activities are as follows:[25]

- Compliance Controls: "defined as currently established activities that modify or reduce risk, and that are required by law or regulation," such as Commission General Orders and Federal or State requirements. While SCE described compliance controls in its RAMP application, it did not evaluate the risk reduction or RSE of compliance activities, as SCE considered that the benefits of these compliance activities are included in the baseline risk level for each risk.
- Controls: "existing controls are mitigation measures established prior to 2018 that are modifying or reducing risk, and are not required by law or regulation," such as overhead conductor program and internal training not associated with compliance requirements. In its RAMP application, SCE measured the risk reduction benefits and RSE of existing controls.
- Mitigation: "defined as new activities and efforts that reduce risk, and that are not required by law or regulation," such as a new program that starts beyond 2018 or beyond that is not currently being performed or a project or program that is under construction

[19] Sempra's 2016 RAMP Application at A-4.

[20] *Application of Pacific Gas and Electric Company (U39M) to submit its 2020 Risk Assessment and Mitigation Phase Report*, June 30,2020, (PG&E's 2020 RAMP Application) at 1-14.

[21] PG&E's 2020 RAMP Application at 1-15.

[22] PG&E's 2020 RAMP Application at 1-15.

[23] SCE's 2018 RAMP Application at 1-4.

[24] SCE's 2018 RAMP Application at 1-4.

[25] SCE's 2018 RAMP Application at 1-5.

process of being implemented. In its RAMP application, SCE measured the risk reduction benefits and RSE of new mitigations.

Sempra stated that it "generally considered controls to be activities in place as of the end of 2018."[26] For example, Sempra applied the requirements per Code of Federal Regulations (CFR) 49 Part 192 Subpart M-Maintenance, for mitigation measures that were in place by the end of 2018, as controls.[27] In its 2016 RAMP Report, Sempra described controls as "existing" risk mitigations, and "proposed mitigations" as incremental activities to be proposed.[28]

Similar to SCE, in its 2020 RAMP Application, which is the first RAMP application after the adoption of the Settlement Agreement Decision, PG&E characterized programs that are required by law as controls. For example, PG&E's Leak Survey Program was counted as a control required by law.[29] PG&E further identified a control as "a currently established measure that modifies risk, such a standard operation/routine work that is undertaken as part of normal business operations and is not a new program, or an enhancement to an existing one. Controls have no end date PG&E."[30]

In its 2020 RAMP application, PG&E indicated that it primarily reduces risk through controls, and that they did not calculate RSEs for all controls that were currently in place.[31] PG&E indicated its commitment to calculate RSE scores in its 2020 GRC application, for proposed control programs for the Test-Year 2023 GRC, and for the purpose of prioritization of programs to mitigate safety and/or reliability risks, including proposed new risk mitigation programs, continuation of existing risk mitigation programs, continuation of existing risk control programs (both mandatory or discretionary), and enhancing existing mitigations and control programs.[32]

Looking at the definitions, a "control," ("currently established measure that is modifying risk"), if it is "in process" and "designed to reduce the impact/consequence and/or likelihood/probability of an event," *is* a "mitigation." As mentioned above, the Settlement Agreement requires that RSEs be calculated for mitigations.

In PG&E's 2020 RAMP, PG&E did not provide RSE scores for controls. PG&E cited the lack of preparation time for the 2020 RAMP as a reason for not providing RSEs for controls.[33] This omission impeded Staff's and other parties' ability to compare the cost effectiveness of *proposed* mitigations against those of established risk modification measures.

---

[26] Sempra's 2016 RAMP Application at 10-11.

[27] Sempra's 2016 RAMP Application at 10-11.

[28] Sempra's 2016 RAMP Application at A-4.

[29] PG&E's 2020 RAMP Application at 7-19.

[30] PG&E's 2020 RAMP Application at 1-15.

[31] PG&E's 2020 RAMP Application at 3-24.

[32] PG&E's 2020 RAMP Application at 2-11.

[33] PG&E's 2020 RAMP Application at 1-6.

While Staff does not recommend changes in the adopted definitions for "controls" and "mitigations," Staff recommends consistent treatment of controls and mitigation measures in utilities' filings across various Commission proceedings; a mitigation, whether it is already in process or is newly proposed, should be evaluated for efficacy and efficiency.

In the following section, Staff provides a discussion on the proper baseline (or reference point) to compare risk mitigation expenditures, risk reductions, and risk scores. From a risk assessment perspective, it is critical that utilities apply a consistent approach to identify the appropriate baseline to quantify their risk reductions and scores and, consequently, to prioritize mitigation measures to select and propose for implementation.

Baseline Risk

An essential element of any RDF is the accurate portrayal of the safety risks under current conditions. This concept has been established as a best practice in safety mitigation investment in all major industries.

For the Commission, defining how utilities should quantify and communicate the baseline safety risk of their infrastructure is essential to ensure accurate assessment and monitoring of utility safety performance in the RDF Proceeding. When determining current and forecasted assessment of safety conditions it is necessary to identify several factors regarding existing measures, including whether a risk mitigation measure/activity is:

- Approved for funding in prior GRC applications but has not yet been installed and/or implemented;
- Currently being implemented but has not yet been completed by the beginning of the new GRC test-year; or,
- A proposed mitigation measure/activity.

The terms "baseline, baseline risk, or baseline risk profile" are not mentioned in either the Settlement Agreement Decision or the 2018 S-MAP Revised Lexicon. Baseline is a concept that arose naturally during the evaluation of utilities' RAMP applications. The baseline refers to the existing level of risk at the start of the new GRC cycle. If a utility does not account for the expected risk reduction benefits from previously approved measures and/or programs that are not yet installed and/or implemented (i.e. "in progress") or completed by the time a utility submits its RAMP or GRC applications, it may introduce errors, including double counting risk reduction benefits, in its estimates of the effectiveness of proposed new risk mitigations.

In a February 19, 2020 letter to PG&E, TURN raised concerns on the issue of using the correct risk baseline, based on preliminary information that PG&E provided at two "pre-RAMP" workshops held on January 13, 2020 and February 4, 2020. In its pre-RAMP documents, PG&E did not include all risk mitigation benefits expected to be achieved prior to the next GRC period in its baseline. TURN stressed in its letter the importance of using the correct baseline "to ensure that PG&E is not double counting risk reduction benefits that are supposed to be achieved by currently funded mitigation programs." TURN also wanted PG&E to "capture the effects of risk mitigation benefits expected to be achieved prior to the next GRC period."[34] Similar issues were raised in the first workshop for the 2021 Sempra RAMP filing by TURN.

There are two scenarios to consider when discussing baselines for mitigations that are either in process or not yet implemented prior to the end of the current GRC cycle:

1. The utility has received funding for proposed mitigations and the utility plans to implement the proposed mitigations before the start of the new GRC cycle.

In case 1, the utility's baseline should account for all costs and expected risk reduction benefits from approved mitigations up to the start of the new GRC test-year. Failure to account for these expected risk reduction benefits would overstate the risk score at the beginning of the new GRC cycle. However, the net effect of overstating the starting risk score would be unclear since the item of interest is the *difference* between the initial risk score and the ending risk score. It could be that the overstatement of risk would affect the initial risk score and the ending risk score equally, in which case the error would not be carried through to the incremental difference. This condition is likely the situation where the incremental risk reduction benefits of proposed mitigations would be largely insensitive to what previous mitigation work had been implemented.

On the other hand, there could also be cases where the incremental risk reduction benefits of proposed mitigations would be highly dependent on what previous mitigation work had been implemented, in which case having the correct starting risk score would be critical. To prevent these kinds of uncertainties and potential errors, the utilities should use the correct baseline by consistently including the expected costs and risk reduction benefits calculated using the most recent approved MAVF approach for all risk mitigations that the utility plans to implement, including controls and compliance-based programs, up to the start of the new GRC test-year.

2. The utility has received funding for proposed mitigations but does not implement the mitigations during the current GRC cycle as originally proposed**.**

In case 2, the expected risk reduction benefits of approved mitigations up to the start of the new GRC cycle should not be included the previously expected risk reductions in the baseline. For this case, the utility may have to provide an explanation in its annual Risk Mitigation Accountability Report to account for funding of approved mitigations that was not spent in the current GRC cycle.

PG&E acknowledged in its 2020 RAMP application that the documents released for the pre-RAMP workshops did not comply with the Settlement Agreement as they did not consider the benefits of all mitigations expected to be implemented prior to the end of the current GRC period.[35] PG&E explained that this omission was due to the unavailability of data needed to support subject matter expert (SME) estimates of the expected mitigation benefits when the pre-RAMP documents were prepared, and that this omission was corrected in the actual RAMP filing. PG&E presented in its 2020 RAMP a revised methodology that treated baselines in a

---

[34] PG&E's 2020 RAMP Application Footnote 47 at 3-42.

[35] PG&E's 2020 RAMP Application at 1-4.

manner consistent with both cases 1 and 2 above to produce its test-year 2023 Baseline risk scores.[36]

In Sempra's 2016 RAMP application, the risk baseline was set to September 2015.[37] That date served as the point for establishing the residual risk scores, intended to represent the level of risk prior to implementation of any proposed risk mitigations. Sempra assumed the level of risk would remain constant until the proposed mitigations would begin, without considering that ongoing mitigations might alter risk levels beyond the baseline before the start of the next rate case period. The calculation of Sempra risk scores in its 2016 RAMP application was based on an older model, the 7x7 Risk Matrix. Each category in the matrix covered a broad range of risk frequencies and outcomes on scales of 1 to 7. For example, a level 3 Frequency meant the likelihood of risk event was between 10 and 30 years. That model has been replaced with the MAVF model now in effect.

Risk Mapping

In the 2019 SCE GRC, the utility provided a baseline risk profile for its 10,000 circuit miles of distribution assets in the High Fire Threat District (HFTD). This baseline risk profile provided a transparent and accountable foundation for that GRC proceeding to address wildfire mitigation and investment on a granular level for the first time. This demonstrated that the RDF needs to address not only how baseline risk is quantified but also how it is presented. With recent upgrades to utility wildfire risk modeling capabilities, Staff recommends that IOUs explore presenting such risk profiles by utilizing tools such as digital mapping, or GIS, that can better communicate safety/reliability risks and mitigation activities.

[36] PG&E's 2020 RAMP Application, Ch.1 Section C.3.b at 1-14 and Ch.3, Section D.1.e at 3-22.

[37] Sempra's 2016 RAMP Application at A-1.

2.2 Staff Recommendations

Consistent with Commission established directives, Staff recommends that the IOUs apply uniform methodologies to establish risk baselines in their RAMP applications and other relevant RDF filings. As directed in the Settlement Agreement Decision, IOUs are required to include in their RAMP applications a description of "controls" or "mitigations" currently in place, which creates a "baseline for understanding how safety mitigation improves over time."[38]

It is imperative that IOUs establish risk baselines (controls or mitigations currently in place) using a uniform approach for the Commission and stakeholders to understand the associated costs and risk reduction benefits from the proposed mitigation measures in their RAMP applications. Uniform methodologies allow for comparing and understanding the relative costs/benefits of existing or proposed controls and mitigation measures/activities in a utility application. In addition, uniform methodologies allow for comparing the relative risk evaluation factors for controls and mitigation measures/activities across different utilities' applications, such as comparing RSEs and risk scores, and other risk evaluation factors.[39]

Staff recommends that IOUs apply uniform methodologies to establish risk baselines for existing controls and/or mitigations when evaluating risks and the associated costs and risk reduction benefits.

To prevent potential errors and inconsistent treatment in evaluating risks across utilities, including but not limited to the calculation of RSE and risk scores, in utilities' RAMP applications, Staff recommends that utilities apply the following requirements:

- Type A Baseline Measures: For all controls and mitigation measures and/or activities that a utility plans to implement prior to the beginning of the upcoming GRC test-year, the utility accounts for all actual and forecasted risk reduction benefits in the baseline associated with those measures and/or activities that *have been approved* in the prior and/or current GRC cycles.
- Type B Baseline Measures: Account for all actual and forecasted risk reduction benefits in the baseline associated with all controls and mitigation measures and/or activities that have *not been funded by ratepayers and/or exceed the original approved scope and/or funding* in the prior and/or current GRC cycles. In other words, incremental costs (above what was approved for funding in prior GRCs) associated with these measures are excluded from the RSE calculations; however, the utility should account for risk reduction benefits associated with these measures.

[38] D.18-12-014 at 33.

[39] Examples of risk evaluation factors include quantifying: residual risk, (which are risk remaining after currently controls), risk tolerance (which is the maximum amount of residual risk that an entity or its stakeholders are willing to accept after application of risk control or mitigation; Risk tolerance can be influenced by legal or regulatory requirements), planned or forecasted residual risk (risk remaining after implementation of proposed mitigations), D.18-12-014 at 17-18.

- Type C Baseline Measures: Exclude from the baseline forecasted risk reduction benefits for all mitigation measures and/or activities (that have been approved in the prior and/or current GRC cycles), which the utility doed not plan to implement prior to the beginning of the upcoming GRC test-year.
- The utility should identify in its annual Risk Spending Accountability Reports the costs for controls and/or mitigation measures and/or activities that were approved in prior GRC cycles but not implemented, as applicable.

Staff also recommends that, in Phase II of this proceeding, the Commission consider examining how risk profiling and mapping, utilizing tools such as digital mapping, or GIS, could be incorporated into future RAMP filings to further improve transparency and accountability.

3 Foundational Elements

The Scoping Memo asks how "foundational programs or activities," such as technological tools for data gathering, should be estimated or measured in the RDF.[40] During the Phase 1 Track 1 Workshop on December 15, 2020, parties discussed whether foundational programs or activities would require a risk reduction score. The Settlement Agreement Decision does not define "foundational."

Examples of foundational programs or activities include software and computer hardware resources, situational awareness initiatives such as weather modeling, and vehicles used by employees. These foundational initiatives support or enable utility mitigation programs and/or improve utility operations but do not, in and of themselves, directly reduce safety risks. Therefore, Staff does not recommend the application of risk reduction scores and RSE calculation requirements directly to foundational programs and activities. Instead, since the costs and risk reduction benefits of foundational activities are embedded in the mitigation programs, considerations should be made to determine how to treat foundational costs.

"Foundational programs or activities" may be defined as "initiatives that support multiple mitigation programs but do not directly reduce the consequences or reduce the likelihood of risk events."

3.1 Discussion

On May 6, 2021, Staff held a TWG meeting to discuss its preliminary recommendations on Track 1 Scoping Memo issues. TURN, MGRA, The Public Advocates Office (Cal Advocates) and Protect our Communities Foundation (PCF), (Joint Intervenors), indicated that they would like to seek additional clarification on foundational activities. The Joint Intervenors pointed out that some examples of foundational elements that Staff presented, such as situational awareness and SCADA, do not meet Staff's definition of foundational elements as they would have an impact to reduce the consequences or likelihood of risk events, and accordingly such activities should be scored. Staff agrees with TURN that SCADA does not qualify as a foundational element under the definition proposed by Staff.

The Joint Intervenors proposed that a process for categorization activities as foundational elements should be adopted in this proceeding. The Joint Intervenors suggested a process similar to the "Step 3 Supplemental Analysis in the GRC" that is presented in the Settlement Agreement, where utilities are required to conduct mitigation analysis for certain programs that meet specific criteria.[41]

There is little question that foundational costs can be a significant hidden cost that should be recognized when determining the cost effectiveness of new mitigations. There are many potential intricacies that could be involved in differentiating foundational costs from general

[40] Scoping Memo, Issue (d.) at 5.

[41] D.18-12-014, Attachment A, line 28 at A-14.

overhead and in determining the thresholds and the precise methodology to apportion foundational costs. These potential intricacies can only be properly addressed after further discussions with parties in future workshops or TWG meetings.

Three topics come into play when discussing the treatment of foundational costs:

1. Cost Threshold

For relatively small foundational costs, it may be permissible to ignore them when calculating RSEs. On the other hand, when a foundational cost is significant and exceeds some yet to be defined threshold, Staff recommends a process to apportion the cost to the different mitigation activities that the foundational activity supports.

Take, for example, a hypothetical foundational activity to construct a purpose-built expensive building to support two newly proposed mitigation programs on two different risks. This expensive building would not be needed and would not be built but for the operation of the two mitigation programs. Since this new building has no other function and no other benefits except to support these two mitigation programs, the construction cost of the building should not be treated as a general overhead cost. Instead, the building cost should be included in the calculation of RSEs for the two mitigation programs by apportioning the foundational activity cost to the two mitigation programs. Omitting this significant foundational activity cost would make the proposed mitigations appear much more cost effective than they really are by essentially inflating their RSE scores.

2. Sunk cost versus Non-sunk cost

Another factor to consider when determining whether to include a foundational cost when calculating the RSE of a newly proposed mitigation is whether the foundational cost is a sunk cost relative to the proposed mitigation.

Going back to the example above, the foundational costs should be included and apportioned when the first two mitigation programs were considered because when the first two mitigations were proposed, the building had not been built and the building cost had not been incurred. It was not a sunk cost relative to the first two mitigations at the time when those mitigations were proposed.

On the other hand, suppose a couple of years after the building has been built to support the first two mitigations, the utility proposes a third mitigation that also requires the use of the building. By this time, since the cost for the building has already been incurred and paid for; the original building cost is now a sunk cost and is irrelevant to the decision on whether to proceed with the third new mitigation. The sunk cost should not be included in the RSE calculation of this new mitigation program.

3. Apportionment of Foundational Costs to Different Mitigations

If a foundational cost exceeds the threshold and is not a sunk cost, then the cost must be included in the calculation of RSEs for mitigations using a procedure to apportion the foundational cost to the mitigations. Staff proposes two different methods to apportion foundational costs to mitigation programs. The first method is based on the relative costs of the mitigation programs. The second method is based on the relative risk mitigation reduction benefits of the mitigation programs.

Method 1: Apportionment based on Mitigation Program Costs

Under Method 1 the foundational cost is apportioned to the mitigations using the same percentages as the mitigation costs. For example, suppose there are two mitigation programs M1 and M2 for two different risks with respective net present value mitigation costs C1 and C2. Let the net present value of the total foundational cost be F. Then the foundational costs to be apportioned to M1 and M2, respectively referred to as F1 and F2, are:

$$F1 = F \times C1/(C1+C2)$$

$$F2 = F \times C2/(C1+C2)$$

Method 2: Apportionment based on Risk Reduction Benefits

Under Method 2 the foundational cost is apportioned to the mitigations using the same percentages as the total risk reduction benefits. For example, suppose there are two mitigation programs M1 and M2 for two different risks with respective net present value total risk reduction benefits R1 and R2 calculated over the expected life either of the mitigation programs or of the foundational activity, whichever is shorter. Let the net present value of the total foundational cost be F. Then the foundational costs to be apportioned to M1 and M2, respectively referred to as F1 and F2, are:

$$F1 = F \times R1/(R1+R2)$$

$$F2 = F \times R2/(R1+R2)$$

3.2 Staff Recommendations

As discussed above, Staff suggests that "foundational programs or activities" be defined as "initiatives that support multiple mitigation programs but do not directly reduce the consequences or reduce the likelihood of risk events." This definition is being discussed in upcoming TWG meetings scheduled for June 2021 and may be further refined based on those discussions. Pending further discussions with the TWG, Staff suggests that the Commission consider adding this definition to the Revised Lexicon in an upcoming decision in this Proceeding.

Staff does not recommend the application of risk reduction scores and RSE calculation requirements directly to such foundational programs and activities and proposes that any Commission adopted definition of "foundational programs or activities" include this clarification. Instead, since the risk reduction benefits of foundational activities are embedded in mitigation programs, consideration should be given as to how to treat foundational costs.

Staff recommends that foundational activities and their costs be subject to a threshold test and a sunk cost test. For foundational activities that meet the conditions set for these two tests, Staff recommends that the foundational costs be apportioned to the mitigations.

Staff's initial recommendations on approaches on the treatment of foundational costs will be used as a starting point for further discussions with the TWG to develop guidelines on consistent treatment of foundational costs in the RDF proceeding. These guidelines are still being developed through TWG discussions. Staff suggests that in an upcoming decision, the Commission direct the IOUs to apply consistent treatment of foundational costs in their RDF filing based on these guidelines.

Staff is planning a TWG meeting on this topic in June of 2021 to address the following researchable questions:

1. Whether foundational costs should be subject to a threshold test, and if so, what should the threshold(s) be? Should the threshold test apply to each foundational activity cost individually, or to the aggregated cost for all foundational activities associated with the same risk?
2. How should foundational costs be apportioned to mitigations?

4 Public Safety Power Shutoff Events

The Scoping Memo asks: "How should public safety power shutoff (PSPS) events and other utility activities with high customer impacts be treated in the RDF?" [42]

Consistent with SDG&E's recent filing as well as other electric IOUs WMP filings this year, Staff recommends that IOUs include their assessment of impacts and risks associated with PSPS events in their RAMP filings. This is consistent with ongoing Commission proceedings that address and acknowledge the safety risks and impacts associated with PSPS events and would further Commission requirements that utilities identify the safety risks and impacts associated with PSPS events.

As background, WSD's Guidance Template requires that utilities detail the methodology they use to calculate and model risks and impacts associated with PSPS events, "including a list of all inputs used in impact simulation; data selection and treatment methodologies; assumptions, including Subject Matter Expert (SME) input; equation(s), functions, or other algorithms used to obtain output; output type(s), e.g., wind speed model; and comments.[43]" The WSD guidelines do not require a specific methodology. However, they require transparency in how the risks of PSPS are modeled. Utilities must also show how they plan to reduce the probability and impact of PSPS events on the public.

SDG&E proposed an approach to assess the risk impacts of PSPS events in their WMP that they argue attempts to balance wildfire risks and the risks and costs of PSPS events. SDG&E's updated risk assessment includes separate risk scores for both wildfire risk and PSPS impacts. SDG&E acknowledges that "the evaluation of PSPS impacts is still in the early stages of development, and SDG&E's framework will continue to evolve in quantifying and understanding the impacts of PSPS to inform strategies for wildfire mitigation."[44]

SDG&E's RAMP, filed on May 17, 2021, models PSPS as a risk impacting the overall total wildfire risk score, as well as a mitigation to wildfire risk.[45] SDG&E considers PSPS events as an aspect of the wildfire risk score; "Modeling Public Safety Power Shut-off (PSPS) De-Energizations SDG&E informed stakeholders that within its Wildfire risk chapter (SDG&E-Risk-1), PSPS impacts would be modeled as a risk that impacts the overall total wildfire risk score, as well as a mitigation to the wildfire risk…"[46]

Staff evaluation of SDG&E's RAMP will build on WSD's analysis of SDG&E's WMP. This will be the first RAMP application to evaluate the risk/risk reduction benefits of PSPS events in the context of RDF.

---

[42] Scoping Memo, Issue (b) at 4.

[43] Resolution WSD-011, Attachment 2.2 - 2021 WMP Guidelines Template at 27.

[44] SDG&E 2021 WMP Plan Update at 28-29.

[45] SDG&E 2021 Risk Assessment and Mitigation Phase (RAMP) Report | San Diego Gas & Electric

[46] SDG&E 2021 RAMP Report, Chapter A, at SCG/SDG&E-RAMP-A-8.

In addition, Staff notes that the Commission is currently addressing PSPS policy in another proceeding, including the potential development of additional or modified de-energization guidelines.[47] This proceeding is addressing various complex issues associated with PSPS, including, assessing risks and impacts associated with PSPS events on customers, and identifying measures to mitigate those impacts. Staff is closely monitoring and participating in the PSPS proceeding and will build on the Commission's findings and decisions on the treatment of PSPS risks, and potential measures to mitigate those risks, as they could potentially inform the treatment of PSPS events in the RDF proceeding.

Given the current Commission activities on evaluating PSPS risks in a parallel proceeding, and the fact that SDG&E's 2021 RAMP application is the first application modeling PSPS events in the context of RDF, Staff recommends continuing working with the TWG to further scope the issues related to modeling PSPS events in the RDF, and any substantial changes to the adopted RDF approaches be addressed in Phase II of the RDF proceeding.

Staff presented this recommendation during the May 6, 2021 TWG meeting, and parties agreed with Staff's recommendation. At the meeting, the IOUs and other intervenors agreed on forming a TWG sub-group to convene as soon as practicable due to the importance of incorporating the risks and impacts associated of PSPS into the RDF. Staff agrees and plans to host TWG sub-group meetings on PSPS-RDF topics in the summer of 2021.

[47] *Order Instituting Rulemaking to Examine Electric Utility De-Energization of Power Lines in Dangerous Conditions*, R.18-12-005.

5 Multi Attribute Value Function in RDF

The Scoping Memo asks, "Can the Commission identify any guiding principles, best practices, aspirational characteristics, and/or minimum requirements for developing an RDF Multi-attribute Value Function?"[48]

A MAVF is defined as a tool to combine all potential consequences of the occurrence of a risk event and express these as a single value.[49] The Settlement Agreement Decision only requires that utilities develop a MAVF, to be used for assessing the "consequences of failure," based on the following six principles:[50]

1. Attribute Hierarchy,
2. Measured Observations,
3. Comparison,
4. Risk Assessment,
5. Scaled Units, and
6. Relative Importance.

A utility may adjust its MAVF over time if it adheres to the terms of the six principles. The flexibility is evident in the Settlement Agreement Decision's discussion of Principle 4 on Risk Assessment and is of particular interest to parties, as it allows the utility to "assess 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."[51]

5.1 Discussion

5.1.1 Party Comments from the February 3, 2021 TWG

During PG&E's 2020 RAMP, MGRA advocated for using power law probability distributions to model wildfire consequences.[52] Building off this initial recommendation by MGRA, during the December 15, 2020 Phase 1 Track 1 Workshop, parties expressed interest in discussing utilities' risk modeling approach for wildfire risk, which is a risk with high potential for extreme consequences. Staff and intervenors specifically wanted to discuss whether the current modeling approach, that is uniquely applied by each utility to model wildfire risk consequences, is appropriate and whether the power law probability distribution is the best

[48] Scoping Memo, Issue (c.) at 4.

[49] D.18-12-014 at 17.

[50] D.18-12-014, Appendix A.

[51] D.18-12-014, Appendix A.

[52] Protest filed by Mussey Grade Road Alliance on Proceeding A.20-06-012, July 29, 2020.

method for modeling consequences from a risk with future events expected to be larger than those from past events, thereby "throwing off any mean based on backwards-looking data."[53]

On February 3, 2021, Staff hosted a TWG meeting and discussed the appropriateness of power law probability distribution for modeling the consequences of wildfire risk. MGRA presented its white paper discussing use of power law functions to model wildfire behavior.[54]

To demonstrate the validity of using power law mathematical functions to model wildfire consequences, MGRA showed that historical wildfire data points of wildfire size versus frequency closely follow a straight line when both the x and y axes are expressed on logarithmic scales. A distinguishing feature of wildfire size (or consequence) following power law behavior is that extreme events dominate the results. A distribution function having this characteristic is described as having a "fat tail." The "fat tail" feature of power law distribution functions is consistent with the recent California wildfires of historical proportions.

Given how closely historical wildfire size data points follow power law behavior, a corollary of the power law function's "fat tail" feature is that using other types of distribution functions to model wildfire consequences may underestimate the wildfire risk.

Following the February 3, 2021 TWG meeting, parties provided informal written feedback on the discussion of power law probability distributions. Cal Advocates provided comments in support of the use of power law probability distributions to model wildfire risk.[55] Cal Advocates supported adopting, as a best practice, use of power law probability distributions to model wildfire consequences. Cal Advocates recommended that utilities be required to justify the effectiveness of their modeling approaches if they choose another type of distribution function to model wildfire consequences.

PG&E and Sempra both stated that the use of power law probability distributions to model wildfires appears reasonable. PG&E wrote, "Power law probability distribution is a prime candidate for sampling of wildfire events and a feasible approach for wildfire risk modeling and will be seriously explored by PG&E."[56] Sempra wrote, "[t]he power law probability distribution is a worthy consideration for a probability distribution, but SoCalGas and SDG&E have not committed to a specific distribution we will use in our next RAMP."[57] Meanwhile, SCE stated that, "SCE cannot draw any firm conclusions based on a single slide presentation whose rigor

---

[53] MGRA White Paper, *Wildfire Statistics and the Use of Power Laws for Power Line Fire Prevention*, (MGRA White Paper) February 11, 2021 at Appendix A.

[54] MGRA White Paper at Appendix A.

[55] Informal Comments of Public Advocates Office on Topics from the February 3, 2021 Phase 1 Track 1 Technical Working Group Meeting (PAO February 3, 2021 TWG Meeting Informal Comments) at 2-8.

[56] PG&E Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting at 1.

[57] Sempra Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting at 1.

and accuracy were not tested or made subject to discovery and other inquiry."[58] "The use of power law probability distribution can be rather complex, and the material presented through the slides would need to be materially fleshed out and verified before any prudent and precise conclusions can be drawn regarding its strengths and weaknesses in comparison to SCE's current approach."[59]

PG&E, Sempra, and SCE all stated that the Commission should not require the use of power law probability distribution for modeling wildfire risk.[60] According to SCE, "there is not a sufficient basis to require any application of a power law probability distribution methodology."[61] PG&E, SCE, and Sempra were also in agreement that further discussion on the specific use of power law probability distributions for modeling wildfire risk, as well as wider discussions on topics related to risk quantification and assessment, should take place in Phase II of this proceeding.

TURN and The Utility Consumers' Action Network (UCAN) shared concerns about the use of power law probability distributions. TURN stated that the use of a power law distribution, with an infinite expected value, would increase the expected value of the consequence of risk event (CoRE), and that truncating a power law distribution with an assumed upper bound is contrary to the entire purpose of using the modeling approach.[62] UCAN stated that utilities should not be required to "force fit a single type of analysis to the fire industry, which has varied risks."[63]

5.1.2 Party Comments from the May 6, 2021 TWG

Since historical data show that wildfire consequences closely follow power law behavior, Staff initially recommended that the Commission direct utilities to apply power law functions to model wildfire risks, as a best practice, and in the event a utility choses an alternative approach, to provide thorough justifications, including comparative analysis, on the benefit and appropriateness of using an alternative function. Staff would then continue to review and evaluate the forthcoming RAMP applications and other relevant utility filings to build on lessons learned for further discussion in Phase II of this proceeding.

---

[58] SCE Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting at 4.

[59] SCE Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting at 4.

[60] PG&E, Sempra and SCE Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting.

[61] SCE Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting at 4.

[62] TURN Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting (TURN February 3, 2021 TWG Meeting Informal Comments) at 2.

[63] UCAN Informal Comments on Topics from the February 3, 2021 Phase I, Track 1 Technical Working Group Meeting (UCAN February 3, 2021 TWG Meeting Informal Comments) at 1.

Staff presented its preliminary recommendations at a May 6, 2021 TWG meeting. MGRA, speaking on behalf of TURN, Cal Advocates, PCF, and itself, supported the preliminary recommendations presented in the Staff memo. The group of intervenors agreed that asking the utilities to explore the use of power law probability distribution for modeling wildfire would ensure, to some extent, that the utilities are thinking about calculating the correct risk in the high end of losses (i.e., the extreme events), without being prescriptive.

However, SCE strongly objected to Staff's preliminary recommendation that the Commission direct utilities to explore the use of power law functions to model wildfire risks and provide a thorough justification for not choosing the power law function that includes a comparative analysis should a utility choose an alternative approach. SCE argued that the power law function would effectively function as the "default" methodology, even though MGRA's presentation on power law probability distribution at the February 3, 2021 TWG meeting was not subject to any of the due process established by the Commission for building a record on an evidentiary basis. SCE asserted that the use of the power law function was not rigorously tested in Commission proceedings.

Other comments from parties centered around technical specifications of the power law probability distribution as well as parameter estimation for the truncated power law probability distribution.

5.2 Staff Recommendations

Joseph Mitchell of MGRA presented his white paper on the application of power law during the February 3, 2021 TWG meeting, citing several research papers that demonstrated the goodness of fit of the power law function in modeling wildfire sizes as well as his own studies using California-specific wildfire data. Using CAL FIRE perimeter data for wildfires attributed to power line ignitions from 2005 through the end of 2019, shown as cumulative distributions plotted on log-log axes, MGRA showed that the vast majority of loss potential comes from the most extreme events, where "[t]ypical events are small. Typical losses are from catastrophic events."[64] MGRA noted that the issue is not so much about the prescriptive use of power law probability distribution, but how the utilities are modeling the extreme end of wildfire risk's probability distribution and whether they are doing it in a way that accurately estimates the risk impact.

Staff is planning to work with parties in this proceeding to further refine the RDF, and identify guiding principles, best practices, aspirational characteristics, and minimum requirements to improve future RAMP requirements. Additionally, PG&E is planning to examine application of the power law distribution function in modeling wildfire risk consequences and to share its findings with the TWG in August of 2021. Given that PG&E, MGRA and potentially other parties will be testing the applicability of power law distribution function in modeling wildfire, Staff no longer recommends utilities be required to explore the

[64] MGRA White Paper, Appendix A at 9.

use of power law probability distribution or provide justification for any non-power law distribution approach, including a comparative analysis. Staff and parties have the option to request power law related scenario analysis from a utility related to its RAMP filing to further build understanding on this topic.

Staff recommends that utilities and parties continue to collaborate to validate different methodologies that appropriately estimate the risk of extreme events to capture maximum loss, consistent with wildfire risk behavior. As initially indicated in the Staff Memo to the TWG, Staff proposes that this topic be discussed further in Phase II of this proceeding, which includes in scope a wide range of substantive changes to RDF technical requirements.

6 Climate Change Impacts

The Scoping Memo indicated that Track 1 will consider discrete RDF technical questions that the Commission should clarify in the short term, whereas more substantive revisions to the RDF will be considered in Phase II.[65] Phase II issues includes refining the RDF adopted in the Settlement Agreement Decision, including incorporating uncertainties relating to climate change risk drivers.[66] This Staff Proposal introduces a discussion on potential climate change risks, impacts, and mitigation activities in California.

In April 2018, the Commission initiated R.18-04-019 to consider how best to integrate climate change adaptation into the IOUs' existing planning and procurement processes to ensure the safety and reliability of utility operations. Pursuant to D.19-10-054, the IOUs must apply specific data guidance to all climate impact, climate risk, and climate vulnerability analyses with respect to their infrastructure assets, operations, and customer impacts.[67]

The IOUs' RAMP applications address climate change and the safety implications of power outages, amongst other risks. In its most recent RAMP application, PG&E identifies six primary climate-driven contributors to risk: (1) increased severity and frequency of storm events; (2) sea level rise; (3) land subsidence; (4) change in temperature extremes; (5) changes in precipitation, and patterns and drought; and (6) wildfire. PG&E identifies two risks associated with climate change that were integrated into their RAMP model: wildfires and failure of electric distribution overhead assets. PG&E proposes mitigation actions that include facilities relocation, mitigating transmission pipelines impacted by climate change, and conducting further research to address climate change related events.[68]

Due to the complexity and importance of this topic, Staff recommends that the Commission address this topic in Phase II of this proceeding to allow sufficient time to develop a framework outlining suitable approaches to assess potential risks and mitigations associated with climate change impacts in California.

[65] Scoping Memo, Issue (f.) at 3.

[66] Scoping Memo at 8.

[67] *Order Instituting Rulemaking to Consider Strategies and Guidance for Climate Change Adaptation* (R.18-04-019) Decision on Phase 1 Topics 1 And 2, Ordering Paragraph 2 at 56.

[68] PG&E's 2020 RAMP Application.

6.1 Discussion

The *Safeguarding California Plan 2018 Update* (the "Plan"), led by the California Natural Resources with contribution by staff from 38 state agencies, found that more than 100 years of weather-related records are now unreliable predictors of future climate change events.[69] The Plan forewarns that climate change will disproportionately impact the state's most vulnerable populations. *Climate Change Assessment* reports emphasize that the energy system in California is vulnerable to climate change and the *Fourth Climate Change Assessment* report underscores the dramatic changes needed in the near and foreseeable future to achieve the State's greenhouse gas emissions reduction goals. The report identifies several expected climate impacts in California with varying degree of confidence.[70]

Expected climate impacts include, warming temperature, rising sea levels, declining snowpack, increasing intensity of heavy precipitation events, increasing frequency of drought, and increasing acres burned by wildfire.[71] In addition to potential safety risks to people and public health, climate change has a direct impact on the failure of energy infrastructure in California, such as damage of the electric grid from wildfires, damage to electric assets from rising sea-levels during extreme storm events, flooding and dam failures. Climate change also has indirect impacts on the performance of the energy delivery system due to energy demand associated with rising temperatures.[72]

Climate change poses direct risks to people and public health affecting mortality (early death) and morbidity (illness). The main drivers for climate impacts on public health are high ambient temperatures. Climate change also poses indirect risks to people including increased vector-borne diseases, stress and mental trauma due to extreme events and disasters, economic disruptions, and residential displacement. The main drivers for these indirect impacts include changes in temperature, aridity, wildfires, and inland flooding.[73] Power outages associated with heat-induced demand on the electrical systems result in health and safety impacts, such as: food safety/spoiling, risks to refrigerated medicines including vaccines, medical equipment impacts, and exposure to emissions from emergency generators. The safety of utilities' employees and contractors, working in heat, and more hazardous work associated with mitigation efforts, are also major risks.

---

[69] *The 2018 Update to the Safeguarding California Plan* is a roadmap showing how California's state government is taking action to respond to climate change. The Plan was produced through the efforts of hundreds of state agency and representatives across 38 agencies.

[70] *The Statewide Summary Report of the 2018 California Fourth Climate Change Assessment* Report (The 2018 State Summary Report) summarizes the results of peer-reviewed work sponsored by the California Natural Resources Agency and California Energy Commission.

[71] The 2018 Statewide Summary Report.

[72] The 2018 Statewide Summary Report.

[73] The 2018 Statewide Summary Report at 10-11.

Climate change has a direct impact on failure of the energy system infrastructure in California and an indirect impact on the energy delivery system performance due to changing energy demand.[74]

Other impacts to the electric system that could lead to service interruptions include:

- Damage to the electric grid from wildfires
- Damage to electric assets (such as, inundation of substations and pole mounted transformers) from rise in sea-levels during extreme storm events
- Flooding and dam failures

The key driver of climate change related risk in California's energy system is temperature, typically expressed in heating degree days, which is roughly proportional to energy demand. Of particular significance is the effect of peak electricity demand in hot months of the year, as opposed to annual average electricity demand. The projected increases in peak summer demand associated with rising temperatures pose risks to energy infrastructure and may exceed the capacity of existing substations and distribution circuits in California. Certain adaptation measures can mitigate such risks, including installing additional substation capacity, distributed energy resources, or load shifting to avoid overloading local substation capacities.[75] Figure 4 outlines major climate impacts to the electric system in California.

[74] The 2018 Statewide Summary Report at 47-55.

[75] The 2018 Statewide Summary Report at 44-55.

Figure 4: Main impacts to the resilience and performance of the electric system in California.[76]

Direct Risks to the California Grid from Wildfires	Damage to California's electricity grid (2001 to 2016) was caused by a relatively small number of wildfres (>$700 million)
Direct Risks to Assets from Rise in Sea-Levels and Extreme Storm Events	Inundation of substations in low lying areas during extreme storm events could lead to service interruptions to thousands of customers
	Increased maintenance and repair costs of impacted ground duct banks and pole-mounted transformers
Decreased Hydropower Generation in Summer Peak Demand	Temporal shift in runoff (due to early season inflow) leads to increased electricity generation in winter and spring, and decreased generation in the summer during the annual peak demand period. This loss of low-carbon summertime electricity would need to be replaced with more generation from other sources that may not be carbon-neutral. This in turn would affect the amount of spinning reserve power available to be dispatched to the grid on short notice.

Climate change also impacts the natural gas system (pipelines and underground storage units) in California; impacts include exposure of infrastructure to projected coastal hazards and humidity leading to corrosion risks and structural damage due to rise in sea levels and extreme storms. Figure 5 outlines major climate impacts on the natural gas system in California.

[76] The 2018 Statewide Summary Report at 44-45.

Figure 5: Main impacts on the resilience and performance of the natural gas system in California.[77]

Direct Impact to Natural Gas Facilities (Underground Storage Units and Pipelines)	Compounded effects of increase in subsidence of levees, sea-level rise and storms could cause overtopping or failure of the levees, exposing natural gas pipelines and other infrastructure to damage or structural failure
	Buried infrastructure can also be exposed to humid conditions due to flooding or an increase of the elevation of the water table due to sea-level rise
	Levees might fail to meet the federal levee height standard by 2060 or 2080, depending on the rate of sea-level rise
	The transmission pipeline running from Los Angeles to San Diego is a major pipeline asset that is potentially exposed to projected coastal hazards and could experience disruption. This line was seen to have low sensitivity overall because it is backfed (i.e., supplied from both northern and southern ends), which would limit service disruptions.
	Cathodic protection is the prevailing approach to minimizing pipelines' corrosion risks in coastal areas at risk to inundation and saltwater intrusion. However, these protections require regular inspection and maintenance (So-CalGas, 2016); and the potential for the effectiveness of this protection to diminish due to weather-related factors has been raised in public filings (CPUC, 2016).
Financial Impacts	A multi-hazard risk assessment study of the natural gas system in SDG&E territory to coastal and inland flooding, wildfire, and extreme heat shows that the natural gas system in SDG&E territory is generally not very vulnerable to these risks. Findings of the study indicate that, there could be substantial cost impacts associated with restoration of service connections after fire events; increased cooling costs for compressor equipment due to accelerated wear and tear resulting from extreme heat.

[77] The 2018 Statewide Summary Report at 51.

6.2 Staff Recommendations

During the May 6, 2021 TWG meeting, parties agreed with Staff's preliminary recommendations on this topic. The Joint Intervenors supported Staff's recommendations that the Commission develop an explicit framework for addressing climate change-driven risks in RAMP applications in Phase II of this proceeding and coordinate with ongoing Commission work on climate change. The Joint Intervenors suggested that the development of the framework should consider projections and not rely on historical data.

During the TWG meeting, PCF emphasized the pressing need to reduce greenhouse gas (GHG) emissions. Cal Advocates indicated that RAMP applications would provide a path to identifying mitigation measures to combat climate change impacts as it drives the GRCs, which subsequently drive activities and implementation of measures that can lead to reducing these impacts. Cal Advocates outlined two scenarios for mitigating risks from climate change impacts: mitigations targeting the reduction of GHG emissions, such as new technologies that can detect sources of methane leaks, and mitigation measures targeting the protection of utility energy infrastructure from the effects of climate impacts.

As a key part of efforts to further refine the RDF in this proceeding, Staff recommends that in Phase II of this proceeding, the Commission consider refining the RDF adopted in the Settlement Agreement Decision to develop a framework for assessing risks and identifying mitigation measures associated with climate change impacts on utility electric and natural gas infrastructure and operation, as well as customer impacts, in a manner that complements existing Commission guidance to the utilities on climate change adaptation. Topics that require further study include methodologies to identify, quantify, and incorporate uncertainties associated with climate change as a risk driver, as well as methods to estimate potential risk reductions that could result from implementing mitigation measures and/or activities.

In addition, further work is needed to measure and track the effectiveness of electric and gas utilities' mitigation measures and activities to combat climate impacts on utilities' infrastructure, including exposure of pipelines to projected coastal hazards and humidity leading to corrosion risks, potential structural damage to pipelines and underground storage tanks due to rise in sea levels and extreme storms, and exposure of electric assets to rising sea-levels, extreme storm events, and other climate change impacts.

7 Data Transparency and Uncertainty in IOUs' RDF Related-Filings

The topic of transparency in RDF filings falls under Scoping Memo Issue (f.) of Phase 1, Track 1: Other related clarifications as needed.[78] Transparency in RDF filings refers to the inclusion of sufficient documentation in the initial RDF filing, and more specifically as in IOUs RAMP applications.[79] The need for such guidelines will allow parties and Staff to be able to effectively evaluate methodologies and verify risk, consequence, and mitigation information, without necessitating subsequent time-consuming discovery by Staff and parties. Transparent submittals allow Staff and parties to adequately understand and verify the risk evaluation methodologies used and to identify all critical inputs and assumptions as well as uncertainties embedded in the risk models.

The need for greater transparency in RDF filings was first suggested by TURN in the December 15, 2020 Track 1 workshop. TURN brought up the topic again at the February 3, 2021, and Staff and other parties agreed with TURN's suggestion to address transparency in IOUs filings during this Phase of the proceeding. Staff held a TWG meeting on March 10, 2021 expressly to discuss this topic.

At the March 10, 2021 TWG meeting, TURN presented their perspective on key features that a transparent RDF process should possess:[80]

- Repeatability of results: IOUs should provide information sufficient that a stakeholder can repeat the calculation and arrive at roughly the same result.
- Uncertainty is an important piece of information that should be presented. IOUs should identify, describe, and, if possible, quantify the uncertainty of the assumptions or estimates; and
- Risk analysis should be sufficiently granular.

TURN's presentation also suggested a streamlined matrix format for reporting risk model assumptions, uncertainties, and annual estimates of pre-mitigation and post-mitigation likelihoods, consequences, mitigation costs, and RSEs.

PG&E volunteered at the March 10, 2021 TWG meeting to develop an initial proposal on transparency guidelines and engaged with TWG members to develop the proposal. A subsequent TWG meeting was held on April 14, 2021 to discuss this initial PG&E proposal, which contained both transparency guidelines and standardized risk reporting templates. Parties then provided informal written feedback. On April 23, 2021, PG&E distributed its final, amended proposed Transparency Guidelines and standardized risk reporting templates, as well as a summary of feedback from TWG members on its initial proposal.

---

[78] Scoping Memo, Issue (f.) at 3.

[79] RDF filings refer to all IOUs filings related to the RDF proceedings, including RAMP applications, Risk Spending Accountability Report, Risk Mitigation Accountability Report, and GRC filings associated with RAMP.

[80] TURN's Transparency of Estimates and Assumption Presentation, March 10, 2021 TWG meeting.

7.1 Summary of PG&E's Proposed Transparency Guidelines

On April 23, 2021, PG&E presented its "Proposal to Address Transparency and Uncertainty in IOU's Risk-Based Filings" (Transparency Guidelines) as a member of the TWG. The PG&E Proposal recommends two new elements for inclusion in future RAMP reports to address the shortcomings with data transparency and uncertainty highlighted by TURN, Staff, and other parties in their responses to the 2020 PG&E RAMP report.[81] The first element is a set of standard workpaper templates and the second is a set of criteria for assessing the quality of data estimates used in the RAMP. PG&E's proposed Transparency Guidelines are included in Appendix E to this Staff Proposal.

1. <u>Workpaper Templates</u>

IOUs often provide detailed workpapers in Commission filings, including data and calculations to support their analyses and findings pertaining to spending requirements and risk calculations. Each IOU may decide what format and what level of detail to present in their workpapers. Parties often make ad-hoc data requests during their review of the RAMP applications seeking additional information that is not available in the workpapers, often to validate or reproduce calculations and understand underlying assumptions or sources of data inputs, etc. This process takes up to two weeks from the time a party issues a data request to the time it gets a response from an IOU, leading to a considerable amount of time and effort spent by the utilities to provide the requested information and for parties to complete their analyses of a utility's RAMP application using it.

PG&E now proposes a standard set of templates for workpapers to be used for all RAMP applications, which would not preclude parties from making ad-hoc requests but should streamline the review process. The templates support standard formats to provide input data, output calculations, and the associated risk models for each risk assessed in a RAMP application.

2. <u>Estimate Quality Criteria</u>

Calculations of residual risk and the risk reduction potential of proposed mitigation measures typically require estimates and/or assumptions of risk, which may introduce uncertainties in risk calculation results. PG&E proposes a set of criteria to categorize the quality of each estimate used, instead of just reporting a numerical uncertainty value. The estimates would be rated as High-, Medium-, or Low quality, to help inform parties of the degree of certainty in the calculations.

7.2 Discussion

7.2.1 Party Informal Comments and positions on PG&E proposal

[81] PG&E RAMP filed in A.20-06-012.

SCE and Sempra do not support PG&E's proposal for several reasons. SCE argues that some of the technical details of the PG&E proposal are premature, such as the concept of "incorporating uncertainties," and that the proposed "Confidence Interval" should be reserved for further exploration in Phase II.[82] Similarly, Sempra argues that the tables in PG&E's proposal for a "Confidence Interval" do not align with statistics and views the "Estimated Quality" as potentially pejorative.

Both SCE and Sempra argue that it is premature to adopt PG&E's proposal. Sempra comments that adoption without feedback on their recently filed 2021 RAMP Report would be a "disservice to the tremendous effort" Sempra has made to follow the existing Settlement Agreement Decision requirements and the incorporation of PG&E's proposal into their GRC next year would be difficult: "SoCalGas and SDG&E have not calculated an exact estimate of the potential costs associated with adopting PG&E's proposal, and we have not fully evaluated the entire set of possible pros and cons of doing so."[83]

Staff agrees incorporating PG&E's proposal in the 2022 Sempra GRC filing would be difficult. Consequently, Staff recommends that PG&E's proposed Transparency Guidelines should be tested in SCE's RAMP application in 2022, so this proposal would not impact Sempra's upcoming applications.

SCE argues that there is not sufficient time in the Phase I schedule of this proceeding to adequately develop PG&E's proposal, in alignment with due process and the legal requirements for adoption of Commission decisions, including all material being on the record and the opportunity for evidentiary hearings.[84]

Staff disagrees with SCE's objections on this issue. As discussed above, a standardized form of work papers could significantly improve Staff's and parties' evaluation of RAMP reports.

Staff also disagrees with SCE's procedural concerns. The workpaper template proposal merely provides guidance on the form for submission of information and does not alter substantive requirements of the Settlement Agreement. Similarly, the Estimate Quality Criteria proposal provides a consistent form to categorize the quality of estimates. Staff does, however, acknowledge that additional work is needed to help understand practical implementation issues and to discover any needed refinements to achieve a consistent means to provide the data transparency required by the Settlement Agreement.

MGRA, Cal Advocates, PCF, UCAN and TURN are all in support of PG&E's proposal and provide additional related recommendations. MGRA supports PG&E's proposal and

[82] SoCalGas and SDG&E May 7, 2021 Informal Comments on PG&E's Track 1 Proposal at 2. Southern California Edison Company's (U 338-E) Informal Comments on PG&E's Track 1 Proposal Transparency and Uncertainty in Risk-Based Filings, submitted May 07, 2021 at 2

[83] SoCalGas and SDG&E May 7, 2021 Informal Comments on PG&E's Track 1 Proposal at 2. Southern California Edison Company's (U 338-E) Informal Comments on PG&E's Track 1 Proposal Transparency and Uncertainty in Risk-Based Filings, submitted May 07, 2021 at 2

[84] Southern California Edison Company's (U 338-E) Informal Comments on PG&E's Track 1 Proposal Transparency and Uncertainty in Risk-Based Filings, submitted May 07, 2021 at 2

recommends that it will require a "prototyping" phase to allow for further evaluation and development before it can be fully adopted.[85] MGRA suggests that the proposed Transparency Guidelines could be tested in SCE's 2022 RAMP submission, rather than waiting two additional years, to allow additional feedback and analysis prior to the 2024-2026 IOU RAMP/GRC cycles.[86]

MGRA comments include additional technical recommendations on the treatment of sensitivity calculation as proposed by PG&E.[87] MGRA supports PG&E's adoption of TWG feedback including changing the term "Data Confidence Level" to "Estimate Quality (EQ)," adding a statistical distribution corresponding to the quantitative uncertainty, changing the sensitivity calculation to incorporate IOU-defined testing ranges, and PG&E's agreement with MGRA's suggestion that some uncertainties regarding cross-cutting risk factors can be captured in the parameters used to define tranches.[88]

MGRA points out that PG&E's proposal to present sensitivity information on a parameter as the average between the upper and lower bounds of the parameter can obscure the true sensitivity of risk values associated with that parameter. MGRA proposes that sensitivity information be conveyed by presenting the risk values at some upper and lower bounds of the parameter in question, such as the 10^{th} and 90^{th} percentiles of the parameter in question. Staff agrees with MGRA's suggestion.

Cal Advocates also recommends additional specific elements be included in PG&E's proposal with respect to risk results and risk sensitivity analysis and that prototyping the Transparency Guidelines should be a collaborative process between PG&E, the Commission, and parties.[89]

While Staff generally finds merit in many of the additions suggested by Cal Advocates to the PG&E proposal. However, Staff recommends that in the interest of moving expeditiously forward with a test drive of a standardized reporting format to promote transparency, that Cal Advocates' suggested additions be postponed to future updates of the Transparency Guidelines, after PG&E's proposed guidelines be successfully tested in the upcoming SCE's 2022 RAMP application.

At the March 10 TWG meeting, TURN pointed out the Settlement Agreement addresses transparency.[90] Whereas the Settlement Agreement lay out transparency guidelines in somewhat

[85] MGRA's Informal Comments on PG&E's Transparency Guidelines Proposal, submitted May 07, 2021.

[86] MGRA's Informal Comments on PG&E's Transparency Guidelines Proposal, submitted May 07, 2021.

[87] MGRA's Informal Comments on PG&E's Transparency Guidelines Proposal at 2-4.

[88] MGRA's Informal Comments on PG&E's Transparency Guidelines Proposal, submitted May 07, 2021.

[89] Cal Advocates' May 7, 2021 Informal Comments on PG&E's final proposal on transparency guidelines.

[90] D.18-12-014, Attachment A, Rows 29, 30 and 31.

general terms, the streamlined reporting formats proposed separately by TURN and PG&E represent concrete ways to implement those general guidelines.[91]

In urging the Commission to adopt a streamlined risk reporting format, TURN cited "difficulty (a) identifying inputs used to calculate the risk scores calculated by PG&E for various risks and mitigations and (b) identifying PG&E's proposed slate of mitigations" within PG&E's 2020 RAMP Application as an example justifying the proposed changes.[92] Presumably, a standardized risk reporting format containing sufficient information would prevent the types of difficulties that TURN experienced during its analysis of the PG&E 2020 RAMP.

In informal comments submitted on May 7, 2021, TURN generally did not oppose PG&E's proposal but cautioned that more consideration would be needed before adoption. TURN expressed concerns over PG&E's proposed approach to convey uncertainty information using qualitative indications of "High," "Medium," or "Low" as well as concerns over how sensitivity analysis of inputs is calculated.[93] TURN states that the "Estimate Quality categories identified as High, Medium and Low are not necessarily indicative of the accuracy or reliability of the data sources being categorized" and "the relationship among the three levels of Estimate Quality and what one might mean by accuracy is unclear."[94]

TURN recommends that the Commission adopt a streamlined format "for reporting [risk score] inputs to promote transparency and enable easier reproduction of the various calculations used to determine risk-spend efficiency."[95] Specifically, TURN requests that utilities explicitly identify the discount rate used and the time horizon for each mitigation to indicate how the level of an attribute changes over time in the presence of a mitigation.

TURN, in contrast to PG&E's approach, recommends that utilities quantify uncertainties with probability distributions.[96] For example, "[i]f attribute levels are uncertain, then report the probability distribution of the attribute level for each attribute in each period before and after mitigation in each cell of the matrix."[97] TURN also recommends that, "[i]f the parameters of the probability distribution are uncertain, then report the probability distribution for the uncertain parameter for each year."[98]

TURN's and PG&E's proposed streamlined risk reporting formats differ in several key respects, as presented in the following discussion.

---

[91] Settlement Agreement rows 29-31 describe transparency in RAMP and GRC results, sensitivity analysis, and data support and data sources.

[92] TURN's May 7, 2021 informal comments on PG&E's final proposal on transparency guidelines.

[93] TURN's May 7, 2021 informal comments on PG&E's final proposal on transparency guidelines.

[94] TURN's May 7, 2021 informal comments on PG&E's final proposal on transparency guidelines.

[95] TURN's May 7, 2021 informal comments on PG&E's final proposal on transparency guidelines.

[96] TURN's Transparency of Estimates and Assumption Presentation at slide 12.

[97] TURN's Transparency of Estimates and Assumption Presentation at slide 13.

[98] TURN's Transparency of Estimates and Assumption Presentation at slide 12.

Presentation of Risk-related Data

TURN proposes two identical templates in tabular format for reporting costs, consequences, and likelihoods:

- The Estimates Template is used to list the estimated values of the above variables; and
- The Uncertainties Template is used to describe the uncertainties embedded in each cell of the variables in the Estimates Template.

FIGURE 1: TURN'S PROPOSED ESTIMATES TEMPLATE TABLE PRESENTING RISK DATA

	YEAR	1	2	3	...	T
COST						
CoRE Before (n_A rows)						
CoRE After (n_A rows)						
LoRE Before						
LoRE After						

PG&E, on the other hand, proposes using three tables to present risk information:

- Risk Results Table
- Risk Sensitivity Analysis Table
- Risk Model Listing Table

PG&E's Risk Results Table contains all the information in TURN's Estimates Template, plus additional information not captured by TURN's templates.

PG&E's proposed format contains a template to present the results of an initial sensitivity analysis based on parameters that PG&E considers critical. TURN's suggested format does not require sensitivity analysis to be included with the initial RDF filing documents. Parties could still request sensitivity analysis to be done after a RAMP application has been filed, pursuant to requirements included in the Settlement Agreement.[99]

[99] D.18.12-014, Appendix A.

FIGURE 2: PG&E'S PROPOSED TABLE PRESENTING RISK DATA

Column	Description
Risk	Name of Risk
Tranche	Name of Tranche
Year	Year for which the Value pertains to
Mitigation	One of: • Name of Mitigation • "Baseline": The Values represent baseline estimates • "All": Values are for Post Mitigation estimates assuming all the proposed mitigations are in place.
Attribute	One of: • Name of MAVF Attribute: e.g., for PG&E, "Safety", "Electric Reliability" • "Overall": Values represent the overall MARS score, or are not related to Attributes (e.g., likelihood estimates are not related to Attributes)
Value	Numerical value
Result Type	See table below for valid Result Types
Estimate Quality	"High", "Medium", "Low". The qualitative degree of certainty/confidence associated with the output. See discussion in the Estimate Quality section below.
Confidence Interval	Quantitative confidence interval of estimate/calculation. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise "N/A".

Presentation of Uncertainty Information

PG&E presents uncertainty information in the Risk Results Table using either qualitative descriptions of confidence on data quality (High, Medium, Low) or confidence intervals if data values permit determination of numerical confidence levels.

On the other hand, TURN's approach for presenting uncertainties requires the following:

- If the estimates are certain, the estimate is reported in the template.
- If the estimates are uncertain, the utilities must provide:
  - Either a continuous probability distribution function to describe the variability of the estimate, or
  - A discrete probability distribution using percentiles. TURN suggests reporting the estimates at the 10, 50, and 90 percentiles for each year.

7.3 Staff Recommendations

Broadly speaking, PG&E’s proposal is more comprehensive than TURN’s suggested format because PG&E’s format contains more categories of information while not omitting any information contained in TURN’s format. However, TURN raised valid concerns over PG&E’s proposal. Staff agrees with TURN’s suggestion for additional consideration and development of PG&E’s proposal, including an opportunity to test drive the proposal before adoption.

MGRA also broadly supported PG&E’s proposal. MGRA suggests that the proposed Transparency Guidelines could be tested in SCE’s RAMP application in 2022, rather than waiting two additional years, to allow additional feedback and analysis prior to the 2024-2026 IOU RAMP/GRC cycles. Staff agrees with MGRA’s suggestion to use SCE’s 2022 RAMP as the venue for the initial testing of PG&E’s proposal.

Regarding PG&E’s Risk Sensitivity Analysis Table, Staff agrees with MGRA’s suggestion to include reporting of risk values at the upper and lower bounds of a parameter, with the lower bound set at the 10^{th} percentile and the upper bound at the 90^{th} percentile of the parameter. Staff proposes that the reporting format contained in PG&E’s final proposal be updated to include these suggestions, and the Transparency Guidelines be tested during SCE’s 2022 RAMP application.

END APPENDIX A

APPENDIX B

STAFF PROPOSAL ON SAFETY AND OPERATIONAL METRICS

& Recommendations on Phase I Track 2 Issues Outlined in the November 2, 2020 Assigned Commissioner's Scoping Memo and Ruling Issued in the Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (R. 20-07-013)

Safety Policy Division

Risk Assessment and Safety Analytics Section

Steve Haine, P.E.

Fred Hanes, P.E.

Marty Kurtovich, P.E.

Arnold Son

David Van Dyken

Shayla Funk

RASA_Email@cpuc.ca.gov

.

Executive Summary

The November 2, 2020 Assigned Commissioner's Scoping Memo and Ruling (Scoping Memo) outlined issues to be considered in the Order Instituting Rulemaking to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (RDF Proceeding).[1] The Scoping Memo stated that "Phase I and Phase II of this proceeding will draw on the experiences and lessons learned so far regarding requirements adopted in [Application] A.15-05-002 *et al* and [Rulemaking] R.13-11-006. Issues considered may include assessing impacts on environmental and social justice communities, including the extent to which actions in this proceeding impact achievement of any of the nine goals of the Commission's Environmental and Social Justice Action Plan."[2]

Specifically, Phase I Track 2 of this proceeding considers safety, operational, and performance metrics and their broad application, including refining the safety performance metrics (SPMs) adopted in Decision (D.)19-04-020, and developing new metrics as needed, including the development of Safety and Operational Metrics (SOMs) for Pacific Gas and Electric Company's (PG&E) Enhanced Oversight and Enforcement (EOE) process, approved in D.20-05-053.[3]

The November 17, 2020 Assigned Commissioner's Ruling (ACR) directed Pacific Gas and Electric Company (PG&E) to propose SOMs suitable for use as Triggering Events as specified in the EOE process.[4] In response to the ACR, PG&E proposed 12 SOMs.[5] PG&E excluded electric overhead conductor metrics from its proposed SOMs, as directed in the ACR because these metrics were under development by the Safety Model Assessment Proceeding (S-MAP) Technical working group, pursuant to D.19-04-020.[6] In subsequent comments and reply comments, parties critiqued PG&E's proposals and suggested additional SOMs.[7]

[1] *Assigned Commissioner's Scoping Memo and Ruling* of the Order Instituting Rulemaking (Scoping Memo) to Further Develop a Risk-Based Decision-Making Framework for Electric and Gas Utilities (Rulemaking (R.) 20-07-013), November 2, 2020.

[2] Scoping Memo at 3.

[3] Scoping Memo at 3.

[4] *Assigned Commissioner's Ruling Regarding the Development of Safety and Operational Metrics*, November 17, 2020, at 1. Available here: November 17, 2020 ACR (R.20-07-013)

[5] January 15, 2021 Response of Pacific Gas and Electric Company to Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics. Available here: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M359/K864/359864708.PDF

[6] ACR at 4.

[7] Available here: R.20-07-013

The Safety Policy Division (SPD) staff (Staff) lunched a public workshop on January 28, 2021 where PG&E presented its proposed SOMs, followed by Technical Working Group (TWG) meetings to address Phase I Track 2 issues.

On April 22, 2021, following review of PG&E's proposed SOMs and party comments, Staff circulated a Draft Staff Proposal and requested informal comments from the TWG. The Draft Staff Proposal proposed a set of SOMs addressing PG&E's safety, reliability, and clean energy goals. The Draft Staff Proposal also included recommendations on modifying the adopted SPMs in D.19-04-020. Staff proposed SOMs are intended for use exclusively for PG&E's EOE Process, whereas Staff recommended modifications and additions to the adopted SPMs in D.19-04-020, apply to all IOUs. This document reflects SPD Staff's recommendations following consideration of discussion in the TWG and parties' informal comments on the Draft Staff Proposal.

Appendix C provides a summary of Staff's proposed SOMs and Appendix D provides a summary of Staff recommended modification/additions to adopted SPMs, developed pursuant to D.19-04-020.

Summary of Staff's Proposal on SOMs as EOE Triggering Events

D.20-05-053 approving PG&E's bankruptcy plan of reorganization established the EOE process allowing the California Public Utilities Commission (Commission) to take additional steps to ensure PG&E is improving its safety and operational performance as part of the decision approving the reorganization following the utility's bankruptcy if specified Triggering Events occur.[8]

That decision described SOMs as "attainable Safety and Operational Metrics that, if achieved, would ensure that PG&E provides safe, reliable, and affordable service consistent with California's clean energy goals."[9] In addition, D.20-05-053 indicates that the "Commission will consider metrics to measure PG&E's quality of service and quality of management in the proceeding addressing Safety and Operational Metrics..."[10]

Following guidance outlined in the ACR, Staff developed its proposed SOMs to meet two primary objectives: (1) SOMs must be suitable for use as Triggering Events as specified in the EOE process approved in D. 20-05-053; and (2) SOMs should be suitable, over time, for the Commission, intervenors, and the public to gauge the safety and operational performance of all gas and electric IOUs.[11]

In selecting SOMs, Staff sought to identify metrics that are objective, outcome-based, defined clearly, auditable/verifiable, enforceable, measurable over time, and preferably,

[8] D.20-05-053, at Appendix A.

[9] D.20-05-053, at 38.

[10] D.20-05-053, at 96.

[11] ACR at 1-4.

leading indicators. Staff proposed SOMs cover a variety of topic areas including worker safety, electric reliability, ignitions, electric and natural gas systems' safety, quality of service, and clean energy goals. Staff also considered, but ultimately opted not to select metrics specific to PG&E's quality of management and affordability.[12]

Staff has selected SOMs that will serve as supplemental, cross-cutting tools in support of the Commission's existing oversight and enforcement activities. All SOMs are intended to serve the purpose of prompting PG&E to improve its safety and operational performance.

Staff recommends that PG&E report SOMs, including historical data, on an annual basis. As many of Staff's proposed SOMs are also reported to the Commission more frequently, such as on a quarterly basis, in compliance with other regulatory requirements, PG&E should provide a copy of those reports to SPD at the same time they are filed with the Commission.

Staff also recommends that PG&E, as part of their annual SOMs submittals, propose one-year and five-year targets for each of the metrics. PG&E should also include a narrative discussing its current and planned activities to achieve these targets.

Organization of the Document

Part I of this document responds to the issues raised in Phase I Track 2 of the Scoping Memo for R.20-07-013. It is primarily dedicated to the development and selection of SOMs suitable for use as Triggering Events as specified in the EOE process approved in D.20-05-053 on PG&E's post-bankruptcy reorganization plan, but also covers other questions.

Part II of the document includes proposed modifications and additions to the adopted SPMs in D.19-04-020.

Table 1 provides a summary of Staff proposed SOMs. Table 2 provides a summary of Staff recommended modification/additions to adopted SPMs in D.19-04-020.

[12] See sections 2.16 and 2.17

Table 1: Staff proposed SOMs.

Number Index	Staff Proposed SOMs	SPMs
1	SIF related SOMs	
1.1	Rate of SIF Actual (Employee)	√ *SPM 17*
1.2	Rate of SIF Actual (Contractor)	√ *SPM 18*
1.3	Rate of SIF Potential (Employee)	N/A
1.4	Rate of SIF Potential (Contractor)	N/A
2	Reliability Related SOMs	
2.1	System Average Sustained Interruption Duration (SAIDI) (Unplanned)	N/A
2.2	System Average Sustained Interruption Duration (SAIDI) (All Outages)	N/A
2.3	System Average Sustained Interruption Frequency (SAIFI) (Unplanned)	N/A
2.4	System Average Sustained Interruption Frequency (SAIFI) (All Outages)	N/A
2.5	Customer Average Sustained Interruption Duration Index (CAIDI) (Unplanned)	N/A
2.6	Customer Average Sustained Interruption Duration Index (CAIDI) (All Outages)	N/A
2.7	System Average Customers Impacted (All Outages)	N/A
PSPS Related SOMs		
2.8	Number of PSPS events in a calendar year	N/A
2.9	Duration of each PSPS Event in hours in a calendar year	N/A
2.10	Number of Customers Impacted by each PSPS Event in a calendar year	N/A
System Average Outages due to Vegetation and Equipment Damage in HFTD Areas		
2.11	System Average Outages due to Vegetation and Equipment Damage in HFTD Areas (Major Event Days)	N/A

Number Index	Staff Proposed SOMs	SPMs
2.12	System Average Outages due to Vegetation and Equipment Damage in HFTD Areas (Non-Major Event Days)	N/A
3	Electricity Related SOMs	
Wires Down Related SOMs		
3.1	Wires Down Major Event Days in HFTD Areas	√ *SPM #2*
3.2	Wires Down Non-Major Event Days in HFTD Areas	√ *SPM #1*
3.3	Wires Down Red Flag Warning Days in HFTD Areas	N/A
Patrols, Inspections & Compliance Related SOMs		
3.4	Overhead Distribution Patrols in HFTD Areas	√ *SPM #33*
3.5	Overhead Distribution Detailed Inspections in HFTD Areas	√ *SPM #33*
3.6	Overhead Transmission Patrols in HFTD Areas	√ *SPM #33*
3.7	Overhead Transmission Detailed Inspections in HFTD Areas	√ *SPM #33*
3.8	Distribution Vegetation Line Clearance Inspections in HFTD Areas	√ SPM #34
3.9	Transmission Vegetation Line Clearance Inspections in HFTD Areas	√ SPM #34
3.10	Backlog Compliance Metrics in HFTD	√ SPM #42
3.11	Electric Emergency Response Time (Proposed by PG&E)	√ *SPM #3*
Ignitions & Wildfires Related SOMs		
3.12	Number of CPUC-Reportable Ignitions in HFTD Areas (Distribution)	√ *SPM #4*
3.13	Percentage of CPUC-Reportable Ignitions in HFTD (Distribution)	N/A
3.14	Number of CPUC-Reportable Ignitions in HFTD (Transmission)	N/A

Number Index	Staff Proposed SOMs	SPMs
3.15	Percentage of CPUC-Reportable Ignitions in HFTD (Transmission)	√ *SPM #4*
4	**Natural Gas Related SOMs**	
4.1	Number of Gas Dig-Ins per 1000 USA tickets on Transmission and Distribution pipelines	√ *SPM #5*
4.2	Number of Overpressure (OP) Events	√ *SPM #44*
4.3	Normalized Overpressure Events	N/A
4.4	Time to Respond On-site to Emergency Notification	√ *SPM #11*
4.5	Gas Shut-In Time, Mains	√ *SPM #8*
4.6	Gas Shut-In Time, Services	√ *SPM #9*
4.7	Uncontrolled Release of Gas on Transmission Pipelines	N/A
4.8	Time to Resolve Hazardous Conditions	N/A
5	**Clean Energy Goals**	
5.1	Clean Energy Goals Compliance Metrics	N/A

Table 2: Staff Recommended Modification/Additions to Adopted SPMs in D.19-04-020.

Number Index	Staff Proposed SPMs	IOUs Required to Report
Recommended Modifications to Selected Metrics of the 26 Adopted SPMs in D.19-04-020		
1.	Wires Down Non-Major Event Days	PG&E, SCE, SDG&E, SoCalGas
2.	Wires Down Major Event Days	PG&E, SCE, SDG&E, SoCalGas
5.	Gas Dig-in	PG&E, SDG&E, SoCalGas
6.	Gas In-Line Inspection	PG&E, SDG&E, SoCalGas
7.	Gas In-Line Inspection Upgrade	PG&E, SDG&E, SoCalGas
8.	Gas Shut-In Time – Mains	PG&E, SDG&E, SoCalGas
9.	Gas Shut-In Time – Services	PG&E, SDG&E, SoCalGas
10.	Cross-Bore Intrusions	PG&E, SDG&E, SoCalGas
11.	Gas Emergency Response	PG&E, SDG&E, SoCalGas
12.	Natural Gas Storage	PG&E, SDG&E, SoCalGas
13.	Gas System Internal Inspection Status	PG&E, SDG&E, SoCalGas
14.	Employee Serious Injuries and Fatalities	PG&E, SCE, SDG&E, SoCalGas
17.	Employee OSHA Recordables Rate	PG&E, SCE, SDG&E, SoCalGas
18.	Contractor OSHA Recordables Rate	PG&E, SCE, SDG&E, SoCalGas

Number Index	Staff Proposed SPMs	IOUs Required to Report
Recommended Additions to the 26 Adopted SPMs in D.19-04-020		
27.	Median Time to Correct Inspection Findings (Tiers or Grades)	PG&E, SCE, SDG&E, SoCalGas
28.	Median Time to Correct Inspection Findings	PG&E, SCE, SDG&E, SoCalGas
29.	CPUC-Reportable Overhead Conductor Failure Incidents Excluding Media Attention	PG&E, SCE, SDG&E, SoCalGas
30.	Wires Down Remaining Energized	PG&E, SCE, SDG&E
31.	Wires Down Root Cause Analysis	PG&E, SCE, SDG&E
32.	Wires Down by Cause	PG&E, SCE, SDG&E
33.	Missed Inspections and Patrols for Electric Circuits	PG&E, SCE, SDG&E
34.	Missed Vegetation Management Inspections	PG&E, SCE, SDG&E
35.	Overhead Conductor Wire Size Compliance in HFTD Areas	PG&E, SCE, SDG&E
36.	Overhead Conductor Wire Size Compliance in non-HFTD Areas	PG&E, SCE, SDG&E
37.	Infrared Inspections on Electric Distribution Circuits in HFTD Areas	PG&E, SCE, SDG&E
38.	System Hardening in HFTD Areas	PG&E, SCE, SDG&E
39.	System Undergrounding in HFTD Areas	PG&E, SCE, SDG&E
40.	Enhanced Vegetation Management (EVM) Work Completed	PG&E, SCE, SDG&E
41.	Work Order Backlog	PG&E, SCE, SDG&E, SoCalGas
42.	Electric Work Order Backlog in HFTD Areas	PG&E, SCE, SDG&E
43.	GO-95 Corrective Actions in HFTD Areas	PG&E, SCE, SDG&E
44.	Gas Overpressure Events	PG&E, SCE, SDG&E
45.	Gas In-Line Inspection Interval	PG&E, SCE, SDG&E

.

Part I

1 Staff Proposal on Safety and Operational Performance Metrics

1.1 Introduction

Phase I Track 2 of this proceeding considers safety, operational, and performance metrics and their broad application, including refining the safety performance metrics adopted in D.19-04-020, and developing new metrics as needed. This includes the development of SOMs for PG&E's EOE process, approved in D. 20-05-053.[13]

The November 2, 2020 Scoping Memo outlined the following Phase I Track 2 issues:[14]

- Issue (a): What safety and operational performance metrics should be developed pursuant to D.20-05-053 addressing PG&E's reorganization plan? What are appropriate criteria for selecting metrics as safety and operational performance metrics? What is the relationship and/or difference between safety metrics and operational metrics?
- Issue (b.) Should the safety and operational performance metrics apply to all Investor-Owned Utilities (IOUs)? Are there variances regarding how these adopted metrics should be applied to individual IOUs? How should the Commission use adopted safety and operational performance metrics?
- Issue (c.): Should the Commission adopt performance criteria or targets for safety and operational performance metrics at the same time it adopts the metrics, or at a later time?
- Issue (d.): Should the Commission refine any of the 26 safety performance metrics adopted in D.19-04-020? Should the Commission adopt additional safety performance metrics to those adopted in D.19-04-020?
- Issue (e.) Should the Commission develop a method to streamline safety performance metrics development and reporting across proceedings? If so, what methods should be considered?
- Issue (f.): D.20-05-053 states that the Commission will consider metrics to measure PG&E's quality of service and quality of management in the proceeding addressing safety and operational metrics.[15] Should the Commission adopt quality of service and management metrics for PG&E in this proceeding? If so, what are appropriate

---

[13] Scoping Memo, at 3.

[14] Scoping Memo, at 5.

[15] Decision Approving Reorganization Plan (D.20-05-053), at 105.

> metrics? Are there other aspects of D.20-05-053 concerning metrics that should be clarified or implemented here, such as identifying a metric to assess levels of safety or risk-driven investments?[16]

The November 17, 2020 ACR directed PG&E to develop SOMs suitable for use as Triggering Events as specified in the EOE process. PG&E proposed 12 SOMs, and electric overhead conductor metrics from its proposed SOMs, as directed in the ACR because these metrics were under development by the S-MAP Technical Working Group, pursuant to D.19-04-020.[17] In subsequent comments and reply comments in this proceeding, parties critiqued PG&E's proposals and offered additional SOMs.

The first R. 20-07-013 Phase I Track 2 Workshop was held on January 28, 2020. It began with PG&E's SOMs presentation, which PG&E submitted to the docket in response to the November 17, 2020 ACR. The rest of the workshop was dedicated to other IOUs' and Intervenors' perspectives on PG&E's proposed SOMs.

After the workshop, Staff held a Phase I Track 2 R.20-07-013 TWG Kick-Off Meeting on April 1, 2021 to discuss the workplan and schedule to address Phase I Track 2 SOMs issues.

Following review of PG&E's proposed SOMs and ensuing party comments, Staff circulated a draft of a proposal on April 22, 2021 (Draft Staff Proposal) addressing Phase I Track 2 issues outlined in the Scoping Memo to the TWG.

On May 4, 2021 Phase I Track 2 TWG Meeting #2 was held to discuss the Draft Staff Proposal on the Phase I Track 2 safety and operational performance metrics issues outlined in the November 02, 2020 Scoping Memo. Staff requested informal comments from TWG members on the Draft Staff Proposal. TWG members submitted informal comments on the proposal on May 11, 2021.

This document reflects Staff's recommendations following consideration of discussion in the TWG and parties' informal comments on the Draft Staff Proposal.

Appendix C provides a summary of Staff's proposed SOMs and Appendix D provides a summary of Staff recommended modification/additions to adopted SPMs, developed pursuant to D.19-04-020.

[16] D.20-05-053, Appendix A, at 2.

[17] Pacific Gas and Electric Company's Response to Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics (PG&E's ACR Response), January 15, 2021.

1.2 Staff Recommendations on Phase I Track 2 Issues

1.2.1 Staff's Proposed Approach to SOMs as Triggering Events

The Scoping Memo asks what safety and operational performance metrics should be developed pursuant to D.20-05-053, which addresses PG&E's reorganization plan. The Scoping Memo also asks whether the Commission should consider adopting metrics in this proceeding to measure PG&E quality of service and quality of management or other aspects of D.20-05-053 concerning metrics, such as identifying a metric to assess levels of safety or risk-driven investments.[18]

D. 20-05-053 approving PG&E's bankruptcy plan of reorganization established an EOE process allowing the Commission to take additional steps to ensure PG&E is improving its safety and operational performance if Triggering Events occur.[19] The steps range from Step 1, which contains enhanced reporting and oversight requirements, to Step 6, involving the potential revocation of PG&E's ability to operate as a California electric utility.

As shown in figure 1, SOMs play a role in multiple steps within the EOE process. The Commission may invoke this process if PG&E self-reports or the Commission becomes aware of Triggering Events covered in the process.

D.20-05-053 describes the SOMs as "attainable Safety and Operational Metrics that, if achieved, would ensure that PG&E provides safe, reliable, and affordable service consistent with California's clean energy goals."[20] D.20-05-053 indicated the "Commission will consider metrics to measure PG&E's quality of service and quality of management in the proceeding addressing Safety and Operational Metrics..."[21] Based on the broad terms used to describe them, SOMs can overlap with other Triggering Events identified in the EOE process.

[18] Scoping Memo issues (a) and (f), at 5-6.

[19] D.20-05-053, at Appendix A.

[20] D.20-05-053, at 38.

[21] D.20-05-053, at 96.

Figure 1: Steps in EOE Process that Implicate SOMs.[1]

Step 1: "PG&E fails to comply with, or has shown insufficient progress toward, any of the metrics...contained within the approved Safety and Operational Metrics…" the Commission may order PG&E into Step 1 of the EOE process."

Step 2: "PG&E fails to comply with electric reliability performance metrics, including standards to be developed for intentional de-energization events (i.e., PSPS) and any that may be contained within the approved Safety and Operational Metrics"

Step 3: "The Commission determines that additional enforcement is necessary because of PG&E's systemic non-compliance or poor performance with its Safety and Operational Metrics over an extended period."

Triggering Events in the EOE process include failure to comply or show sufficient progress with any metrics set forth in:

- Wildfire Mitigation Plans,
- Public Safety Power Shutoff (PSPS) protocols,
- Safety Culture Investigation, or
- any Safety and Operational Metrics.

An additional Triggering Event in Step 1 would occur if PG&E demonstrates insufficient progress toward approved safety or risk-driven investments related to the electric and gas business…"[22] Step 2 can be triggered if the destruction of a 1,000 or more dwellings is the result of PG&E failing to follow Commission Rules or good management practices or if PG&E fails to comply with electric reliability performance metrics.[23]

SOMs are an important element of the multi-faceted EOE process. This process allows the Commission to monitor PG&E's safety and operational performance and take additional enforcement steps, ranging from reporting and corrective action requirements to potential revocation of PG&E's ability to operate as a California electric utility.[24]

[22] D.20-05-053, Appendix A, at 2.

[23] D.20-05-053, Appendix A, at 3.

[24] D.20-05-053, Appendix A.

SOMs and the EOE process also overlap with the Commission's recently updated Enforcement Policy,[25] enforcement aspects of the Safety Performance Metrics,[26] compliance with Renewables Portfolio Standards, compliance with California's greenhouse gas (GHG) emissions reduction goals or the Cap-and-Trade program, Occupational Health and Safety rules, and other state laws and regulations.

In addition to the enforcement implications, SOMs are intended to be used by PG&E for purposes of determining executive compensation. D.20-05-053 and the Wildfire Safety Division guidance on executive compensation indicate that a "a significant component of [PG&E's] long-term incentive compensation" must be based "on safety performance, as measured by a relevant subset of the Safety and Operational Metrics." [27]

The EOE process does not supplant the Commission's existing regulatory or enforcement authority and does not limit the Commission's ability to pursue other enforcement actions against any regulated utility. The Commission is free to pursue all Commission's regulatory authority at its disposal including, but not limited to Resolution M-4846, which adopted the Commission Enforcement and Penalty Assessment Policy.[28] As stated in D.20-05-053, the EOE process does not replace or limit the Commission's regulatory authority, including the authority to issue Orders to Show Cause and Orders Instituting Investigations and to impose fines and penalties. A Commission Resolution would place PG&E in the appropriate step based upon the occurrence of a specified triggering event.[29]

---

[25] Resolution M-4852: Placing Pacific Gas and Electric Company into Step 1 of the "Enhanced Oversight and Enforcement Process," based on the finding that "PG&E has made insufficient progress toward Approved Safety or Risk-Driven Investments Related to Its Electric Business (Enhanced Oversight and Enforcement process Step 1, Triggering Event A(iii)).

[26] *Application of San Diego Gas & Electric Company (U902M) for Review of its Safety Model Assessment Proceeding Pursuant to Decision 14-12-025*, Phase Two Decision Adopting Risk Spending Accountability Report Requirements, D.19-04-020 at 33.

[27] D.20-05-053, at 88. Wildfire Safety Division guidance on executive compensation, December 22, 2020.

[28] Resolution M-4846, Enhanced Oversight and Enforcement process Step 1, Triggering Event A(iii).

[29] D.20-05-053, Appendix A.

1.2.2 Selection of PG&E's SOMs

The Scoping Memo asks what criteria should be used to select metrics as SOMs.[30]

Following guidance outlined in the November 2020 ACR, Staff developed its proposed SOMs to meet two primary objectives: (1) SOMs must be suitable for use as Triggering Events as specified in the EOE process approved in D. 20-05-053 on PG&E's post-bankruptcy reorganization plan; and (2) SOMs should be suitable, over time, for the Commission, intervenors, and the public to gauge the safety and operational performance of gas and electric IOUs.[31]

In selecting SOMs, Staff sought metrics that are objective, outcome-based, defined clearly, auditable/verifiable, enforceable, measurable over time, and preferably, leading indicators.

This Staff Proposal also discusses clean energy goals, quality of management, and other possible metrics. Staff has selected SOMs that will serve as supplemental, cross-cutting tools in support of the Commission's existing oversight and enforcement activities.

Staff's proposed SOMs apply exclusively to PG&E. The proposed SOMs encompass worker and contractor safety, electric safety risks, reliability, gas safety risks, and customer satisfaction.

1.2.3 Performance Criteria or Targets and Evaluation of PG&E's SOMs

The Scoping Memo asks how the Commission should use the adopted SOMs, and whether the Commission should adopt performance criteria or targets for SOMs at the same time it adopts the metrics, or at a later time.[32]

Staff does not recommend adopting triggers based on specified thresholds for the purpose of PG&E's EOE process at this time. More data collected over a longer period of time is needed for specific, enforceable targets to be developed. Selecting triggering thresholds that may not be statistically valid could force the Commission to move PG&E into an enforcement step when no discernible corrective action would remedy the situation or, alternatively, preclude the Commission from acting based on performance on a metric when enforcement and corrective action would provide a safety benefit.

After collecting additional data, Staff and parties can explore if adopting triggering thresholds based on clear trends is feasible and practical for the selected SOMs. At that time, the Commission could revisit establishment of automatic triggers based on a larger body of data and evidence. Staff intends to implement an "indicator light" approach to metrics' evaluation, measuring important safety and operational characteristics of PG&E's performance. Recognizing that SOMs will overlap other data streams within the

[30] Scoping Memo, issues (a) and (c), at 5.

[31] ACR at 1-4.

[32] Scoping Memo, issue (b), at 5.

Commission, Staff selected metrics that can serve as an indicator for the most concerning risk events.

For example, wildfire ignitions are clearly important to electrical safety. However, rather than incorporating all ignition data already collected by the Wildfire Safety Division, Staff selected ignition data in High Fire Threat Districts (HFTD) Areas as a SOM.

The EOE process refers to "insufficient progress" and "poor performance" leading to Triggering Events.[33] Staff recommends that the SOMs be used like other Triggering Event metrics in the EOE process - analyzing submitted SOMs for "insufficient progress" based on context, trends, and statistical relationships with other relevant data in those metrics.

Staff is proposing to use qualitative and quantitative evaluations of PG&E's performance as measured by the proposed SOMs. As part of its evaluation, Staff would analyze PG&E's performance with respect to SOMs based on current data and historical trends, to assess anomalies and abnormally large variance in performance trends associated with a single or multiple SOM(s). Staff would also evaluate the SOMs qualitatively using additional contextual information, such as exogenous factors including major events (major storms, heat waves, and earthquakes etc.) that may have led to anomalies and abnormal variations in the reported SOMs. Staff will use this evaluation approach to determine what would constitute "insufficient progress" and/or "poor performance." Based on the findings, Staff will then recommend the Commission invoke the applicable Step in the EOE process, if warranted.

Staff's proposed evaluation approach is consistent with the Commission's intent in evaluating PG&E's performance, as stated in the decision adopting the EOE process:

> "*While any adopted metrics would be intended to measure PG&E's future performance, the metrics themselves (and the process of their development) could take into consideration PG&E's past performance, such as for the development of performance baselines or other measurement criteria.*"[34]

[33] D.20-05-053, Appendix A.

[34] D.20-05-053, at 39.

Data Collection and Reporting Requirements

With regard to PG&E's SOMs, the Commission states that "[w]hile any adopted metrics would be intended to measure PG&E's future performance, the metrics themselves (and the process of their development) could take into consideration PG&E's past performance, such as for the development of performance baselines or other measurement criteria. This issue can be addressed more appropriately in the proceeding to develop the metrics."[35]

Staff recommends that PG&E report its SOMs annually. Many of the metrics encompassed in SOMs are also reported to the Commission more frequently, such as on a quarterly basis. To establish baselines, which would enable the assessment of PG&E's future performance relative to historical trends, Staff recommends that PG&E provide all available historical data with its first SOMs submission.

For each SOM, PG&E would include the following:

- All available historical data for the metric.
- A proposed target for the year following the reporting period for each metric as well as a five-year target for each metric. The proposed target may be specific values, ranges of values, rolling average, or other specified target value.
- A narrative description of the rationale for the selection of the targets established for each SOM and why a specific value, a range of values, rolling average or other type of target is selected.
- A narrative description of progress on each metric towards the proposed annual and five-year targets.
- A narrative description on any substantial deviation on the metrics from prior trends based on quantitative and qualitative analysis, as applicable.
- A brief description of current and future activities to meet the proposed targets.

[35] D.20-05-053, at 39.

1.2.4 Application of SOMs to Other IOUs

The Scoping Memo asks if the SOMs should apply to all IOUs[36]. Staff proposed SOMs are intended to apply exclusively for PG&E's EOE process. Staff does not propose any additional application or use of the SOMs for other IOUs.

The EOE process was conceived of in an ACR in Investigation (I.) 19-09-016 related to PG&E's bankruptcy.[37] As indicated earlier, the primary purpose of SOMs is for use as a Triggering Event in the EOE process as articulated in D.20-05-053, applicable only to PG&E; and in part for PG&E's determination of its long-term incentive compensation on safety performance.[38] The Wildfire Safety Division also restates this requirement as applicable to PG&E in their guidance on submittal of executive compensation plans for approval as part of the safety certificate process.[39]

Staff does not see grounds for expanding the application of the EOE process to other utilities at this time. Staff, does, however recommend collection of additional SPMs for all utilities for the purposes of oversight and enforcement in conjunction with other investigations, audits, and inspections outside of the EOE process as envisioned in D.19-04-020.[40] Part II of this Proposal includes a discussion on Staff's recommendations on SPMs.

---

36 November 2, 2020 Scoping Memo at 5.

37 Assigned Commissioner's Ruling and Proposals in Investigation 19-09-016, February 18, 2020, at 10.

38 D. 20-05-053, at 88.

39 Wildfire Safety Division guidance on executive compensation, December 22, 2020.

40 D.19-04-20, at 33.

1.3 Discussion

Conceptualization of SOMs

Some parties either expressed concern or disagreed with Staff's assertion that the absence of a definition of SOMs in D.20-05-053 as well as their broad description, "ensure that PG&E provides safe, reliable and affordable service consistent with California's clean energy goals,"[41] necessarily indicates that SOMs would overlap with other metrics collected by the Commission.

Mussey Grade Road Alliance (MGRA) indicates they are "concerned that there will be significant duplication of metrics between those collected by the Wildfire Safety Division and those required for the EOE process."[42] Staff does not dispute that there will be duplication of data collected by the Wildfire Safety Division. However, as noted above and described in the TWG meeting, Staff deliberately selected a subset of metrics already collected or substantially similar to those collected by the Wildfire Safety Division for several reasons.

The November 2020 ACR requesting that PG&E propose SOMs noted that PG&E "may draw upon existing utility key performance indicators or similar metrics."[43] If PG&E is already collecting and submitting data that informs safety performance to the Commission, Staff does not see a reason to collect new and unique data if the metric under consideration already provides key information regarding PG&E's safety and operational performance. Rather, Staff selected a subset of data that reflect the highest risk indicators with the idea that SPD would provide "belt and suspenders" on other enforcement and oversight activities. This will foster greater collaboration and communication between the new Office of Energy Infrastructure Safety (OEIS) and SPD in overseeing PG&E's activities.

MGRA continues that "[i]t should be noted that the Wildfire Safety Division will be exiting the Commission within the next months and will no longer be a 'Division.' Additionally, the data collected to support the Wildfire Mitigation Plans are not 'Proceedings.' The Draft should be revised to note that Commission staff should attempt to coordinate and align data collection with [Wildfire Safety Division]."[44] Staff is aware that Wildfire Safety Division is leaving the Commission to become OEIS. The Commission and OEIS are finalizing a Memorandum of Understanding (MOU) to facilitate information sharing. This will include an agreement to share electrical infrastructure and wildfire mitigation tabular and spatial data.

[41] D.20-05-053, at 38.

[42] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 1.

[43] PG&E's ACR Response.

[44] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 4.

PG&E also takes issue with Staff's interpretation of the description of SOMs as necessitating overlap with other metrics/enforcement coverage stating, "SPD states that the Commission's 'broad description' indicates that the 'SOMs unavoidably overlap with other Triggering Events.' PG&E disagrees. The SOMs represent one part of a larger framework of metrics in the EOE process, which also includes metrics in the Wildfire Mitigation Plan (WMP) including PSPS protocols and the Safety Culture Investigation. While SPD infers that there will be overlap, the Commission has not found that overlap amongst the triggers is necessary."[45]

The metrics cover both safety and operations. They are intended to measure PG&E's performance in providing energy services in a safe, reliable, affordable way consistent with California's clean energy goals. SOMs are intended to be expansive, covering much of PG&E's activities within the Commission's energy related mission and jurisdiction. In fact, PG&E's own proposed metrics overlap with data collected by other divisions within the Commission and implicate other triggers within the EOE Process. Staff does not see an entirely unique set of metrics that would fit the description and guidance associated with SOMs in D.20-05-053 and the ACR.

Targets and Triggers

Parties generally agree with Staff's approach of not setting automatic thresholds or triggers to move PG&E into the EOE Process.

MGRA "supports the general approach taken by Staff in the development of the Draft Proposal. Specifically, MGRA supports Staff's proposal not to require automatic triggers."[46] "[The Utility Reform Network (TURN)] generally supports the Draft Staff Proposal with the clarifications and changes…TURN supports adopting the SOMs in place without first identifying triggering thresholds for the [EOE process]. This allows the Commission, the utilities and stakeholders a process for moving forward while still gathering additional necessary information."[47] TURN goes on to say later in their comments that "Delaying the adoption of triggers allows the Staff to adopt the SOMs without delay and still requires the utility to provide the data that would be required to establish the triggers going forward."[48] The Public Advocates' Office (Cal Advocates) agrees with TURN that following "adoption of the SOMs, the Commission should convene the Technical Working Group to assess selection of SOMs thresholds and SOMs trends to guide the EOE process."[49]

PG&E states that it "agrees with SPD's proposed approach for target-setting for these SOMs, but requests the following clarifications: (1) the 'goals' should be considered

[45] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 6.

[46] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 1.

[47] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 1.

[48] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021at 4.

[49] Cal Advocates' Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at cell D7.

indicator-levels for SOMs and should consider overall trends and rolling averages; and (2) indicator-levels should be attainable within authorized funding."[50] Staff generally accepts PG&E's position.

This Staff proposal clarifies that the one- and five-year targets (initially referred to as goals), could be specific values, rolling averages, ranges, or other targets. Staff includes an additional reporting requirement for PG&E to provide a rationale for establishing the specific target for each SOM.

Staff agrees with PG&E that the SOMs should be "attainable" as is consistent with the description of SOMs in D.20-05-053.[51] However, PG&E requests that Staff specify "attainable with authorized funding."[52] Staff interprets the phrase "authorized funding," as approved ratepayer funded expenditures and risk mitigation activities funded as part of General Rate Case. While safety-related investments are almost entirely funded using approved expenditures, there are cases arising from civil, criminal, or administrative penalty settlements or by an order stipulating that specified activities be funded with shareholder dollars. If these types of activities are included within "authorized funding," Staff does not see a reason to object to PG&E's proposed caveat.

SOMs as a Flexible Enhanced Enforcement Tool

In their comments PG&E states, "[w]hile SPD acknowledges the 'overlap' between the SOMs, SPMs, and Resolution M-4846 in the Draft Proposal, PG&E requests that…SPD confirm that it will follow the Policy adopted in Resolution M-4846 in any enforcement action."[53]

Staff does not agree that Resolution M-4846 binds the EOE process. Pursuant to D.20-05-053, the EOE process "delineates an entirely new and additional oversight and enforcement process for the Commission, and does not supplant or preclude the Commission from its continuing enforcement role, including the issuance of Orders to Show Cause and opening of investigations through Orders Instituting Investigations."[54] Nothing in Staff's recommendation is intended to affect such jurisdiction or limit the Commission's authority to pursue other enforcement related to subject matter covered or facts implicated by the SOMs. As indicated in Resolution M-4846, the Commission's Enforcement Policy, "the Commission currently uses numerous enforcement tools such as Orders Instituting Investigation (OII), Orders to Show Cause (OSC), citations, subpoenas, stop-work orders,

---

[50] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 3 and 4.

[51] D.20-05-052, at 38.

[52] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 1.

[53] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 5.

[54] D.20-05-053, at 55.

revocations of authority, referrals to other agencies, or court actions. These tools remain unaltered by this resolution."[55]

As noted, Staff recommends substantiating a "triggering event" for SOMs in a manner similar to the process undertaken for Resolution M-4852. There, the Commission evaluated the facts and found that PG&E had demonstrated insufficient progress toward approved safety or risk-driven investments related to its electric business.[56] For the purposes of substantiating a triggering event with SOMs, Staff may identify one or more of the SOMs, examine associated facts and recommend that the Commission act to move PG&E into the appropriate EOE process step based on consideration of the facts, as appropriate. Staff may also propose other types of enforcement as appropriate.

PG&E also argues that SOMs should not be used for the purpose of information gathering because it is contrary to the intent of SOMs, and that "SOMs are not a resource to better understand and parse data; they must be used specifically as a potential triggering event to evaluate whether PG&E is providing a reasonable level of service."[57]

As noted above, in selecting each SOM staff's primary criteria was that the metric "must be suitable for use as Triggering Events as specified in the EOE process approved in D. 20-05-053 on PG&E's post-bankruptcy reorganization plan." However, additionally, according to November 2020 ACR, SOMs "should be suitable, over time, for the Commission, intervenors, and the public to potentially gauge the safety and operational performance of all gas and electric IOUs."[58]

Staff believe that each of the SOMs either individually, in combination, or in conjunction with other data used to evaluate the SOMs, are suitable for use as Triggering Events. As discussed above, Staff is recommending an "indicator light" approach and not adopting specific thresholds and/or targets to assess PG&E's performance. Moreover, the information provided by SOMs could be instrumental to eventually modifying or developing new SOMs and developing future performance targets.

---

[55] M-4852, at 2.

[56] Resolution WSD-003 (at 24-25) and WSD's June 11, 2020 Action Statement on PG&E Wildfire Mitigation Plan (at 3-5) required PG&E to demonstrate that it was using a system of risk prioritization in all of its wildfire mitigation work. This direction included a requirement that PG&E use risk assessment to determine where to target its Enhanced Vegetation Management (EVM) work. WSD found that less than five percent of the EVM work PG&E completed in 2020 was done to the 20 highest-risk power lines. This failure to appropriately prioritize and execute EVM on its highest-risk power lines was determined to be a Triggering Event under Step 1, Section A(iii), because PG&E demonstrated insufficient progress toward approved safety or risk-driven investments related to its electric business.

[57] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 6.

[58] Assigned Commissioner's Ruling Regarding the Development of Safety and Operational Metrics, November 17, 2020, at 1.

Factors Outside PG&E's Control

PG&E opposes inclusion of SOMs that include factors outside PG&E's control, citing the impact of variations in weather conditions from minimal to extreme.[59] For example, PG&E argues that Staff's proposed SOMs including PSPS, reliability, and Wires-Down metrics that include Major Event Days (MEDs) would be impacted by variations in weather conditions, such that "…a year with above average extreme weather events will likely drive an increase in adverse performance, even if PG&E improved its processes and performed reasonably," which would "…obfuscate the Commission's ability to evaluate whether PG&E is performing reasonably."[60]

Staff disagrees with PG&E's assertion that the inclusion of MEDs in Staff's proposed SOMs "seeks to measure utility failure in conditions beyond utility control and design standards."[61] A metric that measures failure of a utility's asset on MEDs gives visibility to the utility's vulnerability to events such as extreme weather conditions and could reveal underlying factors that might have contributed to the failure. These may include the condition of the utility's assets or the utility's management, maintenance, and operation of that asset.

Extreme weather patterns are one factor that can affect MEDs, but so can other factors, such as:

- Deficiencies in overhead electric system design, operation, and maintenance;
- Deficiencies in workforce planning and training;
- Deficiencies in planning, procurement, and delivery of reliable energy resources, including natural gas supplies to power plants; and
- Failure to adequately harden a utility electric system and plan upgrades for the effects of climate change, including increased frequency of extreme weather events.

A utility is expected to assess, and address risks associated with extreme weather events, climate change impacts, and other exogenous factors that affects the safety and reliability of its system and operations. In fact, a recurring theme in the Risk Assessment and Mitigation Phase (RAMP) and General Rate Case (GRC) proceedings is how a utility should identify and mitigate risks associated with low frequency, but high consequence events, such as safety and reliability risks posed by extreme weather events that could result in catastrophic wildfires.

As a general matter, Staff disagrees that the presence of exogenous factors in a metric makes the metric unsuitable as a SOM. As noted, metrics that include MEDs, which may

[59] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 9.

[60] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 9-10.

[61] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 15.

involve exogenous factors, can provide important information on PG&E's operations and performance, and capture the interactions and impacts that could result from these factors.

As discussed above, Staff is proposing to use qualitative and quantitative evaluations of the proposed SOMs, including underlying data. Staff would conduct rigorous quantitative analysis of PG&E's SOMs data based on current and historical trends, to determine if a "spike" and/or continuous deterioration in trends associated with a single and/or multiple SOM(s) would constitute "insufficient progress" or "poor performance." Based on the findings, Staff will then recommend the Commission invoke the applicable Step in the EOE process, if warranted. This approach provides staff an opportunity to consider to what extent changes in the SOMs are driven by exogenous factors.

Staff recognizes PG&E's concern regarding exogenous factors in SOMs. As indicated in their informal comments, while supporting Staff's inclusion of reliability and PSPS metrics in PG&E's SOMs, MGRA emphasizes the importance that metrics be properly normalized against the magnitude of external driver events.[62] Staff is open to considering approaches to normalize SOMs, to control the impacts of such external driver events and/or MEDs. This could include addressing year over year variation by normalizing against specific types of exogenous events related to environmental conditions, extreme weather conditions (major storms), or earthquakes etc. Normalization could also take the form of the IEEE statistical approach, known as the 2.5 Beta Method. The 2.5 Beta methodology was developed to normalize reliability indices and extract MEDs so they can be studied separately from electrical system performance that occurs during normal conditions. This approach seeks to limit the effect of weather in making year to year comparisons. Normalizing reliability and electric safety related metrics to identify and separate, external driver events or major events that are so far away from normal performance (outliers), would allow for analyzing and trending the data, and setting appropriate targets.

[62] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 7.

2 Safety

2.1 Worker Safety Related SOMs

In its Draft Staff Proposal, which was circulated to the TWG for informal comments, Staff initially proposed safety related SOMs, outlined in the following sub-sections.

Staff recommends the following Serious Injury or Fatality (SIF) related SOMs:

- Rate of SIF-Actual Employee
- Rate of SIF-Actual Contractor
- SIF-Potential Rate (Employee)
- SIF-Potential Rate (Contractor)

Refer to Appendix C for a summary of Staff Proposed SOMs, including modified SOMs based on suggestions made by parties in their informal comments on the Draft Staff Proposal.

2.1.1 SIF-Actual (Employee and Contractor)

PG&E proposed *SIF Actual (Employee and Contractor)*, defined as follows:

"Any injury or illness resulting from work at/for PG&E that results in: [63]

- *A fatality – a work-related fatal injury or illness;*
- *A life threating injury or illness – a work-related injury or illness that, if not addressed, could lead to a fatality, or a work-related injury or illness that required immediate life-preserving rescue action, and if not applied immediately, would likely have resulted in the death of that person; or*
- *A life-altering injury or illness – a work-related injury or illness that resulted in a permanent and significant loss of a major body part or organ function. life-threatening or life-altering injury or illness, or fatality, to an Employee or Contractor resulting from work at/for PG&E. Metric is drawn from the Safety Performance Metrics (SPMs). This metric is benchmarkable, outcome-based, and relies on objective data."*

San Diego Gas & Electric Company (SDG&E) and Southern California Gas Company (SoCalGas), (Sempra), criticize PG&E's January 15, 2021 proposed SIF Actual metric, indicating that it does not provide a specific process or criteria to evaluate incidents, which could lead to ambiguity and is inadequate for benchmarking.[64] SCE proposes the use of the

[63] PG&E's ACR Response, at 10-11.

[64] Sempra's Comments on Administrative Law Judge's Ruling that Requested Additional Comments on Pacific Gas & Electric Company's Proposed SOMs (Sempra's March 1, 2021 Additional Comments), March 1, 2021, at 2.

use of the Edison Electrical Institute (EEI) 14 criteria method for use in determining whether a workplace injury constituted a reportable SIF.[65] Staff notes the EEI method was developed in conjunction with nationally recognized experts and utilities throughout the United States and has been adopted by several utilities including ConEd, Duke, the Tennessee Valley Authority, Portland General Electric, Southern California Edison Company (SCE), SDG&E, SoCalGas, and several others.

PG&E indicates their definition of SIF Actual is intended to prioritize the most serious of injuries and focus and prioritize corrective actions towards the most serious "life-altering" or "life-threatening" events. To address PG&E's lack of conformity to other utilities' methods of accounting for SIF Actual, Staff's April 22, 2021 Draft Staff Proposal would have required that SIF Actual reporting be consistent with Cal Occupational Safety and Health Administration (OSHA) reporting requirements. In their May 11, 2021 informal comments, PG&E states that they support inclusion of a SIF Actual metric and indicated they could conform their reporting to the same EEI system used by other utilities rather than the Cal OSHA requirements.[66] This proposal would address the concerns raised by SoCal Gas and SCE and provide for a high-quality metric for SIF Actual.

Staff supports aligning the definitions of SIF Actual across all IOUs for the purpose of greater comparability and benchmarking among IOUs. This will also allow the Commission and interested stakeholders to better compare safety performance of IOUs with other industry sectors enabling a greater contextual understanding of the PG&E's SIF numbers.

For Contractor SIF Actuals, Cal Advocates recommends Contractor SIF include an additional requirement that PG&E impose a condition on their contractors to compel them to report SIF Actuals as a condition of doing utility related work for PG&E.[67] Staff concurs with this recommendation to ensure that contractors are appropriately incentivized to report SIFs according to EEI methodologies. In addition to adopting Staff's proposed definition of SIF Actual SOMs, Staff recommends the Commission require PG&E to impose this requirement on their contractors.

---

[65] SCE's Comments on Administrative Law Judge's Ruling that Requested Additional Comments on Pacific Gas & Electric Company's Proposed SOMs (SCE's March 1, 2021 Additional Comments), March 1, 2021, at 8.

[66] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 17.

[67] Cal Advocates' Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at cell D11.

2.1.2 SIF-Potential (Employee and Contractor)

PG&E's January 15, 2021 SOMs proposal includes SIF-Potential as a SOM. They define SIF-Potential as "[A]n incident that had the credible potential to cause a fatality, life-altering injury or illness or life-threatening injury or illness."[68] PG&E indicates that when this metric is coupled with the SOM for SIF Actual, the paired metrics meet the goals and criteria outlined by the bankruptcy reorganization decision and the ACR requesting SOMs.[69]

In response to a February 1, 2021 Administrative Law Judge's (ALJ's) Ruling, PG&E elaborates on their prior SIF-Potential definition as a "credible potential" for a serious injury as a circumstance that includes: (i) a high energy incident, (ii) where there is no direct control and (iii) a serious injury is not sustained.[70] PG&E's SIF-Potential determination process includes the following four questions:[71]

1. Was high energy present? The term 'high energy' refers to a condition where the physical energy exceeds 500 ft-lb.

2. Did a high-energy incident occur? A high energy incident is defined as an instance where the high energy source was released and where the worker came in contact with or proximity to the high energy source.

3. Was a serious injury sustained? [A serious injury incorporates PG&E's proposed SIF Actual definition including determination as to whether or not "injury was or could be "life threatening" or "life altering."]

4. Was a direct control present? A direct control is present if (i) the control is specifically targeted to the high energy source; (ii) the control effectively mitigates exposure to the high energy source when installed, verified, and used properly (i.e., a SIF should not occur if these are present); and (iii) the control is effective even if there is unintentional human error during the work (unrelated to the installation of the control).

Staff notes that this approach is generally consistent with current understanding that a reduction in all accidents, including those that result in less severe injuries, does not correspond to a reduction in SIFs and that it is necessary to focus on specific precursors of SIFs rather than merely accident avoidance.[72]

[68] PG&E's ACR Response, at 11.

[69] PG&E's ACR Response, at 11.

[70] Response of Pacific Gas and Electric Company to the Administrative Law Judge's Ruling Regarding SIF Potential, February 12, 2021, at 2.

[71] Response of Pacific Gas and Electric Company to the Administrative Law Judge's Ruling Regarding SIF Potential, February 12, 2021, at 3.

[72] Terry McSween & Daniel J. Moran Assessing and Preventing Serious Incidents with Behavioral Science: Enhancing Heinrich's Triangle for the 21st Century, 2017 Journal of Organizational Behavior Management, at 37:3-4, 283-300

In their March 1, 2021 informal comments, TURN states that "increases in SIF Potential events would demonstrate more near misses, which is concerning, but also indicate the avoidance of more serious events, which would be welcome."[73] TURN indicates that "the SIF- Potential metric neither provides helpful information on PG&E's safety conduct nor does it meet the requirements of Commission Guidance."[74] Staff points out that a reduction in SIF potential incidents would reflect a reduction in life-threatening incidents as a result of mitigating risks to workers and contractors. A substantial body of worker safety research over the last several years indicates that the relative infrequency of fatalities and other serious events can give an appearance of them being random and unpredictable. Studying SIF Potential events – the occurrence of an injury, accident, near miss, or exposure that is likely to result in serious injury or death if repeated, enables organizations to understand the systems or environments that are more likely to lead to SIFs.[75]

In their March 1, 2021 information comments, Sempra correctly point out that PG&E's process for identifying SIF Potential includes a "detailed, multi-step decision tree on how PG&E derives the determination of whether an incident had 'SIF-Potential.' In order for this metric to be comparable across IOUs, as is the Commission's stated objective with the Safety Performance Metrics, each IOU would need to adopt this exact same decision tree and apply each step in the exact same way. PG&E's proposed SIF-Potential metric is thus too subjective to use as a basis for comparison."[76]

In their March 1, 2021 informal comments, Sempra also argue that "near miss reporting… is seen as a positive move forward in enhancing a company's safety culture and should not be viewed by the Commission or others as a rate that should be managed. The internal follow-up, lessons learned, and corrective actions are the important factors, not the number of potential incidents that have been identified."[77] SCE, on the other hand, states "that the SPM [report] criteria could be modified to adopt the Edison Electric Institute (EEI) Safety Classification and Learning Model (SCL) Employee and Contractor SIF definitions for actual *and potential* SIF. This will allow a greater degree of benchmarking with utilities outside of California. It will also leverage the work of EEI's working group(s) of industry safety leaders and technical advisors and experts."[78] Staff agrees that capturing SIF potentials would be beneficial and could produce more effective strategies to reduce SIF Actuals.

---

[73] TURN Comments on Administrative Law Judge's Ruling that Requested Additional Comments on Pacific Gas & Electric Company's Proposed SOMs (TURN March 1, 2021 Additional Comments), at 6.

[74] TURN March 1, 2021 Additional Comments at 6.

[75] See for example, Martin, D. K., & Black, A. (2015, September). Preventing serious injuries & fatalities—Study reveals precursors & paradigms. Professional Safety Journal, at 35–42.

[76] Sempra's March 1, 2021 Additional Comments, March 1, 2021, at 3.

[77] Sempra's March 1, 2021 Additional Comments, March 1, 2021, at 3.

[78] SCE's March 1, 2021 Additional Comments, March 1, 2021, at 8.

Given that PG&E's total number of SIFs increased from 2019 to 2020, Staff is interested in ways the company can reduce this number and is receptive to this metric as a SOM.[79] PG&E's proposed SIF Potential metric was developed in consultation with Edison Electric Institute,[80] and is consistent with methodologies found to be effective by DEKRA based on seven multinational organizations and over 1,000 SIF incidents.[81] Both the Edison Electric Institute working group and the DEKRA study found that SIF exposure decisions trees, with appropriate training, can be highly accurate in identifying incidents that could have resulted in SIFs, but did not. As SCE noted, a Safety Classification and Learning (SCL) approach to SIF Potential allows them to "learn from potential incidents, not just those that result in serious injuries, and to communicate these learnings to the Commission."[82] Staff sees a benefit to this approach for both PG&E's employees and contractors as well as all other utilities' employees and contractors.

In the April 22, 2021 Draft Staff Proposal, Staff recommended the *Potential SIF Rate* be reported as a SOM for both employees and contractors for purposes of the EOE process. The metrics would be:

- *Potential SIF Rate (Employee)*
- *Potential SIF Rate (Contractor)*

SIF-Potential would be defined as:

> *Potential SIF incidents identified by using the Edison Electric Institute Safety Classification and Learning (SCL) Model, where a SIF incident in this case would be events that could have led to a reportable SIF.*[83]

Potential SIF Rate would be calculated using the formula:

> *(Number of SIF-Potential (incidents) x 200,000)/hours worked for (Employee or Contractor)*

Use of the Edison Electric Institute methodology has at least two benefits. First, it is based on actual case studies and the data-driven acknowledgement across multiple industry sectors that a reduction in all types of accidents has not resulted in a corresponding reduction in serious injuries and fatalities.[84] On the contrary while minor injuries and days away from

[79] Pacific Gas and Electric Company Safety Culture and Governance Quarterly Report No. 09-202 in Compliance with Decision 18-11-050, January 29, 2021.

[80] Safety Classification and Learning Model.

[81] Preventing Serious Injuries and Fatalities (SIFs): A New Study Reveals Precursors and Paradigms. White Paper.

[82], SCE's March 1, 2021 Additional Comments, at 8.

[83] Edison Electric Institute Safety Classification and Learning Model, Dr. Matthew Hallowell

[84] The efficacy of industrial safety science constructs for addressing serious injuries & fatalities (SIFs), Cooper, M.D, Saf. Sci. 2019, at 120, 164–178.

work have been reducing over time, serious injuries and fatalities have increased.[85] Second, it was developed and is being implemented by over 20 utilities throughout the country allowing for comparison of SIF-Potential with PG&E and other utilities in California and in other states.

Following issuance of the Draft Staff Proposal, and a TWG meeting held on May 4, 2021, in its informal comments, TURN proposes that "changes to the requirements should be made to ensure that the most valuable points of information on a SIF event are captured."[86] TURN also indicates they are "concerned that reporting a rate for this metric, could lead to underreporting even if there is no trigger associated with the metric. The utility should be encouraged to capture these events and learn from them, and creating an associated metric, and the related incentives for a declining rate, may discourage reporting."[87] Cal Advocates raises similar concerns stating, "SIF Potential reporting is a useful safety improvement tool. As a SOM, however, SIF Potentials incentivizes underreporting. Cal Advocates is unaware of any regulator using SIF potential as a negative safety performance indicator."[88]

In addition to the concern about under reporting, TURN's informal comments also indicate they are interested in more qualitative information stating, "the rate is not the important data point to take away from a SIF-Potential or a near miss. The important information from a SIF Potential incident is the lesson learned from the event, be it what worked and prevented a SIF Actual or what additional safety measures that would prevent future close calls…Staff should require the utility to provide information on the program area where the SIF Potential occurred, and the lesson learned from the event rather than a rate of SIF potential events."[89] Staff agrees with TURN's suggestion about including qualitative information and shares TURN and Cal Advocates' concern about the potential for under reporting. Staff believes the underreporting issue is mitigated by the lack of a specified target. Staff plans to evaluate the submitted SOMs for anomalies from trends in prior reporting years.

For SIF Potential, either a large increase or a large decrease could be a matter of concern that would need to be further investigated. For example, if there was a 25 percent drop in SIF Potential incidents without a corresponding drop in the amount of hazardous work being conducted this would be concerning and merit investigation into reporting

---

[85] The efficacy of industrial safety science constructs for addressing serious injuries & fatalities (SIFs), Cooper, M.D, Saf. Sci. 2019, at 120, 164–178.

[86] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 3.

[87] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021.

[88] Cal Advocates Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at Cell 14.

[89] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 3.

practices. Likewise, if there was a 25 percent increase in SIF Potential Incidents, Staff would investigate for patterns and causation.

Additionally, for reporting SIF Potential under PG&E's reporting policies, front line employees and contractors do not decide which events are considered SIF Potential or SIF Actuals. They report safety incidents and PG&E retains a third-party contractor to determine within a two-day period if an injury or near hit should be considered a SIF Actual or SIF Potential. As part of their efforts to improve safety and continue to implement the recommendations for their Safety Culture Investigation, PG&E asserts that it continues to foster an environment where "learn and improve" is valued over "blame and shame."[90] PG&E indicates they continue to train and communicate to workers the importance of reporting incidents by employees and contractors as a means of protecting their own safety as well as that of their colleagues. While all reporting systems and workplace cultures can be improved, PG&E, like other utilities, has noted that it continues to encourage robust and comprehensive incident reporting.[91]

The Commission will continue to monitor PG&E's reporting culture via annual and quinquennial safety culture assessments as required by Public Utilities Code sections 8389(d)(4) and 8386.2, respectively.

Staff agrees with TURN's comment described above that, in addition to submitting SIF Potential Rate, PG&E should be required to include a qualitative description of each reported SIF Potential event. Any Triggering Event would be largely based on trends in a metric or metrics, but additional qualitative information could inform interpretation of the data.

In supporting inclusion of the SIF Potential Metric, PG&E indicates that they have adopted the modified Edison Electric Institute SCL model. While their initial recommendation proposed adoption of their modified version, PG&E comments that it can easily adapt their method to the Edison Electric Institute SCL model used by other utilities.[92]

After consideration of the discussion on May 4, 2021 and the informal comments received on May 11, 2021, Staff retains the initial recommendation included in the Draft Staff Proposal, but recommends adding supplemental reporting requirements, requiring

[90] The recommendations included in the Assessment of Pacific Gas and Electric Corporation and Pacific Gas and Electric Company's Safety Culture: Final Report (provided to the Commission on May 8, 2017) were required to be implemented by Decision D.18011-050 part of I.15-08-019. The latest update from PG&E implementing the recommendations are found in Safety Culture and Governance Quarterly Report No. 10-2021 in Compliance with CPUC Decision 18-11-050, April 30, 2021.

[91] The recommendations included in the Assessment of Pacific Gas and Electric Corporation and Pacific Gas and Electric Company's Safety Culture: Final Report (provided to the Commission on May 8, 2017) were required to be implemented by Decision D.18011-050 part of I.15-08-019. The latest update from PG&E implementing the recommendations are found in Safety Culture and Governance Quarterly Report No. 10-2021 in Compliance with CPUC Decision 18-11-050, April 30, 2021.

[92] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 18.

PG&E to provide information on the program area where the SIF Potential occurred, and the lesson learned from the event, as suggested by TURN.[93]

Staff's final recommendations on SIFs related SOMs are provided in Appendix C, including the additional reporting requirements.

2.2 Staff Recommendations on Worker Safety and Operational Metrics

Based on parties' Informal Comments on the Draft Staff Proposal and discussions in the TWG, Staff propose the following Safety and Operational Metrics:

1. *Employee SIF Actual Rate = (Number of SIF-Actual cases among employees x 200,000)/employee hours worked*[94]
2. *Contractor SIF Actual Rate = (Number of SIF-Actual cases among contractors x 200,000)/employee hours worked.*
3. *Rate of SIF Potential (Employee) = (Employee SIF Potential Cases x 200,000)/total employee hours worked.*[95]
4. *Rate of SIF Potential (Contractor) = (Contractor SIF Potential Incidents x 200,000)/total contractor hours* worked.

Collecting data on the rates would allow for comparison across utilities despite differing number of employees and contractors.

Staff additionally recommends that the Commission require PG&E to establish reporting requirements for its contractors to report SIF Actuals to PG&E, as recommended by Cal Advocates in their informal comments on the Draft Staff Proposal. In addition, consistent with TURN's recommendations, Staff recommends that PG&E includes, with the SIF Potential data submittals, an attendant qualitative description of the SIF Potential incidents, as well as lessons learned and any proposed corrective actions.

For consistency, Staff also recommends the Commission similarly modify the definition of the *Serious Injuries and Fatalities (Employee and Contractor)* SPM adopted in D.19-04-020.[96] Refer to Part II of this document for discussion on SPMs.

---

[93] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 3.

[94] A SIF Actual case is determined using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.

[95] SIF Potential Incidents would be determined using SIF Potential incidents would follow the Potential Serious Injury or Fatality (P-SIF) from the Edison Electrical Institute's Safety Classification and Learning Model.

[96] D.19-04-020, Attachment 1, at 5-6. *OSHA Recordables Rate (Employee and Contractor)* adopted in D.19-04-020: SPM number 17. *Employee OSHA Recordables Rate*, and SPM number 18. *Contractor OSHA Recordables Rate*, to include "serious injury" definition as adopted in the January 1, 2020 CAL OSHA.

2.3 Potential High Threat Public SIF

PG&E proposes the development of a Public Safety metric that: (1) suits the purpose of enhanced operational enforcement and (2) is scoped appropriately to omit incidents outside of PG&E's control; PG&E proposed a definition for Public Safety metric as follows:[97]

> *"Incidents determined to be life-threatening, life-altering, or fatal to the public resulting from work on or caused by a failure or malfunction of PG&E facilities."*

SCE states that the current Public SIF metric definition meets the purposes of the Safety Performance Metrics Report and would not recommend making an update at this time.[98]

TURN states that while PG&E should be working to avoid any public safety incidents, the SOMs should accurately reflect safety performance including the relative impact of each safety incident, "First, the metric should count impacts, in terms of SIF, rather than incidents."[99] TURN indicates that there should be two measures of impacts – one that captures the impact from all incidents and another that only shows impacts from incidents "resulting from work on or caused by a failure or malfunction of PG&E facilities.[100]

Staff agrees that SOMs should include a metric that captures risks to public safety including events that could result in injuries and fatalities. However, a standalone Public SIF Potential SOM is not necessary to accomplish the goal of effective oversight and enforcement. There are already severe criminal and civil penalties associated with causing the death or injury to a member of the public. Whether an incident is caused by a systematic failure of PG&E's infrastructure and/or operation, or by a random event outside the control of PG&E, the incident will be subject to an investigation, and possible civil and criminal penalties from the Commission and/or through courts.

If any IOU is found to be responsible or is likely to be responsible for serious injuries or deaths, then it would not be appropriate for the Commission and other relevant authorities to wait on the submittal of a SOMs report and respond to data when made available. Instead, immediate action should be taken. The full force of law enforcement and the Commission's substantial enforcement powers should be brought to bear. Rather than proposing corrective actions to get out of one of the steps in the EOE process, corrective actions and penalties should be dealt with in appropriate Commission, criminal and civil proceedings with severe legal and financial consequences. Therefore, Staff does not recommend the inclusion of a Public SIF Actual as a SOM for the purpose of PG&E's EOE process.

Likewise, Staff does not recommend the creation of a Public SIF Potential SOM. Several SOMs, such as ignitions or wires down during red flag warning days, overpressure events, slow gas shutoff times are, in fact, "Public SIF Potential" incidents that are captured

---

[97] Pacific Gas and Electric Company's (U 39M) Post-Workshop Comments on Safety and Operational Metrics, March 1, 2021, at 14.
[98] March 1, 2021 SCE's Comments on PG&E's Proposed SOMs, at 9.
[99] TURN March 1, 2021 Additional Comments, at 8-9.

[100] TURN March 1, 2021 Additional Comments, at 8-9.

by the proposed SOMs. Indeed, the purpose of most of the SOMs are to reduce the potential for injuries and fatalities attributable to IOU infrastructure. Any one or a combination of impacts and incidents have the potential to result in serious injuries and fatalities. In reviewing these SOMs and determining whether "sufficient progress" has been shown, Staff will consider if reportable metrics reflect an increase or decrease in the potential to kill or seriously injure members of the public. As such, Staff recognizes poor performance on these metrics could have grave consequences just as a SIF Potential does in a workplace environment.

In the May 11th comments in continuing to argue for the inclusion of a "Public Safety Metric," TURN argues, "[if] the intent of the EOE is to promote a safer PG&E, it is missing a key safety indicator, Public Safety incidents."[101] TURN continues, "a key aspect of demonstrating a safer utility is a reduction in SIF-Public and they should be included in the required SOMs. As with other SOMs, the availability of alternative remedies should not preclude the utility from also reporting this metric. Put simply, including a Public Safety measure demonstrates to the public that the Commission is prioritizing improved public safety performance in its vision for "safe, reliable and affordable service consistent with California's clean energy goals."

Staff continues to agree with TURN that public safety related metrics demonstrate the Commission is prioritizing public safety performance. However, neither in the April 22nd Draft Staff Proposal on Phase 1, Track 2, nor here does Staff recommend the creation of a SOM for Public SIFs or for Public SIF potential.[102] Staff points out that the various proposed metrics on gas and electrical safety already amount to Public SIF potential metrics in that ignitions, wires down, gas overpressure events, etc. have the potential to result in serious injuries and fatalities. The EOE process' Triggering Events do not match the urgency and gravity of Public SIF Actuals as an enforcement tool. In the event authorities believe that a utility may be or is responsible for a serious injury or fatality, it would be unreasonable for the Commission to wait for an annual report before taking enforcement action including investigations, information sharing with local and state officials investigating the incident, and penalties as appropriate under the circumstances.

A spike in Public SIFs such as those that occurred in San Bruno and the Camp Fire, result in severe criminal and civil penalties, bankruptcy, reorganization, independent monitoring, years-long scrutiny, and extensive corrective actions. SOMs, on the other hand are used for moving PG&E into Steps one, two, and/or three of a six step process with associated corrective actions. This is not proportional to the offense of causing serious injuries or fatalities amongst members of the public and Staff does not agree that Public SIF related metrics would enhance enforcement or oversight in such instances.

---

[101] TURN's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 1.

[102] Appendix A, at 32.

Cal Advocates, in their Informal Comments, propose the creation of SOM entitled "Rate of SIF Actual (Public)." They argue "the SIF performance metrics should NOT exclude public safety. Public Safety metrics should instead be used to prioritize corrective actions and for enhanced oversight. Employee/Contractor Safety Performance is an inadequate indicator for Public Safety Performance."

As noted above, Staff believe that the proposed SOMs do not exclude public safety. On the contrary Staff selected safety metrics that they believe indicated the highest risks to public safety. Staff also does not disagree that "Employee/Contractor Safety Performance is an inadequate indicator of Public Safety Performance." The SIF metrics proposed above measure worker safety. While improved worker safety could be indicative of a safety culture that prioritizes safety, possibly including public safety, measuring public safety is not the goal for collecting those metrics.

However, Staff would certainly welcome further discussion with Cal Advocates and members of the TWG on possible methodologies for calculating Rate of SIF Actual (Public). A rate would be a more valuable metric than a raw number and could enable comparison across utilities to assess relative safety performance with respect to the gravest of possible consequences.

At this time, Staff retains the initial recommendation made in its Draft Staff Proposal to exclude Public SIF SOMs to use as a triggering event in the EOE Process.

3 System Reliability: SAIDI, SAIFI & CAIDI

The Commission requires that SOMs track "quality of service and quality of management" issues.[103] Reliability risks go to the very heart of these service and management priorities.[104] According to the American Customer Satisfaction Index Energy Utilities Report 2020-2021 comparing utilities nationally, PG&E "remains worst in class for both electric service reliability and electric service restoration."[105] Based on the 2019 Annual Electric Reliability Reports, which are submitted annually to the Commission, PG&E performed comparatively poorly across several reliability metrics compared to other California Investor-Owned Utilities (IOUs).[106] Providing reliable service is a fundamental responsibility of an IOU. As such, EOE process on reliability metrics for PG&E are appropriate for inclusion.

In its Draft Staff Proposal, which was circulated to the TWG for informal comments, Staff initially proposed SAIDI, SAIFI and CAIDI Related SOMs, as outlined in the following sub-sections. The Draft Staff Proposal initially included the following SOMs related to reliability for use as Triggering Events for the purpose of PG&E's EOE Process:

- *System Average Interruption Duration (SAIDI) (Unplanned)*[107]
- *SAIDI (All Outages)*[108]
- *System Average Interruption Frequency (SAIFI) (Unplanned)*[109]
- *SAIFI (All Outages)*[110]
- *Customer Average Interruption Duration Index (CAIDI) (Unplanned)*[111]
- *CAIDI (All Outages)*
- *System Average Customers Impacted (All Outages)*

[103] D.20-05-053, at 96; and Scoping Memo 5.

[104] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 12.

[105] American Customer Satisfaction Index Energy Utilities Report 2020-2021, at 6.

[106] 2019 Annual Electric Reliability Report.

[107] An "interruption" is the total loss of electric power on one or more normally energized conductors to one or more customers connected to the distribution portion of the system. In essence, an interruption refers to the customer, as opposed to an outage, which refers to the equipment. PG&E's ACR Response, at 15.

[108] An "outage" is the loss of ability of a component to deliver power.

[109] The Protect our Communities Foundation Comments on Workshop on Safety and Operational Metrics Proposed by Pacific Gas and Electric Company (PCF Comments on PG&E Workshop), March 1, 2021, at 4-5.

[110] PCF Comments on PG&E Workshop, March 1, 2021, at 4-5.

[111] A "customer" is a metered electrical service point for which an active bill account is established at a specific location.

Staff considered parties' suggestions and decided to retain its initial proposed SOMs, as discussed in the following sub sections.

3.1 SAIDI Related SOMs

SAIDI is a reliability metric that measures the average length of time of power outages that customers experience in a period of time[112] In accordance with the definition specified by the IEEE 1366: "A sustained interruption is any interruption that lasts for more than five minutes."[113] Staff recommends including two variations of the SAIDI metric for reporting on SOMs: SAIDI (Unplanned), i.e., SAIDI due to unplanned outages, and SAIDI (All Outages), i.e., SAIDI due to all outages.

3.1.1 SAIDI (Unplanned)

PG&E proposes the SAIDI (Unplanned) metric as a reliability metric relevant to the risk of a failure of electric distribution overhead assets, as well as a quality of service and management measure. PG&E defines this metric as: "The number of minutes associated with unplanned sustained outages that the average customer experiences in a year. It measures all T&D outages and excludes Major Event Days."[114]

The SAIDI (Unplanned) metric is currently reported to the Commission's Energy Division as part of the CPUC Annual Electric System Reliability Report, and to the Wildfire Safety Division as part of WMP.[115] The SAIDI (Unplanned) metric that PG&E currently submits to the Commission reflects the reliability of the grid during routine circumstances, as the metric only captures sustained interruptions and excludes outages on MEDs.

Staff recommends adopting PG&E's proposed SAIDI (Unplanned) as a SOM, expressed in hours per customer rather than minutes per customer to align with WMP, on all transmission and distributions outages, and recommends the following definition:

SAIDI (Unplanned) = average duration of sustained interruptions per metered customer due to all unplanned outages, excluding on Major Event Days, in a calendar year where, *average duration* is defined as:

*Sum of (duration of interruption * number of customer interruptions) / Total number of customers served*

and *duration* is defined as *Customer hours of outages*.

[112] D.96-09-045, Appendix A, at 1.

[113] D.16-01-008, Appendix B.

[114] PG&E's ACR Response, at 15.

[115] D.16-01-008, Appendix B. See CPUC Annual Electric System Reliability Report.

3.1.2 SAIDI (All Outages)

Staff recommends SAIDI (All Outages), as a modified version of the SAIDI (Unplanned) metric, to provide an additional perspective on all outage durations that better reflects customer experience and unpredictable events. The SAIDI (Unplanned) metric that PG&E currently submits to the Commission on an annual basis reflects the reliability of the grid during routine circumstances, but it does not include an aggregate metric representing all of the following sustained outages: planned outages, outages due to PSPS, and outages on MEDs. The inclusion of these additional outages in a SAIDI (All Outages) metric would provide a comprehensive picture of reliability performance under any outage circumstance, ranging from routine to extreme.

While the standard SAIDI (Unplanned) metric reflects the reliability of the grid during routine circumstances, the SAIDI (All Outages) metric provides a different perspective on reliability that could indicate average outage durations that weigh heavily towards extreme circumstances. This modified metric is outcome-based and relies on objective data. At the Commission's discretion, the SAIDI (All Outages) metric may not apply to major events beyond the control of the utility, such as, but not limited to, terrorist attacks or other large-scale unanticipated disasters.

Staff recommends adopting SAIDI (All Outages) as a SOM, expressed in hours per customer rather than minutes per customer to align with WMP, on all transmission and distributions outages. This metric captures the full impacts of all outages on customers. Staff will consider exogenous factors beyond the utility's control when making any recommendation associated with the steps in the EOE process on all Outages data. Staff recommends the following definition:

> *SAIDI (All Outages) = average duration of all sustained interruptions per metered customer due to all outages, including, but not limited to, unplanned outages, planned outages, PSPS outages, and outages on Major Event Days, in a calendar year*
>
> where, *average duration* is defined as:
>
> > *Sum of (duration of interruption * number of customer interruptions) / Total number of customers served*
>
> and, *duration* is defined as: *Customer hours of outages*.

3.2 Staff Proposed SAIFI Related Metrics

SAIFI is a reliability metric that characterizes the average number of sustained power interruptions for each customer in a calendar year, [116] in accordance with the definition specified by the IEEE 1366.[117] Staff recommends the inclusion of two variations of the SAIFI metric for reporting on SOMs: SAIFI (Unplanned), i.e., SAIFI due to unplanned outages, and SAIFI (All Outages), i.e., SAIFI due to all outages.

3.2.1 SAIFI (Unplanned)

Protect our Communities Foundation (PCF) proposes the SAIFI (Unplanned) metric, which measures the frequency of outages associated with unplanned sustained outages that the average customer experiences in a year. SAIFI measures sustained interruptions and excludes planned outages and outages due to Major Event Days (MEDs).[118] This metric is already reported in the CPUC Annual Electric System Reliability Report.[119] The SAIFI (Unplanned) metric that PG&E currently submits to the Commission on an annual basis reflects the reliability of the grid during routine circumstances, as the metric only captures sustained interruptions and excludes outages on MEDs.

Staff recommends adopting SAIFI (Unplanned) as a SOM on all transmission and distributions outages and recommends the following definition:

SAIFI (Unplanned) = average frequency of sustained interruptions due to all unplanned outages per metered customer, except on Major Event Days, in a calendar year.

where the *average frequency* is defined as:

Total number of sustained customer interruptions / Total number of customers served.

3.2.2 SAIFI (All Outages)

SAIFI (All Outages) is a reliability metric that modifies the standard version of SAIFI (Unplanned) to include the average frequency of all sustained interruptions, per customer, due to outages from, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to MEDs. This modified version of SAIFI (Unplanned), referred to as SAIFI (All Outages), provides additional perspective on all outage frequencies.

The inclusion of these additional outages in the SAIDI (All Outages) metric would provide a comprehensive picture of reliability performance under any outage circumstance, ranging from routine to extreme. Staff recommends adopting SAIFI (All Outages) as a SOM

[116] D.96-09-045, Appendix A, at 1.

[117] D.16-01-008, Appendix B.

[118] PCF writes, "Normally these two reliability indices [SAIDI and SAIFI] are a pair, two hand-in-glove indicators of utility reliability (PCF Comments on PG&E Workshop, March 1, 2021, at 4-5).

[119] D.16-01-008, Appendix B.

on all transmission and distributions outages that include all types of interruptions and outages. Staff recommends the following definition:

SAIFI (All Outages) = average frequency of sustained interruptions per metered customer due to all outages, including, but not limited to, unplanned outages, planned outages, PSPS outages, and outages on Major Event Days, in a calendar year.

where the *average frequency* is defined as:

Total number of sustained customer interruptions / Total number of customers served.

3.3 CAIDI Related SOMs

In accordance with the definition specified by the IEEE 1366, CAIDI is a reliability metric that represents the average time required to restore service to affected customers.[120] Staff recommends the inclusion of two variations of the CAIDI metric for reporting on SOMs: CAIDI (Unplanned), i.e., CAIDI due to unplanned outages, and CAIDI (All Outages), i.e., CAIDI due to all outages.

If a single customer experiences more than one sustained interruption during a Measured Event, each interruption shall count as a separate customer interruption. CAIDI shall be measured from the beginning of the Measured Event and shall continue until all customers experiencing interruptions during the Measured Event have been restored.[121]

3.3.1 CAIDI (Unplanned)

Staff recommends adopting CAIDI (Unplanned) as a SOM for use as a PG&E EOE process Triggering Event to review the average time required to restore service to affected customers experiencing sustained interruptions due to unplanned outages. This metric specifically measures the average customer minutes interrupted per impacted customer only, whereas the SAIDI metrics consider the average customer minutes interrupted across all customers.

This metric is already reported in the CPUC Annual Electric System Reliability Report.[122] The CAIDI (Unplanned) metric that PG&E currently submits to the Commission on an annual basis reflects the reliability of the grid during routine circumstances, as the metric only captures sustained interruptions and excludes outages on MEDs.

CAIDI (Unplanned) is defined as the total customer interruption duration due to unplanned outages and excluding MEDs divided by the total number of customers interrupted due to unplanned outages and excluding MEDs, expressed in hours per customer

[120] D.16-01-008, Appendix B.

[121] D.16-01-008, Appendix B. See Institute of Electrical and Electronic Engineers (IEEE) 1366, at 4.

[122] D.16-01-008, Appendix B.

rather than minutes per customer, on all transmission and distributions outages. Staff recommends the following definition:

> *CAIDI (Unplanned) = average duration of sustained outages per* ***impacted*** *metered customer due to all unplanned outages, excluding on Major Event Days, in a calendar year*
>
> where, *average duration* is defined as:
>
> *Sum of (duration of interruption * number of customer interruptions) / Total number of impacted customers*
>
> and *duration* is defined as: *Customer hours of outages*.
>
> In other words, this metric can be calculated as:
>
> *SAIDI (Unplanned) / SAIFI (Unplanned*).

3.3.2 CAIDI (All Outages)

In contrast to the CAIDI (Unplanned) metric, CAIDI (All Outages) is a reliability metric that includes the average frequency of sustained interruptions, per affected customer, due to outages from, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to MEDs. CAIDI (All Outages) provides additional perspective on the duration of sustained interruptions for impacted customers. The inclusion of these additional outages in the CAIDI (All Outages) metric would provide a comprehensive picture of reliability performance under any outage circumstance, ranging from routine to extreme. Therefore, Staff recommends adopting CAIDI (All Outages) as a SOM for use as a PG&E EOE Process Triggering Event.

CAIDI (All Outages) is defined as the total customer interruption duration due to all outages divided by the total number of affected customers interrupted due to all outages, expressed in hours per customer rather than minutes per customer, on all transmission and distributions outages. In other words, CAIDI (All Outages) represents the average time required to restore service to affected customers. Staff recommends the following definition:

> *CAIDI (All Outages) = average duration of sustained outages per impacted metered customer due to all outages, including, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to Major Event Days, in a calendar year.*
>
> where, *average duration* is defined as:
>
> *Sum of (duration of interruption * number of customer interruptions) / Total number of impacted customers*
>
> and *duration* is defined as: *Customer hours of outages*.
>
> In other words, this metric can be calculated as:
>
> *SAIDI (All Outages) / SAIFI (All Outages*).

3.4 System Average Customers Impacted (All Outages) SOMs

Staff recommends adopting *System Average Customers Impacted (All Outages)* as a SOM on all transmission and distribution outages for use as a Triggering Event for the purpose of PG&E's EOE process. Staff recommends the following definition:

> *System Average Customers Impacted (All Outages) = average number of all metered customers experiencing sustained interruptions due to all outages, including, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to Major Event Days, in a calendar year.*

where the term *average customers* is defined as:

> *Number of customers impacted / total number of customers served.*

3.5 Reporting Requirements

Currently, the IOUs are required to report the preceding calendar year's electric reliability data, which include SAIDI (Unplanned), SAIFI (Unplanned), and CAIDI (Unplanned) metrics, on July 15th of each year as part of their annual reliability report, pursuant to Decision 16-01-008.[123] The metrics are reported in the Annual Electric Reliability Report to the Energy Division. The most recent reliability metrics available should be reported to SPD with the annual SOMs as well.

3.6 Discussion

Unplanned Outages

In their informal comments on Draft Staff Proposal, both Cal Advocates and PCF agreed that the "unplanned" reliability metrics proposed in the initial Draft Staff Proposal should be included as SOMs. Cal Advocates stated that "reliability related metrics should include both metrics that include Major Event Days and also metrics that exclude Major Event Days."[124] PCF stated that it "appreciated that the Staff Proposal Incorporates SAIFI as a Safety and Operational Metric (SOM) in addition to System Average Interruption Duration (SAIDI)."[125]

PG&E also agreed that the "unplanned" reliability metrics – SAIDI (Unplanned), SAIFI (Unplanned) and CAIDI (Unplanned) – are appropriate SOMs. Yet, even as PG&E agrees with the proposed set of "unplanned" reliability metrics, it notes that "these metrics are all

[123] D.16-01-008, Appendix B.

[124] Cal Advocates TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021, at Attachment.

[125] PCF'S TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021 at 7.

similarly situated" and "[the] inclusion of all three metrics does not provide additional information to the Commission, since they all rely on the same sets of data."[126]

Staff disagrees with PG&E's assertion that the three metrics do not provide additional information to the Commission. SAIDI (Unplanned) allows the Commission to track PG&E's performance on the duration of interruptions in a calendar year, while SAIFI (Unplanned) allows the Commission to track PG&E's performance on the frequency of interruptions, both of which are important to track. Even if the three 'unplanned' reliability metrics are "similarly situated," according to PG&E, there is no guarantee the metrics will move in tandem. In other words, the duration of interruptions to the average customer can improve over time even as the frequency of interruptions per customer gets worse. Additionally, the Commission can use CAIDI (Unplanned) to track PG&E performance on duration of customer interruptions per affected customer.

Based on informal written feedback from Cal Advocates, PG&E, and PCF showing consensus on the "unplanned" reliability metrics, Staff continues to recommend SAIDI (Unplanned), SAIFI (Unplanned), and CAIDI (Unplanned) as SOMs.

SAIDI (All Outages), SAIFI (All Outages), CAIDI (All Outages), and SACI (All Outages)

While Cal Advocates agrees with the initial Staff Draft Proposal inclusion of "all outages" reliability metrics, PG&E disagrees with their inclusion and finds it inappropriate for the following reasons: "(1) It seeks to measure utility failure in conditions beyond utility control and design standards; (2) the number of Major Event Days within PG&E's territory within a year are not predictable, which creates the inability to establish indicator-levels or assess performance trends to signal failure beyond reasonable or minimum levels of service; and (3) Inclusion renders the metric non-benchmarkable, furthering the inability to assess for reasonable or minimum levels of service.[127]

Staff disagrees with PG&E's reasoning for not including Staff's proposed all outages reliability SOMs.

As previously discussed, the definition of MEDs indicates that weather is only one factor that can affect MEDs.[1] A metric that measures failure of a utility's asset on MEDs gives visibility to the vulnerability of the utility's system to extreme weather conditions. It could also reveal other underlying factors that might have led to the measured failure, including deficiencies in the utility's management, maintenance, and operation of that asset.

Staff disagrees with PG&E's written comments that the inclusion of the SAIDI, SAIFI, and CAIDI metrics that evaluate "all outages" is inappropriate. Staff views the "all outages" metrics as an important system-wide indicator for the reliability of the utility's infrastructure under all conditions, including extreme weather patterns. From the customer perspective,

[126] PG&E's TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021 at 14.

[127] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 15.

customers depend on the overall reliability of the electric grid and do not necessarily make the distinction between interruptions due to "all outages" and "unplanned" outages.

The "all outages" metrics can signal a need to investigate a potential problem, that otherwise would be attributed to major events instead of deficiencies in PG&E's management and operation of its system. For example, forests are changing due to climate change. If increasing outages associated with vegetation contact or wires down from branches or trees, it may be that PG&E needs to change their assumptions and policies regarding the use of the vegetation management exception in GO 95[128]. Staff's proposed process for evaluating SOMs that may lead to recommending PG&E enter into the EOE process will be subject to a comprehensive quantitative and qualitative analysis. This analysis will likely incorporate additional reliability metrics reported to the Commission, and other underlying data that contextualize factors that might be out of the control of the utilities, such as the frequency and severity of MEDs in a given year.

3.7 Staff Recommendations on SAIDI, SAIFI & CAIDI

Staff recommends the Commission adopt our initial proposed SOMs as summarized in Appendix C: Staff recommends that PG&E report "all outages" metrics – SAIDI (All Outages), SAIFI (All Outages), and CAIDI (All Outages) and permutations of these metrics on Unplanned Outages – as reliability SOMs. Staff's final recommendation modifies our Draft Staff Proposal per PG&E's informal comments to align the definition of sustained interruptions on which SAIDI, SAIFI, and CAIDI metrics are based with the IEEE 1366 definition: "Any interruption not classified as a part of a momentary event. That is, any interruption that lasts more than five minutes."[129]

[128] General Order No. 95, Exception 4 of Rule 35, at III-20.

[129] *IEEE 1366- Reliability Indices* Presentation, February 19, 2019, at 6.

4 Public Safety Power Shutoff

4.1 Introduction

PSPS events are an important safety tool of last resort available for IOUs to utilize when dry conditions and/or high wind events create an unacceptably high probability of electrical equipment sparking wildfire. However, PSPS events can negatively impact the safety and livelihood of customers and negatively impact the economy. In summarizing harms caused by PSPS events in 2009, the Commission found: "[A] safe electric system is one which is operated to prevent fires. However, operating a safe system also includes the reliable provision of electricity. Without power, numerous unsafe conditions can occur. Traffic signals do not work, life support systems do not work, water pumps do not work, and communication systems do not work. As the California Legislature recognized in §330(g), "reliable electric service is of utmost importance to the safety, health, and welfare of the state's citizenry and economy."[130]

The Commission gave additional guidance to IOUs on PSPS, emphasizing that, "there is a strong presumption that power should remain on for public safety reasons."[131] In D.19-05-042, the Commission reiterated the need for utilities to identify the public harms of de-energizations and then balance those harms against potential wildfire benefits[132] and further stated utilities must only use power shutoffs as a last resort for wildfire mitigation.[133] As a result, the Commission currently has reporting and mitigation requirements for IOUs to follow in advance of, during, and after PSPS events.

The Commission closely monitors the execution of PSPS events. Commissioners have convened numerous public meetings with utility executives to address PSPS execution and preparedness. In addition, the Commission has taken enforcement action against utilities for failure to comply with PSPS guidelines including the Order to Show Cause in R.18-12-005, and the Order Instituting Investigation on the Commission's Own Motion on the Late 2019 Public Safety Power Shutoff Events (I.19-11-013).[134]

The scope of Track 2 of R.20-07-013 indicates the development of PSPS SOMs should consider, "[r]equirements regarding the management and minimization of Public Safety

---

130 D.09-09-030, at 61.

131 D.09-09-030, at 61.

132 D. 19-05-042, Appendix A at A24.

133 D. 19-05-042, Appendix A at A1.

134 Decision Addressing the 2019 Public Safety Power Shut Off Events by Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company. I1911013 (Rev.1), issued on June 3, 2021. Available here: [Decision Addressing Late 2019 PSPS Events]

Power Shutoff (PSPS) events adopted in Rulemaking (R.) 18-12-005, including in D.19-05-042 and D.20-05-051."[135]

Existing Oversight and Enforcement of PSPS

IOU PSPS activities are subject to oversight and enforcement by the Commission. Currently each electric IOU is required to submit a post event report on each PSPS event to the Commission, regardless of whether de-energization has actually occurred. Post events are required to be reported to Safety and Enforcement Division within 10 business days of power restoration that describe the quantitative and qualitative factors the IOU considered in calling, sustaining, or curtailing each PSPS event, among other details. Post event reports are required pursuant to D.19-05-042 and D.20-05-051.[136]

In addition, the aforementioned decisions require the electric IOUs to maintain website updated on a year-round basis regarding efforts to reduce the need for or scope of de-energization events, including, asset and vegetation management, sectionalizing, switching, system hardening, backup power projects, progress on de-energization mitigation efforts, and planned dates of completion.

Starting in 2021, IOUs are required to include in their WMPs specific short, medium, and long-term actions the IOU will make to reduce the impact of and need for PSPS events.[137]

Further, in addition to the proposed SOMs here, "failure to comply" with PSPS protocols is a Triggering Event in Step 1 of the EOE process. [138] Considering the significant impacts customers and communities may incur during a PSPS event, it is important for the Commission to include PSPS related metrics in the SOMs for purposes of the EOE process. Inclusion as a SOM will further incentivize progress on the implementation of mitigation measures to reduce the impact of PSPS events on Californians.

---

[135] R.20-07-013, at 2 and 3.

[136] D.19-05-042 Appendix A at A-22 – A-25; and D.20-05-051, Appendix A, at 9-10.

[137] D.20-05-051, Appendix A, at 8-9.

[138] D.20-05-053, Appendix A, at 1.

4.2 Discussion

Other Parties' Suggested PSPS Metrics Considered in the Draft Staff Proposal

In response to PG&E's proposed SOMs, MGRA recommends "PSPS Damage Reports" as a metric to report damages to IOUs' facilities during PSPS events, which demonstrates the resiliency of utilities infrastructure to fire and weather conditions.[139] MGRA notes that the Commission requires the IOUs to collect and report this information pursuant to D.19-05-042. MGRA also suggests tracking weather metrics, such as wind speeds associated with all risk events as a way of normalizing ignition, Wires Down, risk events, outages, and PSPS damage. MGRA recommends Weather Events metric for tracking events that occur during and within the boundaries of National Weather Service High Wind Warnings, High Wind Advisory, and Red Flag Warning areas, as a simple proxy for weather data. MGRA articulates that although these metrics are not ideal, they can provide a baseline that can be compared across utilities. MGRA indicates that utilities are required to report number of utility mile-days that their infrastructure spends under High Wind Warnings and Red Flag Warning conditions, which allows some degree of normalization.[140]

MGRA recommends "PSPS instances found to be unreasonable by Commission standards" as a SOM.[141] MGRA indicates that CPUC is already supposed to determine whether utility PSPS events were reasonable, and it is also tasked with developing reasonableness criteria for de-energization. If the reasonability standards are well-defined and objective, then they could serve as triggering mechanisms for EOE.[142]

MGRA states that regarding wildfire, the only "operational" metrics that would be relevant to safe utility operation would have to do with the protocols surrounding power shutoff. Other metrics, such as risk events, Wires Down, or ignitions are trailing metrics not under the utilities' direct control.[143]

[139] MGRA, March 1st, 2021 Comments, at 8-10.

[140] MGRA, March 1st, 2021 Comments, at 8-10.

[141] MGRA, March 1st, 2021 Comments, at 9.

[142] MGRA, March 1st, 2021 Comments, at 9.

[143] MGRA, March 1st, 2021 Comments, at 4.

MGRA recommends the following factors when considering power shutoff protocols:[144]

- Does the utility have specific shutoff criteria on a circuit-by-circuit (or finer) basis, and are these criteria transparently stated?
- For a given risk event, did the utility adhere to its shutoff criteria, i.e. did the measured weather conditions exceed the thresholds?
- Are shutoff thresholds consistent with real risk of either vegetation contact or damage to equipment from wind gusts exceeding GO 95 design criteria?
- Did the utility's weather measurements correspond to its forecasts?
- Did the utility notify all required customers and partners regarding de-energization and re-energization on a timely basis?

MGRA indicates that many of these factors are (or are supposed to be) included in post-event reporting by the utility, but the Commission has not adopted guidelines on "reasonableness" evaluations. MGRA recommends that the Commission consider a more rigorous and regular review of the utility post-event reports, and the creation of specific operational metrics that can be tracked and compared across utilities.[145]

Staff reviewed MGRA's comments with interest but concluded that this is not the appropriate time to develop the types of metrics that MGRA recommends because the Commission proceedings that are dedicated to this topic are actively deliberating on these issues and failure to comply with PSPS protocols are already covered as Triggering Events under PG&E's EOE process.[146]

Staff recognizes the importance of tracking PSPS Damage Reports and Weather Events metrics as indicators to monitor the conditions of utilities' infrastructure. Reports of damage are already filed pursuant to the existing reporting requirements and, as noted, failure to comply with PSPS Protocols is both a Triggering Event in the EOE process and subject to Commission enforcement.[147]

---

[144] MGRA, March 1st, 2021 Comments, at 4-5.

[145] MGRA, March 1st, 2021 Comments, at 5.

[146] Step 1 Triggering Event ii "PG&E fails to comply with, or has shown insufficient progress toward, any of the metrics (i) set forth in…Public Safety Power Shutoffs (PSPS) protocols…" D.20-05-053, Appendix A of at 1.

[147] PSPS damage reports.

Parties' Informal Comments on Draft Staff Proposal

In its April 22, 2021 Draft Staff Proposal, Staff proposed that PG&E report on *average* frequency, duration, and number of customers impacted by PSPS event, annually.

MGRA expresses concern that many outcomes related to wildfire are driven by external events rather than by the degree of utility culpability. MGRA indicates that inappropriate application of the EOE process may push PG&E into adopting more aggressive PSPS policy that may not adequately take into account PSPS risks and costs.[148] MGRA suggests coordination and alignment of data collection with Wildfire Safety Division for efficiency and to avoid misinterpretations and inconsistencies.[149]

Although the utilities cannot control weather or vegetation conditions, strategic system improvements and upgrades can be made to reduce the number and severity of PSPS occurrences. Cal Advocates presents an analysis indicating that 0.6 miles of targeted undergrounding in a specific location in a Santa Rosa neighborhood that frequently experiences PSPS occurrences, would eliminate most, if not all, future PSPS occurrences in this neighborhood.[150]

Staff recognizes that weather and vegetation conditions in any given year may alleviate or intensify the need for PSPS events. However, as contemplated in WMPs and RAMPs continuous strategic system hardening, undergrounding, establishing circuit redundancies, establishment of microgrids, and vegetation control measures can be expected to mitigate risks associated with PSPS events and PSPS occurrences (frequency, duration, and/or number of customers impacted) could therefore be expected to trend downward over time. Staff will evaluate these trends as SOMs. Nonetheless, as noted above, Staff is open to considering normalizing SOMs to reduce exogenous variation.

In its informal comments PG&E expresses concern with including customers that have received a PSPS notice but were not actually de-energized. PG&E's comment states, "[f]or those customers that were notified, yet were not de-energized, it is unclear how to determine the duration of impaction."[151] Staff disagrees with PG&E's assessment.

Consistent with Commission's PSPS related reporting requirements: "[t]he electric investor-owned utilities must report on lessons learned from each de-energization event, including instances when de-energization protocols are initiated, but de-energization does not occur, in order to further refine de-energization practices,"[152] Staff recommends that PG&E reports PSPS related SOMs to include measurements regardless of whether de-energization actually occurred.

---

[148] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 2.1.

[149] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 2.2.

[150] Cal Advocates' Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, 2.9.

[151] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 13.

[152] D.19-05-042, Appendix A, at A3.

The reporting period for a PSPS event begins with the first notification of an impending power shut-off. The PSPS ends when the last circuit is restored and customers and critical facilities are notified.[153] Even if a customer is never de-energized during a PSPS event, that household is still under notice that power could be shut off. Customers may prepare for an impending power shut-off by securing back-up power, relocating to a hotel, or by making other preparations. A notice of impending PSPS can be especially impactful to medical baseline and other Access and Functional Needs (AFN) customers who may rely on electricity to power life sustaining or life supporting devices, customers who need to work from home, needs of school-aged children, to name a few scenarios. Businesses, emergency services, and critical infrastructure providers will also be on alert and will make potentially costly preparations due to the PSPS notification. These customer impacts and their disruption to safety, livelihoods, and economy are why SOMs should track impacts of PSPS events regardless of whether or not de-energization occurs.

4.3 Staff Recommendations on PSPS SOMs

Following consideration of parties' informal comments on the Draft Staff Proposal, instead of reporting *average data* on Staff's originally proposed PSPS SOMs, Staff recommends that PG&E report absolute measurements of these metrics on annual basis (number of PSPS events, duration of events in hours, and number of customers impacted). Such an approach will allow Staff to analyze the metrics to delineate exogenous factors that might skew the average results and evaluate the overall trends in PSPS events in terms of duration, frequency and impacted customers over time.

Staff recommends the following three PSPS related SOMs:

1. *Number of PSPS events in a calendar year.*
2. *Duration of each PSPS Event in hours in a calendar year.*
3. *Number of Customers Impacted by each PSPS Event in a calendar year.*

Staff will evaluate the proposed PSPS related SOMs trends over time. PG&E's strategic system improvements should result in decreased trends in the duration, frequency, and number of customers impacted by PSPS events over time, even in the face of extreme weather conditions and dry vegetation. Even if PSPS events increase in a given year, progress in PG&E's operation performance should be reflected if these PSPS SOMs trend downward over time. Staff may consider approaches to normalize these SOMs to reduce exogenous variation.

[153] D.19-05-042 Appendix A, at A8-A9.

5 Outages due to Vegetation and Equipment Damage

5.1 Outages due to Vegetation and Equipment Damage in HFTD Areas SOMs

Staff recommends that the Outages due to Vegetation and Equipment Damage SOM be specific to Tier 2 and 3 HFTD Areas.[154] Staff considered parties' suggestions and decided to retain its initial proposed definition of this SOMs. Staff includes additional permutations of this SOM to express MEDs and Non-Major Event Days outages, as discussed in the following sub sections.

Refer to Appendix C for a summary of Staff's Proposed SOMs.

5.2 Reporting Requirements

The current Wildfire Safety Plan reporting template developed by the Wildfire Safety Division contains granular categories of electric outage types including vegetation and various types of equipment damage. The specific data on equipment damage-related outages can be aggregated to produce overall outages caused by all equipment damage types in addition to vegetation-related outages.

Similar to other SOMs, Staff recommends that PG&E reports the Outages due to Vegetation and Equipment Damage SOMs on an annual basis and provides historical data of these SOMs with its first report.

5.3 Discussion

In its February 17, 2021 comments in response to PG&E's SOMs proposals, MGRA proposes metrics measuring outages due to vegetation contact or utility equipment damage.[155] MGRA indicates that such metrics provide additional granularity to the Wires Down metric, since Wires Down events can result from either vegetation contact or equipment damage, and an outage due to vegetation contact can be accompanied by either a Wires Down event or a non-wire-down event.[156]

Metrics measuring outages due to vegetation contact or equipment damage can provide visibility to the strength and weaknesses in the following areas: 1) the quality of the utility's vegetation management program, 2) the quality of utility's maintenance program, 3) the condition of the utility's electric assets, 4) the robustness of the utility's circuit protection,

[154] Decision for Adopting the Work Plan for the Development of Fire Map 2 (D.17-01-009), as modified by Decision Amending the Work Plan for the Development of Fire Map 2 (D.17-06-024). Additional Tier information.

[155] Mussey Grade Road Alliance Reply to the Response of Pacific Gas and Electric Company Regarding Development of Safety and Operational Metrics, February 17, 2021 (MGRA February 17, 2021 Response), at 4.1

[156] MGRA February 17, 2021 Response, at 3.3

and 5) the overall resilience of the utility's circuits. The metrics in this category are lagging metrics measuring safety and reliability performance. Staff agreed with MGRA and recommended adopting Outages due to Vegetation and Equipment Damage as a SOM with additional modifications.

Parties' Informal Comments

In its Draft Staff Proposal, Staff recommended that the Outages due to Vegetation and Equipment Damage SOM be specific to Tier 2 and 3 HFTD Areas.[157] As indicated in the proposal, consistent with the recommended reliability SOMs, Staff defines *System Average* Outages due to Vegetation and Equipment Damage *in HFTD*:

> *Average number of sustained outages per 100 circuit miles in HFTD per metered customer, in a calendar year,*
>
> where each *sustained outage* is defined as:
>
> *total number of customers interrupted / total number of customers served*

In its informal comments on the Draft Staff Proposal, PG&E stated that it supports the proposed SOM with additional clarification but does not support including MEDs.[158]

As discussed in Section 1.3 above, Staff disagrees with PG&E on excluding Major Event Days metrics. Including Major Event Days metrics, which may contain exogenous factors, can also provide important information on PG&E's operations and system performance, and capture impacts that could result from various factors, such as deficiencies in maintaining and operating the electric systems. As indicated earlier, Staff recognizes the concern regarding exogenous factors in SOMs, and is open to considering approaches to normalize SOMs to control the impacts of external driver events and major events, including extreme weather conditions, earthquakes, etc.

Staff agrees with MGRA that this metric will allow the identification of hazard conditions, and that although a trailing indicator, "it can also be considered a leading indicator if areas or circuits subject to wildfire ignitions are identified prior to the ignition of a major wildfire."[159]

---

[157] Decision for Adopting the Work Plan for the Development of Fire Map 2 (D.17-01-009), as modified by Decision Amending the Work Plan for the Development of Fire Map 2 (D.17-06-024). Additional Tier information.

[158] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 19.

[159] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 5.

5.4 Staff Recommendations on Outages due to Vegetation and Equipment Damage

Based on TWG discussions and parties' informal comments on the Draft Staff Proposal, Staff recommends that PG&E reports *System Average Outages due to Vegetation and Equipment Damage in HFTD* Major Event Days, as well as Non-Major Events Days outages. Staff maintains its initial definition of this SOM as presented in its Draft Staff Proposal.

In summary, Staff proposes that PG&E reports the following SOMs:

- System Average *Outages due to Vegetation and Equipment Damage in HFTD (Major Event Days)*
- *System Average* Outages due to Vegetation and Equipment Damage *in HFTD (Non-Major Event Days)*
- *System Average Outages due to Vegetation and Equipment Damage* SOMs *(Major Event Days & Non-Major Event Days)* SOMs be specific to Tier 2 and 3 HFTD Areas.[160]

System Average *Outages due to Vegetation and Equipment Damage* in *HFTD* is defined as*:*

> *Average number of sustained outages per 100 circuit miles in HFTD per metered customer, in a calendar year,*
>
> where each *sustained outage* is defined as:
>
> *total number of customers interrupted / total number of customers served*

For the *Outages due to Vegetation and Equipment Damage in HFTD (Major Event Days & (Non-Major Event Days)* SOMs, PG&E should delineate outages due to contact with vegetation versus outages caused by equipment, and distribution versus transmission assets. For equipment damage-related outages, the metrics should also be segregated by overhead versus underground.

[160] Decision for Adopting the Work Plan for the Development of Fire Map 2 (D.17-01-009), as modified by Decision Amending the Work Plan for the Development of Fire Map 2 (D.17-06-024). Additional Tier information.

6 Electric System

In its Draft Staff Proposal, which was circulated to the TWG for informal comments, Staff has initially proposed Wires-Down and Inspection-Compliance Related SOMs, outlined in the following sub-sections. Staff proposes the following eleven SOMs for use as Triggering Events for the purpose of PG&E's EOE process:

1. *Wires Down (Major Event Days)*
2. *Wires Down (Non-Major Event Day)*
3. *Wires Down in HFTD (Red Flag Warning Days)*
4. *Overhead Distribution Patrols Compliance in HFTD Areas,*
5. *Overhead Distribution Detailed Inspections Compliance in HFTD Areas,*
6. *Overhead Transmission Patrols Compliance in HFTD Areas,*
7. *Overhead Transmission Detailed Inspections Compliance in HFTD Areas*
8. *Distribution Vegetation/Conductor Clearance Inspections Compliance in HFTD Area*
9. *Transmission Vegetation/Conductor Clearance Inspections Compliance in HFTD Area*
10. *Backlog Compliance Metrics*
11. *Electric Emergency Response Time* (Proposed by PG&E)

Refer to Appendix C for a summary of Staff Proposed SOMs, including modified Wires-Down SOMs and additional Vegetation/Conductor Clearance Inspections SOMs, based on suggestions made by parties in their informal comments on the Draft Staff Proposal.

6.1 Staff Proposed Wires Down and Inspection Compliance Related SOMs

6.1.1 Wires Down Related Metrics

In its January 15, 2021 response to the November 17 Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics, PG&E proposes "Transmission and Distribution Wires Down" metric as a safety measure relevant to both to wildfire risks and the risk of failure of electric overhead assets.[161]

MGRA objects to PG&E's proposed metric stating that "…the wires-down data omit wires-down data from Major Event Days…," while the majority of wildfire ignitions occur on Major Event Days, of which major fire weather events are a subcategory.[162] MGRA indicates that PG&E's wires-down does not measure how robust utility infrastructure is

[161] PG&E's ACR Response, at 13.

[162] MGRA's Comments on the response of Pacific Gas and Electric Company regarding development of safety and operational metrics (MGRA February 17, 2021 Response), February 17, 2021 (late-filed authorized), at 3.3.

when exposed to fire weather conditions, which makes it an ineffective metric for Triggering Events or tracking data relevant to wildfire risk.[163]

Staff agrees with MGRA that these metrics could provide supplemental data "to normalize for year-to-year and utility-to-utility differences in weather stress that can lead to ignitions, Wires Down, risk events, outages, and PSPS damage." MGRA suggests a simple proxy for weather data to provide a baseline across utilities is whether events occur during and within the boundaries of High Wind Warning, High Wind Advisory, and Red Flag Warning areas.

MGRA also proposes a "Wires Down in HFTD during MEDs and RFW Days" metric. Staff agrees with MGRA regarding this metric and recommends adopting Wires Down in HFTD during MEDs and RFW Days as a SOM for use as Triggering Events for the purpose of PG&E's EOE process. Wires down in these situations are risk drivers that PG&E should make progress in reducing. As such, they are suitable for SOMs in the EOE process. For example, wire down tracking started at PG&E in 2010 and developed into a corporate public safety metric in 2012.[164] The metric will result in an annual tracking of all such events involving transmission or primary distribution conductors that contact the ground or a foreign object, such as, structure, vehicle, tree, etc.

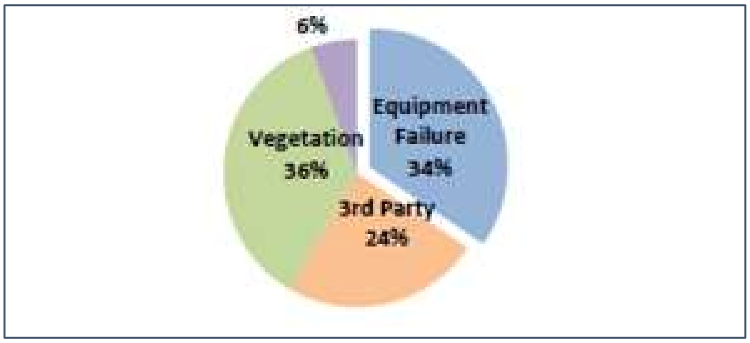
Analyzing trend data such as increase or decrease in the number of Wires Down events per year may indicate problem spots on distributions and transmission lines. If Staff sees troubling trends in the SOM report, Staff can consult with the Wildfire Safety Division (WSD) and review their data, which is also suitable for use as a Triggering Event in the EOE process[165]. Analysis of these SOMs in conjunction with the more substantial data being collected by WSD can be used as a leading indicator to predict future potential failures. Historically, as reported by utilities, wire down events were broken down as one third being caused by vegetation, one third by equipment failure and one quarter caused by a third party.

163 MGRA February 17, 2021 Response, at 3.3.

164 Hayes, Scott et al., Pacific Gas & Electric Company, *Wires Down Improvement Program at PG&E*, Western Protective Relay Conference 2015.

165 Appendix A of Decision 20-05-053, at 1.

Figure 2: PG&E Wires Down Categorized by Risk Driver (Cause) 2012-2014 Excluding Major Event Days)



By tracking wires down caused by all known and unknown causes, broken down by distribution and transmission systems and their segments, the Commission will have broader ability to determine whether utility operations and capital investments are resulting in safety improvements as promised in the IOUs annual Wildfire Mitigation Plans. Tracking Wires Down will be important metrics for tracking utilities' efforts at system hardening. By monitoring whether system hardening investments result in a reduction in equipment failures, including wires down, effective reductions in wildfire safety can be demonstrated transparently.

6.1.2 Wires Down (Major Events Days) in HFTD

In the Draft Staff Proposal, Staff initially proposed Wires Down (Major Event Days) in HFTD Areas SOMs. Based on the May 11, 2021 parties' informal comments on the Draft Staff Proposal, Staff modified the initial proposed definition of Wires Down SOMs to address some gaps identified in the IOUs' proposed definitions that were provided in their informal comments.

Definition for Wires Down

When the original SPMs were adopted in D.19-04-020, the term "Wires Down" was not explicitly defined. Without an explicit definition, "Wires Down" was subject to interpretation and inconsistent reporting. For example, a conductor could become detached from its attachment point on the power pole or transmission tower without breaking and the energized conductor could then come into contact with vegetation or the power pole (or transmission tower). Sparks or molten metal could then fall to the ground to cause a fire. Or, the detached but unbroken energized conductor could drop down to such low level that it would become an electrocution hazard or a hazard to vehicles without touching the ground. Clearly a definition of wire down was needed to capture these scenarios.

In the January 15, 2021 SOMs proposal, PG&E proposed the following definition for wires down:

"Instances where a normally energized electric transmission or primary distribution conductor is broken, or remains intact, and falls from its intended position to rest on the

ground or a foreign object. A conductor is considered energized unless confirmed in an idle state (i.e., normally de-energized)"[166]

PG&E's definition is inadequate as it implies that an energized conductor must rest on top of the ground or a foreign object for it to be considered a downed conductor. An energized high voltage conductor that comes down to an inch above the ground, but not resting on the ground, would not count as a wire down event under this definition.

Conductors on a broken or severely leaning power pole that is only prevented from touching the ground due to supporting tension from adjacent poles would not count as a wire down event even though the conductor could come close to the ground.

SCE proposed in its informal comments on May 11, 2021 this definition for wire down:

"A wire down event is defined as an event that satisfies one or more of these conditions:

1. conductor strikes the ground,
2. Conductor falls on an object (e.g., car, fence, house, etc.) that is not intended to support a conductor and does not contact the ground,
3. Conductor falls to a distance of 6 feet or less to the ground and does not strike the ground or an object listed in 2."[167]

SCE's definition is also inadequate for the following reasons:

1. A conductor that detaches from its attachment point and drops down to above 6 feet from the ground would not qualify as a wire down event. Under this SCE definition, an energized high voltage conductor could drop down to 1" from the top of the balcony of a building without triggering this metric. Residents of the building could touch the energized conductor. Same hazard would apply if the balcony was changed to a rooftop. Someone working on the rooftop could touch the energized conductor.
2. The overhead conductors on a severely leaning power pole may not trigger the wire down metric using this SCE definition. For example, high voltage conductors on a severely leaning or broken power pole may be prevented from touching the ground or coming to within 6 ft of the ground due solely to the tension on the conductors provided by intact adjacent power poles. For all intents and purposes, the conductor on the power pole is not supported and should be presumed to be a downed conductor.
3. The 6-foot clearance threshold is inadequate. Vehicles could drive by and hit the conductor. Passersby could touch the conductor.

[166] PG&E's ACR Response, at 13.
[167] SCE's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021.

Sempra suggested in its May 11, 2021 informal comments this modification to the wire down definition proposed by SPD staff:

"SDG&E recommends modifying conditions 1 and 2 to include '...a conductor comes in contact with the ground or foreign object.' SDG&E also recommends removing condition 3."[168]

Staff agrees with the suggestion to modify conditions 1 and 2 to include "...a conductor comes in contact with the ground or foreign object." However, Staff disagrees with the suggestion to remove Condition 3 in the original SPD definition for the same reasons given previously when discussing the SCE definition. Condition 3 in the SPD definition is intended to capture hazardous conditions where the conductor can come dangerously close to the ground or rooftop without coming in contact with them.

Some illustrative hazardous scenarios involving high voltage overhead conductors that should be captured by the definition for a wire down event include the following. These are illustrative examples, but are by no means exhaustive scenarios:

1. During a heavy windstorm, a broken tree limb falls onto an overhead circuit. The conductor is not broken, but the force or weight of the tree limb exerted on the conductors pulls the conductors close to ground level or close to a rooftop, but the conductor is not touching the ground or the rooftop.
2. A wooden power pole leans dangerously because of either rot at the base of the pole or soft ground. The power pole leans dangerously close to the ground but is not touching the ground. Tension on the conductors provided by intact adjacent poles is preventing the conductors from touching the ground.
3. A wooden power pole is rotten at the top and breaks at the top of the pole with the crossarm still attached. The conductors are still attached to the crossarm, but they come near the ground without touching the ground. Tension on the conductors provided by intact adjacent poles is preventing the conductors from touching the ground.
4. The crossarm (or an insulator pin on the crossarm) on a power pole becomes broken and a conductor dangles seven feet above a road. A large truck drives across the road and hits the energized conductor. Or, a person walking nearby could reach up and touch the energized conductor.
5. Some supporting attachment point, for example a C-hook on a transmission tower, is broken and the intact high voltage conductor comes loose or loses tension and makes contact with the transmission tower, creating sparks that cause a wildfire.
6. An overhead primary distribution conductor becomes detached from the crossarm and rests on the secondary distribution or communication conductors on the same span without falling to the ground. The primary conductor then sends primary distribution

[168] Sempra's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021.

level voltage down the secondary distribution or communication conductors and into residences, resulting in structural fires.

In its Draft Staff Proposal, Staff initially recommended that a *Wires Down event* is an event that satisfies one or more of these conditions:

- *A conductor or splice becomes broken due to mechanical failure, whether or not it comes in contact with the ground,*
- *A conductor is dislodged from its intended design position due to either malfunction of its attachment points and/or supporting structures or contact with foreign objects (including vegetation), regardless of whether the conductor is broken or whether it comes in contact with the ground, or*
- *A conductor's distance from the ground, structures, or objects (not including vegetation) falls below applicable minimum clearances specified in General Order 95.*

Given the above discussions, Staff proposes two additional conditions: *A conductor comes into contact with communication circuits, guy wires, or conductors of a lower voltage, and a power pole carrying normally energized conductors leans by more than 45 degrees in any direction relative to the vertical reference when measured at ground level.*

Staff's final recommendation is that Wires Down SOM is defined as follows:

> *A Wires Down event occurs when a normally energized overhead primary or secondary distribution or transmission conductor satisfies one or more of these conditions:*
>
> *1. A conductor or splice becomes broken,*
>
> *2. A conductor is dislodged from its intended design position due to either malfunction of its attachment points and/or supporting structures or contact with foreign objects (including vegetation),*
>
> *3. A conductor's distance from the ground, structures, or foreign objects (not including vegetation) falls below applicable minimum clearances specified in General Order 95,*
>
> *4. A conductor comes into contact with communication circuits, guy wires, or conductors of a lower voltage, or*
>
> *5. A power pole carrying normally energized conductors leans by more than 45 degrees in any direction relative to the vertical reference when measured at ground level.*

This *Wires Down* event definition excludes vegetation growth-related clearance violations in which the conductor does not otherwise violate the five conditions listed above. This definition includes service drops.

Accordingly, Staff's final recommendation on the definition for *Wires Down (Major Event Days) in HFTD Areas* SOM is as follows:

Number of Wires Down events on Major Events Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by total circuit miles of overhead primary distribution and transmission lines x 1,000, in a calendar year.

Staff's proposed definition of a *Wires Down event* applies to this metric.

For this metric, overhead primary distribution and transmission circuit miles are counted separately and then added together even if they are found on the same spans.

6.1.3 Wires Down (Non-Major Events Days)

In the Draft Staff Proposal, Staff recommended a SOM for Wires Down Major Event Days, Red Flag Warning days, in HFTD. In their May 11, 2021 Informal Comments, PG&E did not support these metrics, preferring instead to use its own definition of Wires-Down metric included in PG&E's January 15, 2021 proposal,[169] which differs from Staff's definition. In opposing Staff's proposal, PG&E argued that including Major Event Days would result in "exemplary" performance in "a year with minimal extreme weather events" with "above average extreme weather events [driving]…adverse performance."[170]

Staff does not agree with PG&E's reasoning for objecting to the Wires Down Major Event Days metric. Since design and maintenance requirements for overhead circuits as specified in GO 95 do not reference Major Event Days, there is no direct linkage between a circuit failing on a Major Event Days and violation of GO 95's design and maintenance requirements. GO 95 specifies wind loading force related minimum strength requirements for overhead conductors in GO 95 Sections 43.1 and 43.2. These wind loading forces can be translated into minimum wind speeds that different conductor types must be able to withstand. Coupled with local wind gust speed data, PG&E could potentially determine whether a particular conductor failed below the minimum wind speed. Nevertheless, failure in this particular conductor may not be solely due to wind loading/speeds.

A metric that measures failure of overhead conductors on Major Event Days gives visibility to the vulnerability of PG&E's overhead electric assets to extreme weather events. As indicated earlier, (See Section 1.3 above), this metric has relevance in the context of risk-based decision making and the expectation for a utility to address safety and reliability risks, notwithstanding extreme weather events. Although a Wires Down Major Event Days metric by itself may not necessarily point to deficiencies in PG&E's compliance with design and maintenance requirements in GO 95, it can serve as an indicator to help direct attention to areas that warrant closer oversight by the Commission.

Staff recognizes PG&E's concern about being held accountable to weather events or other exogenous factors out of the utilities' control. MGRA writes "As noted by PG&E during the May 4th meeting, valuable information regarding system aging and vegetation

[169] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 20-21.

[170] PG&E's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 10.

contacts can be collected as all times. What is important is to have Major Event Days included in this sample, possibly as a second wires down metric or as a supplemental field, so that MED wires down can be differentiated from non-MED wires down.[171]"

Collecting both Major Event Days and Non-Major Event Days Wires Down metrics addresses MGRA's concern about missing the influence of Major Event Days on Wires Down Events, and collecting data without will allow PG&E and Staff to assess the difference between Wires Down performance with and without extreme weather events.

As such Staff proposes and additional SOM to capture non-Major Event Days events.

Staff proposes *Wires Down (Non-Major Event Days) in HFTD Areas* SOM be defined as follows:

> *Number of Wires Down events on Non-Major Events Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by total circuit miles of overhead primary distribution and transmission lines x 1,000, in HFTD Areas, in a calendar year.*

Staff's proposed definition of a *Wires Down event* applies to this metric.

For this metric, overhead primary distribution and transmission circuit miles are counted separately and then added together even if they are found on the same spans.

6.1.4 Wires Down in HFTD Areas (Red Flag Warning Days)

In the Draft Staff Proposal, Staff initially proposed *Wires Down Red Flag Warning Days* in HFTD Areas SOMs. As discussed above, Staff's final recommendation on the definition of "*Wires Down*," also applies to this metric.

Wires Down Red Flag Warning Days in HFTD Areas SOM is defined as follows:

> *Number of Wires Down events on Red Flag Warning Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by total circuit miles of overhead primary distribution and transmission lines x 1,000, in HFTD, in a calendar year.*

For this metric, overhead primary distribution and transmission circuit miles are counted separately and then added together even if they are found on the same spans.

6.1.5 Patrols and Detailed Inspections Compliance (HFTD)

Utilities report maintenance related metrics on annual basis as part of their Wildfire Mitigation Plans, separately for distribution and transmission systems. Some of the key metrics track total miles inspected and inspection findings. These metrics are broken into 28 sub-metrics recording various types of patrols and inspections to better inform the Commission on utility operations and grid conditions.

[171] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 7.

Circuit patrols and inspections are frontline defenses established to prevent hazardous conditions from developing and potentially escalating into serious incidents. These metrics track how well utilities are inspecting and maintaining their distribution and transmission assets including conductors, connectors, poles, towers, crossarms and other essential equipment to enable the safe operation of their assets. Since inspections serve as an early warning bell to detect emerging hazardous conditions and prevent them from escalating into serious incidents, this metric has both lagging-indicator and leading-indicator characteristics. These metrics track the number of occurrences in the past calendar year in which the utility inspected or patrolled the overhead circuits less frequently than scheduled.

In its Draft Staff Proposal, Staff initially recommended four separate metrics as SOMs suitable for use as Triggering Events for the purpose of PG&E's EOE process:

- *Overhead Distribution Patrols Compliance in HFTD Areas,*
- *Overhead Distribution Detailed Inspections Compliance in HFTD Areas,*
- *Overhead Transmission Patrols Compliance in HFTD Areas,*
- *Overhead Transmission Detailed Inspections Compliance in HFTD Areas*

Staff's initial definition, which was included in the Draft Staff Proposal for *Patrols and Inspections Compliance in HFTD, was as follows*:

> *Total circuit miles of detailed inspections (or patrols) that fell below the minimum detailed inspection (or patrol) frequency requirements divided by the total circuit miles of required detailed inspections (or patrols), in HFTD area in past calendar year.*

On its May 11, 2021 informal comments on the Draft Staff Proposal, PG&E pointed out that it tracks overhead electric inspections by the number of structures inspected rather than by circuit miles. Staff agrees that the metrics for overhead electric patrols and inspections should be modified to measure in units of structures that missed inspection rather than in circuit miles. PG&E also suggested combining these four metrics into one. Staff disagrees that these four inspection related metrics should be combined into one metric, since there is value in having this level of granularity to measure compliance of patrols versus detailed inspections to help pinpoint deficient areas. Likewise, there is value in distinguishing inspection of distribution versus transmission infrastructures for the same reason. As a result of the change to measure electric inspections in units of structures that missed inspection, Staff proposes two new Vegetation/Conductor Clearance Inspection Compliance SOMs in HFTD since vegetation-related inspections are recorded by circuit miles.

Accordingly, Staff's final recommendation is that *Overhead Patrols and Inspections in HFTD is defined as follows*:

> *Total number of overhead electric structures that fell below the minimum patrol (or inspection) frequency divided by the total number of overhead electric structures that required patrols (or inspections), in HFTD area in past calendar year.*

where,

For distribution, "Minimum patrol (or inspection) frequency" refers to the frequency of patrols (or inspections) of circuits as specified in GO 165.

"Structures" refer to electric assets such as transformers, switching protective devices, capacitors, lines, poles, etc.

This modified definition (changing "circuit miles" to structures) also applies to the SOMs on Overhead Transmission Patrols and Detailed Inspections in HFTD Areas.

For transmission, "Minimum patrol (or inspection) frequency" refers to the frequency of circuit patrol (or inspection) requirements, as applicable.

Staff proposes two new SOMs on Vegetation/Conductor Clearance Inspection:

- *Distribution Vegetation/Conductor Clearance Inspections in HFTD Areas*, defined as follows:

  Total circuit miles of vegetation/conductor clearance inspection on distribution circuits that fell below the minimum vegetation management inspection frequency divided by the total distribution circuit miles that required inspections, in HFTD area in past calendar year.

- *Transmission Vegetation/Conductor Clearance Inspections in HFTD Areas*, defined as follows:

  Total circuit miles of vegetation/conductor clearance inspection on transmission circuits that fell below the minimum vegetation/conductor clearance inspection frequency requirements divided by the total transmission circuit miles that required inspections, in HFTD area in past calendar year.

6.1.6 Backlog Compliance Metrics

At the January 28, 2021 workshop on SOMs, Cal Advocates suggested using backlog metrics to measure completion of work orders.[172] Since inspection backlog metrics are subsumed into Staff's proposed SOMs, *Patrols Compliance in HFTD Areas, and Detailed Inspections Compliance in HFTD Areas*, introducing a metric that measures the backlogs of overdue maintenance, and corrective work orders, including those generated as a result of patrols and inspections, fills the remaining gap.

A Backlog Compliance metric also covers work orders generated by electric system hardening and Enhanced Vegetation Management programs and measures the number of overdue work orders and the percentage of such overdue work orders in the past calendar year.

The longer system maintenance is delayed or the longer a deficient or unsafe condition remains uncorrected the greater will be the likelihood for the condition to result in an actual

[172] PG&E's March 1, 2021 Additional Comments at 2.

incident. Additionally, when an unsafe or deficient condition is corrected early, the extent of deterioration to the equipment will be less, which could reduce both the likelihood and the potential consequence of a resulting incident.

This type of metric has both lagging and leading characteristics; lagging with respect to the failures to complete work orders on time, which is predominantly an operational performance issue, and leading relative to potential incidents that could occur due to the failures to complete work orders on time.[173]

In its Draft Staff Proposal, Staff recommended adopting *Backlog Compliance Metrics for overhead distribution circuits and for overhead transmission circuits in HFTD Areas,* as a category of SOMs suitable for use as Triggering Events for the purpose of the EOE process. *Backlog Compliance Metrics* is defined as

> *Total number of overdue overhead work orders in High Fire Threat Districts that exceeded the maximum allowable/allotted time frame to complete the work order divided by the total number of closed or still-open electric work orders, in past calendar year, evaluated at the end of the year.*

On their May 11, 021 informal comments on the Draft Staff Proposal, PG&E opposes including the vague term "risk mitigation" in the specification for work orders. Staff agrees that this term is too vague for use in specifying work orders. Accordingly, Staff modified the definition *Backlog Compliance Metrics* to remove the words "risk mitigation" from the specification for this metric.

Staff Proposed Backlog Compliance Metrics in HFTD is now defined as follows:

> *Total number of overdue overhead electric work orders in high fire threat districts that exceeded the maximum allowable/allotted time frame to complete the work order divided by the total number of closed or still-open overhead electric work orders, in past calendar year, evaluated at the end of the year.*
>
> where,
>
> *"Work Orders" include maintenance, and corrective work orders (including those generated as a result of patrols and detailed inspections), electric system hardening, and Enhanced Vegetation Management programs.*

[173] TURN recommended WSD Compliance Actions as a triggering SOM, focusing on the number of Category 1-Severe findings, while all categories of defects be included as data points to provide context to the overall number and severity of the defect. WSD Compliance Actions are already encompassed as triggers under the EOE process. As such, Staff does not support adopting this as a SOM as it would be redundant with WSD enforcement activities. TURN's March 1, 2021 Additional Comments, at 12.

6.1.7 Electric Emergency Response Time

PG&E proposes an "Electric Emergency Response Time" metric as a safety measure relevant to the risk of failure of electric distribution overhead assets, as well as a quality of service and management measure, and defines this as follows:[174]

> Percentage of time that utility personnel respond (are on site) within 60 minutes after receiving a 911 call (electric related), with onsite defined as arriving at the premises to which the call relates.

Staff agrees with PG&E's proposed *Electric Emergency Response Time* as a SOM suitable for use as Triggering Event for the purpose of PG&E's EOE process.

6.2 Reporting Requirements

Assembly Bill (AB) 1054 (Holden, Chapter 79 statutes of 2019) requires that IOUs submit Wildfire Mitigation Plans to the Wildfire Safety Division, which requires IOUs to annually report on metrics that relate to the following wildfire risk categories: 1) environmental conditions, 2) grid conditions, and 3) wildfire impacts.[175]

As part of the 2020 Wildfire Mitigation Plans filings, the Wildfire Safety Division began requiring IOUs to submit specified geographic information system (GIS) data related electrical infrastructure, risk mitigation, and incident. This information is now required on a quarterly basis.[176] As noted previously, "insufficient progress toward, any of the metrics…set forth in its approved wildfire mitigation plan" may be used as a Triggering Event in the EOE process.[177]

To supplement oversight already underway by Wildfire Safety Division, Staff recommends that a subset of electric risk-related metrics be included in the SOMs. In this way the SOMs can act as "indicator lights" on electrical risks. If the SOMs trends look troubling, Staff can seek additional information from Wildfire Safety Division (soon to be the Office of Energy Infrastructure Safety), the Electric Safety Reliability Branch, and the Wildfire Safety Enforcement Branch to substantiate whether the SOMs metrics and/or other EOE process metric substantiate a Triggering event.

[174] PG&E's ACR Response, at 13.

[175] Appendix A includes an excel workbook with details on WSD reporting metrics divided by the three categories, with two categories, grid conditions and wildfire impacts, broken down separately for distribution systems and transmissions systems.

[176] Wildfire Safety Division Data Standard v2.

[177] Step 1 Triggering Event ii "PG&E fails to comply with, or has shown insufficient progress toward, any of the metrics (i) set forth in its approved wildfire mitigation plan…" D.20-05-053 Appendix A, at 1.

Staff recommends that PG&E reports Staff's proposed electric system related SOMs on an annual basis and that PG&E provide all historical annual data with its first SOM submission.

6.3 Staff Recommendations on Electric Related SOMs

Based on consideration of parties' informal comments on the Draft Staff Proposal and TWG feedback, for the reasons articulated above, Staff modified the definitions for Wires Down, and Patrols and Inspections SOMs. Staff also proposes two additional metrics on Vegetation Line Clearance Inspections Compliance SOMs. Refer to Appendix C for the complete list and definitions of Staff's proposed electric system related SOMs.

7 Ignitions & Wildfires

PG&E proposes a "Reportable Fire Ignitions" metric as a safety measure relevant to wildfire risks, defined as follows:

> Powerline-involved fire incidents annually reportable to the CPUC per D.14-02-015 and within the utility's High Fire Threat District. A reportable fire incident includes all of the following: (1) Ignition is associated with the utility's powerlines (both transmission and distribution); (2) something other than the utility's facilities burned; and (3) the resulting fire traveled more than one meter from the ignition point"[178]

TURN agrees with PG&E's proposed SOM here and recommends additional SOMs for Acreage Burned and WSD Compliance activities. TURN states that even if the number of reportable ignitions falls, if one of the ignitions caused a large wildfire, PG&E should be subject to stricter oversight and enforcement. Including both reportable ignitions and acreage burned gives context to the reportable ignitions metric and may provide a better reflection of the larger wildfires happening in PG&E's territory, according to TURN.[179] Staff agrees with TURN that this additional data regarding the impact should be reported. WSD collects acreage burned, fatalities, structures damaged or destroyed, and OSHA reportable injuries reported as part of their Wildfire Mitigation Plan reporting requirements. All WFMP metrics can be used as a Triggering Event under Step 1 of the EOE process.[180] As noted in the introduction of this section, the redundancy associated with collecting these metrics as SOMs provides for rigorous oversight and enforcement on wildfire related metrics. In the event Staff observes a concerning trend on ignitions, Staff can consult with Wildfire Safety Enforcement Branch and WSD, evaluate their data and make appropriate recommendations to the Commission associated with EOE process.

TURN proposes a refinement of PG&E's proposed reportable fire ignitions metric to only include ignitions in the HFTD that occur on red flag warning days. TURN indicates that this metric would demonstrate a reduction in ignitions most likely to result in a catastrophic wildfire.[181] Again, Staff agrees with TURN that this would be an excellent metric to collect and track. When WSD collects their ignition data for their GIS database, an attribute entitled, '[Red Flag Warning] RFW status' is entered along with it. "Insufficient Progress" on the GIS data, like all WFMP data, can also be used as a Triggering Event in Step 1 of the EOE process at the Commission's discretion.

SCE proposes CPUC-reportable ignitions in High Fire Risk Area (HFRA). SCE states that it would be support including this measure in the SPMR and recommends providing the

[178] PG&E's ACR Response, at 13.

[179] TURN March 1, 2021 Additional Comments, at 11.

[180] Step 1 Triggering Event ii "PG&E fails to comply with, or has shown insufficient progress toward, any of the metrics (i) set forth in its approved wildfire mitigation plan…" D.20-05-053 Appendix A, at 1.

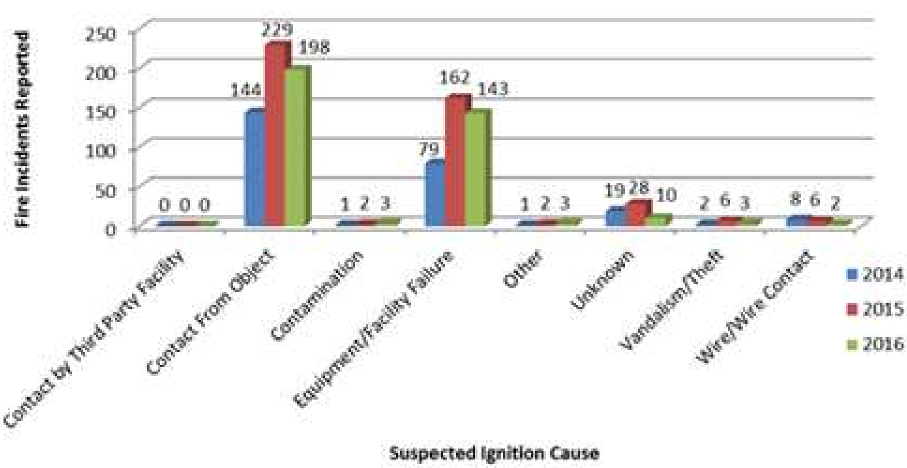
[181] TURN March 1, 2021 Additional Comments at, 11.

data for Fire Ignitions in the same format as the Wildfire Mitigation Plan, which includes additional categories. SCE indicates that in this case the granularity of reported metrics better corresponds to tranches used to define risks and risk mitigations, which is accomplished by including the additional sub-categories for this metric.[182]

Staff agrees with SCE's recommendations and proposes adopting CPUC-Reportable Ignitions in HFTDs as a SOM for use as Triggering Events for the purpose of PG&E's EOE process.

Analyzing and trending data such as increase or decrease in the number of ignitions in HFTD caused by utility equipment per year may indicate problem spots on distribution and transmission systems and are a leading indicator of future potential equipment failures. By tracking ignitions caused by utility equipment, broken down by distribution and transmission systems and their segments, the Commission will have broader ability to determine whether utility operations and capital investments are resulting in safety improvements. Figure 3 below shows the suspected primary causes of ignitions in PG&E service territory during the years 2014 – 2016.[183]

Figure 3: PG&E Fire Incidents by Suspected Ignition Cause



[182] SCE March 1, 2021 Additional Comments, at 9.

[183] 2014-2016 Fire Incident Data Collection.

7.1 Ignitions Related SOMs

In its Draft Staff Proposal, which was circulated to the TWG for informal comments, Staff initially has proposed CPUC-Reportable Fire Ignitions in HFTD Related SOMs, outlined in the following sub-sections.

Staff views a CPUC-Reportable Fire Ignitions in HFTD Areas metrics as consistent with current global best practices in the electric utility industry and meriting Commission adoption. D.14-02-015 adopted a "Fire Incident Data Collection Plan" that requires certain IOUs to collect and annually report certain information that would be useful in identifying operational and/or environmental trends relevant to fire-related events.

7.1.1 CPUC-Reportable Ignitions in HFTD Areas

CPUC-Reportable Fire Ignitions in HFTD Areas are *Ignition events in HFTD* reported to the Commission pursuant to D.14-02-015, whether or not the utility's infrastructures were preliminarily or ultimately determined by either the utility or the Authorities Having Jurisdiction (AHJs) to have played a role in either initiating or propagating the ignitions.

CPUC-Reportable Ignitions in HFTD Areas measures the number of reported ignitions in HFTD areas in a calendar year. The metric distinguishes ignitions caused by transmission from distribution circuits. The utility shall also express the number of reported ignitions as a percentage of circuit miles, separately for transmission and distribution circuits.

Staff recommends four metrics for CPUC-Reportable Ignitions in HFTD Areas, reported in the past calendar year, to be defined as follows:

- *Number of CPUC-Reportable Ignitions HFTD Areas (Distribution): Number of CPUC-Reportable Ignitions involving overhead distribution circuits in HFTD Areas.*
- *Number of CPUC-Reportable Ignitions HFTD Areas (Transmission): Number of CPUC-reportable Ignitions involving overhead transmission circuits in HFTD Areas.*
- *Percentage of CPUC-Reportable Ignitions in HFTD (Distribution): (Number of CPUC-Reportable Ignitions involving overhead distribution circuits in HFTD) divided by (total circuit miles of overhead distribution circuits in HFTD).*
- *Percentage of CPUC-Reportable Ignitions in HFTD (Transmission): (Number of CPUC-Reportable Ignitions involving overhead transmission circuits in HFTD) divided by (total circuit miles of overhead transmission circuits in HFTD).*

Distribution and transmission circuit miles are counted separately if they are on the same spans.

7.2 Discussion

MGRA supports inclusion of an ignition metric, noting: "[i]t is very important to note, however, that CPUC-reportable ignitions do not include major fires under investigation or litigation. Staff may want to include these additional fires, as they represent the lion's share of reported fatalities and damage."[184] This is a similar concern to that raised by MGRA in their March 29th comments on Wildfire Mitigation plans where they said, "Official ignition data collection under CPUC auspices was begun in 2015. One important point of compromise in the original negotiations was that utilities were allowed to withhold any ignition data for any event that they contested was a utility-caused ignition or that was under criminal investigation or civil litigation, in order to preserve their right against self-incrimination."[185]

Staff agrees that including ignitions that are under investigation or subject to litigation is appropriate. To that end, Staff recommends expanding the definition adopted in D.14-02-015 to include CPUC reportable ignitions and any ignitions determined by the Authority Having Jurisdiction investigation to originate from utility infrastructure. This will encompass ignitions that remain the subject of ongoing litigation or other situation where PG&E has yet to formally acknowledge responsibility for a specific ignition.

7.3 Staff Recommendation on Ignitions Related SOMs

Staff final recommendation is to define the *CPUC-Reportable Ignitions in HFTD* SOMs as: *the number of CPUC-Reportable ignitions and any other ignitions determined by the Authority Having Jurisdiction to originate from utility infrastructure.*[186]

Refer to Appendix C for Staff's final recommendations on the definitions of the CPUC-Reportable Ignitions in HFTD SOMs.

---

[184] MGRA's Informal Comments on Staff Draft Proposal on Phase I Track 2 issues, May 11, 2021, at 8.

[185] Mussey Grade Road Alliance Comments on 2021 Wildfire Mitigation Plans of PG&E, SCE, and SDG&E, at 87.

[186] The number of powerline-involved fire incidents annually reportable to the CPUC per Decision 14-02-015. A reportable fire incident includes all of the following: 1) Ignition is associated with a utility's powerlines and 2) something other than the utility's facilities burned and 3) the resulting fire traveled more than one meter from the ignition point.

8 Natural Gas System

Catastrophic circumstances arising from natural gas incidents are fortunately rare. Many safety improvements have been made to California's gas infrastructure since the 2010 San Bruno rupture.[187] Continuation of this safety performance relies on diligent adherence to safe operating practices. The following Staff proposed SOMs aim to measure the IOUs' performance of those activities.

The primary cause of gas safety incidents is loss of containment from the pipeline, which may be due to failure of control devices, mechanical damage from excavation, or degradation of the pipe's material or sealants. Most containment losses result in minor gas leaks which do not ignite but require repairs according to schedules set by the CPUC General Order 112-F.[188]

Staff accepts PG&E's proposed SOMs with some modifications and additions as discussed in the following sections.

8.1 Natural Gas System Related SOMs

In its Draft Staff Proposal, which was circulated to the TWG for informal comments, Staff initially has proposed Natural Gas System Related SOMs, outlined in the following sub-sections. Based on the parties' suggestions, Staff has modified some of its initial proposed SOMs as discussed in the following sub sections.

Refer to Appendix C for a summary of Staff Proposed SOMs, including modified SOMs based on suggestions made by parties in their informal comments on the Draft Staff Proposal.

8.1.1 Gas Dig-Ins

The 2020 PG&E RAMP report indicates that excavation dig-ins are a leading cause of pipeline loss of containment incidents.[189] A frequent result is a gas leak that may require evacuation of the neighborhood and closure of nearby businesses until repairs can be made. In rare cases a rupture with fire can occur. Since 2010, there have been two PG&E transmission line dig-ins by third-party excavators that resulted in the death of the equipment operators themselves.[190]

[187] D.12-12-030, *Decision Mandating Pipeline Safety Implementation Plan, Disallowing Costs, Allocating Risk of Inefficient Construction Management to Shareholders, and Requiring Ongoing Improvement in Safety Engineering*.

[188] CPUC General Order 112-F, Section 143.2.

[189] PG&E 2020 RAMP Report, Figure 7-1.

[190] Data from Pipeline and Hazardous Materials Safety Administration, US Dept. of Transportation.

While gas companies cannot prevent all dig-ins, safety regulations require them to conduct public awareness campaigns about the Underground Service Alert program as part of their damage prevention effort.[191] Contractors who are planning excavations are expected to call 811 to create Underground Service Alert tickets which inform all utilities of the pending excavation. Utilities must respond to Underground Service Alert tickets by marking the location of buried pipelines for the excavators to see. The excavator must then follow safe digging protocols, such as hand-digging within a safe distance of the underground pipe. If a utility fails to respond with accurate marking in the time window required, they may have contributed to a dig-in.

PG&E proposes the *Gas Dig-In Rate* metric as a safety measure relevant to risks regarding the loss of containment on gas pipelines, defined as: "Number of gas dig-ins per 1,000 Underground Service Alert tickets received for gas. The dig-in component tracks all dig-ins to PG&E gas subsurface installations. A gas dig-in refers to damage which occurs during excavation activities (impact or exposure) and results in a repair or replacement of an underground gas facility."[192] PG&E indicates that this metric is like the Gas Dig-In Rate used in the SPMs, except that the SPM metric counts only third-party gas dig-ins.[193]

Sempra Gas do not object to the inclusion of all gas dig-ins for this metric (first, second, and third party) if the metric is reported as set forth in General Order 112-F.[194] TURN had no comment but recommends[195] addition of Gas Loss of Containment and Shut-In Time as SOMs.

The SPM measurement units for Dig-Ins are the number of events per 1,000 Underground Service Alert Tickets received, but only including third-party events. The metric is typically used by utilities to gauge the effectiveness of public awareness campaigns and is reviewed during audits of the public awareness program. Staff agrees with PG&E's proposal to add all parties including the company itself and contractor dig-ins to provide a comprehensive total.

For SOM purposes, Staff recommends separate Gas Dig-In metrics for Transmission and Distribution systems. The consequences of a transmission loss of containment can be more severe than a distribution event. Staff recommends adopting the following metrics as SOMs suitable for use as Triggering Events for the purpose of PG&E's EOE process:

- *Number of Gas Dig-Ins per 1,000 Underground Service Alert tickets on Transmission pipelines*

---

[191] Code of Federal Regulations (CFR), Title 49, Part 192 Section 614.

[192] PG&E's ACR Response, at 11.

[193] D.19-04-020, (SPM #5), Approved Safety Performance Metrics (Version 1.0), Attachment 1.

[194] Sempra's March 1, 2021 Additional Comments, at 3.

[195] TURN March 1, 2021 Additional Comments, at 12.

- *Number of Gas Dig-Ins per 1,000 Underground Service Alert tickets on Distribution pipelines*

  Number of Gas Dig ins per 1,000 Underground Service Alert tickets is defined as: *the number of excavation damages per 1,000 Underground Service Alert tickets by first, second, or third party.*

Excavation damage is a leading cause of pipeline safety incidents. While utilities do not have complete control over third-party dig-in damage they can exert influence and are required to promote damage prevention by safety regulations.

These metrics have both leading and lagging properties. They are leading in the sense that dig-ins produce loss of containment; when more loss-of-containment incidents occur, the likelihood of a high-consequence event increases. They are lagging as an indication that public awareness and other damage prevention operations have become less effective.

8.1.2 Large Overpressure Events

Gas safety regulations specify the Maximum Allowable Operating Pressure (MAOP) for pipelines based on the strength of the pipe material and the population density in the potentially affected area. PG&E has defined "large" events as those exceeding the MAOP by certain amounts depending on the pipeline conditions. For example, a transmission OP event would be considered large if the pressure reached 10 percent or more above the MAOP. The measurement units are the number of large events per time.

This metric meets the selection criteria of *objective, measurable, reportable, and verifiable*. It is a leading metric for loss of containment. Overpressure does not usually result in loss of containment but the higher the number of overpressure events the more likely a leak or rupture will occur.

The metric was proposed by PG&E. PG&E defines the Large Overpressure Events metric as:

"Count of large overpressure events. The proposed pressure limits for large [Overpressure] OP events are:

- High pressure gas distribution:
  - (MAOP 1 psig to 12 psig) greater than 50 [percent] above MAOP
  - (MAOP 12 psig to 60 psig) greater than 6 psig
- Low pressure gas distribution: by 16 inches water-column
- Transmission pipelines: by 10 [percent] MAOP (or the pressure produces a hoop stress of ≥75 [percent] Specified Minimum Yield Strength [SMYS], whichever is lower)."[196]

[196] PG&E's ACR Response, at 12.

PG&E indicates that this metric is already reported to the Commission, and while there is currently no industry-wide metric against which PG&E's performance can be benchmarked, its value and importance support its inclusion as a SOM.[197]

There are minor differences in the way PG&E defines a "large" overpressure event and the definitions of GO112-F for reporting overpressure events. Staff recommends the Commission adopt a Large Overpressure Event metric but recommends adhering to the GO112-F definitions of an overpressure event for SOM reporting to maintain consistency.

Sempra have no objection to reporting overpressure events as specified in General Order 112-F Sections 122.2(a)(3) (per event), 122.d(5) (quarterly), and 123.2(d) (annually). [198] General Order 112-F requires annual reporting of overpressure events, but with different criteria than proposed by PG&E for this metric.

To avoid confusion and maintain consistency, Staff recommends the following definition from GO112-F 122.2(d)(5):

> *"Incidents where the failure of a pressure relieving and limiting stations, or any other unplanned event, results in pipeline system pressure exceeding its established Maximum Allowable Operating Pressure (MAOP) plus the allowable build up set forth in 49 CFR § 192.201."*[199]

Staff further recommends that to allow comparison with other IOUs, the number of overpressure events should be normalized to the total length of pipeline in the PG&E system. The PG&E system total is approximately 50,000 miles of transmission and distribution pipeline.

Staff recommends adopting the following metrics as SOMs suitable for use as Triggering Events for the purpose of PG&E's EOE process:

- *Number of Large Overpressure Events, where overpressure events are defined as those reportable under GO112-F 122.2(d)(5).*[200]
- *Number of Large Overpressure Events for each unit of 50,000 miles, (overpressure events as reportable under GO112-F 122.2(d)(5)).*

If the Commission decides to also require SoCalGas to report this SOM, Staff recommends that SoCalGas be required to normalize its reporting by the SoCalGas's total system miles of approximately 105,000 miles. For example, 20 events for SoCalGas would be normalized to 10 per every 50,000 miles to allow comparison with PG&E.

---

[197] PG&E's ACR Response, at 12.

[198] Sempra's March 1, 2021 Additional Comments, at 3.

[199] CFR Title 49 Part 192 Section 201.

[200] CFR Title 49 Part 192 Section 201.

Although the definition from General Order 112-F 122.2(d)(5) is specified for quarterly reporting, Staff recommends that PG&E report these SOMs on the same basis chosen for the other SOMs.

8.1.3 Gas Emergency Response Time

PG&E operates a call center to receive phone reports of suspected gas emergencies. The center dispatches a PG&E representative to the site for initial assessment of an unsafe condition. Prompt response to an emergency helps to start the remediation sooner, which is expected to reduce the consequences. The metric Gas Emergency Response Time also gives some insight into quality of service and management effectiveness of the response operations.

PG&E proposes the metric Gas Emergency Response Time as a safety measure relevant to risks regarding the loss of containment of gas pipelines, as well as a quality of service and management measure.

PG&E defines the *Gas Emergency Response Time* as: "*Measured from the time PG&E is notified to the time a Gas Service Representative (or a qualified first responder) arrives onsite to the emergency location (including Business Hours and After Hours).*"[201] PG&E indicates that the metric measures the average response time for immediate response orders for the performance period.

Sempra recommend to that this metric be reported as set forth in General Order 112-F.[202] Staff notes, however, that there are differences from the GO112-F definition and the PG&E proposal in the determination of response activity completion. In the General Order, the response is completed when the reported leak is confirmed as not hazardous, or the operator completes actions to mitigate a hazardous leak. In the PG&E proposal, the response is completed by the arrival of the responder on site. Staff recommends the Commission adopt the metric as proposed by PG&E without modification because Staff is proposing an additional metric to track Gas Shut-In Time separately.

8.1.4 Gas Shut-In Time

The consequences of a gas incident can be more severe the longer gas continues to flow. If the gas is feeding a fire it may burn longer. If the gas has not yet ignited, more serious consequences may be avoided with prompt closure of the line.

TURN proposes a *Gas Shut-In Time* metric, defined as "*the average time in minutes required for the utility to stop the flow of gas during incidents involving mains, or services, when responding to any unplanned or uncontrolled release of gas*."[203]

---

[201] PG&E's ACR Response, at 12.

[202] Sempra's March 1, 2021 Additional Comments, at 3.

[203] TURN March 1, 2021 Additional Comments, at 12.

The timing for the metric starts when the utility first receives the report and ends when the utility's qualified representative determines, per the utility's emergency standards, that the reported leak is not hazardous, a leak does not exist, or the utility's representative completes actions to mitigate a hazardous leak and render it as being non-hazardous (i.e., by shutting-off gas supply, eliminating subsurface leak migration, repair, etc.) per the utility's standards. The longer a gas leak can flow, the greater potential consequences.

Gas Shut-In Time is reported separately for mains and services as SPMs.[204] Similarly, Staff recommends adopting two separate metrics as SOMs suitable for use as Triggering Events for the purpose of PG&E's EOE process:

- *Gas Shut-In Time for Mains*
- *Gas Shut-In Time for Services*

8.1.5 Uncontrolled Release of Gas on Transmission Pipelines

The loss of containment, or uncontrolled release, of gas from a transmission pipeline can have serious consequences. A release may take the form of a leak, or a rupture. Routine operations are aimed at preventing uncontrolled releases and such events are rare for transmission pipelines. Measurement units are the number of uncontrolled release events per period of interest.

The metric *Uncontrolled Release of Gas on Transmission Pipelines* applies only to transmission pipelines, which normally have very few such release events. But those events can have serious consequences due to the large amount of energy present in transmission lines. An increasing number of events increases the likelihood that one of them becomes a serious incident, so this metric is a leading indicator of potential incidents but also a lagging indicator for failure to control the release of gas.

All leaks are not routinely reported. The number of gas pipeline leaks repaired are reported to the Commission under GO112-F but some minor leaks may remain open for up to three years and so are not reported until repaired. Leaks that are associated with reportable incidents are also reported to the Commission; reportable incidents meet specified criteria such as $50,000 loss, injury requiring hospitalization, media attention, etc.

This metric will capture all leaks on transmission lines whether routinely reported or not. Staff recommends adopting *Uncontrolled Release of Gas on Transmission Pipelines* as a SOM suitable for use as Triggering Events for the purpose of PG&E's EOE process, defined as: the number of leaks, ruptures, or other loss of containment on transmission lines for the reporting period.

[204] D.19-04-020, (SPM #8,9), Approved Safety Performance Metrics (Version 1.0), Attachment 1.

8.2 Reporting Requirements

Currently, utilities are required to report natural gas Safety Performance Metrics (SPMs) once a year on March 31st to the Commission, pursuant to D.19-04-020:[205] Staff recommends that PG&E reports the following gas related SOMs on an annual basis and that PG&E provide all historical annual data with its first SOM submission.

8.3 Discussion

Parties' Informal Comments on Draft Staff Proposal

Cal Advocates supports the Draft Staff proposal, with suggested modifications to the response time SOMs. Rather than report a single average response time, the metrics should capture the distribution of response times in a granular way. SOM 4.5 and 4.9. Staff agrees with Cal Advocates that the Response Time SOMs 4.5 and 4.9 (and 5.1) should be modified to require SOM reporting of response times in a granular way, particularly as defined in GO 112-F, Section 123.2 c), which includes the times to render the leak non-hazardous (by shut in or other means) and time to arrive on site reported in intervals:

> *"Response times in five-minute intervals, segregated first by business hours (0800 – 1700 hours), after business hours and weekends/legal state holidays, and then by Division, District, and/or Region, to reports of leaks or damages reported to the utility by its own employees or by the public. The intervals start with 0-5 minutes, all the way to 40-45 minutes, an interval of 45-60 minutes and then all response times greater than 60 minutes."*

The timing for the response starts when the utility first receives the report and ends when a utility's qualified representative determines, per the utility's emergency standards, that the reported leak is not hazardous or the utility's representative completes actions to mitigate a hazardous leak and render it as being non-hazardous (i.e., by shutting-off gas supply, eliminating subsurface leak migration, repair, etc.) per the utility's standards. In addition, the utility must report, using the same intervals, the times for the first company responder to arrive on scene."

PCF supports the Staff proposal but suggests more emphasis for Safety Performance Metrics (SPMs) on gas operations and "clean energy metrics". PCF recommends modification of SPMs 27, 28, 29, and 31 to apply to gas as well as electric operations. They also propose several metrics, without specifying as SPMs or SOMs, to measure methane emissions because of GHG emissions concerns.

[205] D.19-08-020, *Second Phase Decision Approving Natural Gas Leak Abatement Program Consistent with SB 1371 and SB 1383,* August 15, 2019, Ordering Paragraph 2.

Safety Policy Division Staff are responsible for administration of the Natural Gas Leak Abatement Program (NGLA), as ordered in D.17-06-015[206] (cited by PCF in their comments). The NGLA Program requires regular reporting of natural gas leak data. The number, types, emission volumes, and sources of leaks is described in detail in those reports. The Program also requires biennial filings of Compliance Plans, to demonstrate how the utility will implement the twenty-six Best Practices for emissions reduction listed in the Decision, to achieve the Statewide GHG emissions reduction goal of forty percent by 2030. Further, the Second Phase NGLA Decision introduced a financial incentive to achieve an interim twenty percent reduction by 2025.[207]

Utility Consumer's Action Network (UCAN) mode no comments on the proposed gas SOMs but offered three "simple" metrics concerning the role of natural gas in climate change: Total GHG contribution from its customer footprint; Total gas losses determined as the difference from gas input to gas sold; and Total methane losses to the environment as a percentage of total gas losses.

Staff appreciates the concern about the role of natural gas in global warming. The State already has programs in place to regulate GHG emissions from natural gas combustion (Cap and Trade) and methane emissions from natural gas pipeline facilities (the Natural Gas Leak Abatement Program of the CPUC).

Staff does not agree that the proposed metrics are simple. Staff knows from experience that the subtraction of gas input minus gas sold, sometimes referred to as LUAF (Lost or Unaccounted For gas), is not an accurate representation of gas lost to the environment. Subtraction results include theft or other unbilled gas usage and inaccuracies in measurement, and so do not provide a reliable measurement of emissions. Methane leak volumes in cubic feet are the subject of intensive annual emission inventory reports co-written by the Safety Policy Division and the Air Resources Board (ARB). These reports show that the contribution to Statewide GHG by gas pipeline leaks is a very small component of methane emissions overall. The comprehensive GHG survey produced by ARB shows that total methane emissions are dominated by agricultural methane emissions, which in turn are a small part of total GHGs. Staff does not agree that further metrics are warranted.

Staff notes the interest in the GHG emissions impacts related to the delivery and operation natural gas systems by some parties. Staff respectfully suggests the parties review the existing program materials and reports such as the annual Methane Emissions Inventory co-produced by the Safety Policy Division and the Air Resources Board for comprehensive metrics on natural gas leaks from utility facilities, Available here: https://www.cpuc.ca.gov/General.aspx?id=8829

---

[206] D.17-06-015, *Decision Approving Natural Gas Leak Abatement Program Consistent with SB 1371,* June 15. 2017.

[207] D.19-08-020.

PG&E made the following suggestions for modifying Staff's recommended SOMs:

- SOM 4.1 and 4.2, *Pipeline Dig-Ins*: PG&E states they cannot separate dig-in information by transmission vs. distribution pipelines and recommends that the total of both is reported as one metric as they originally proposed. Staff agrees with the PG&E recommendation, SOM 4.1 should be modified to include transmission and distribution pipelines, and then 4.2 can be removed.
- SOM 4.4, *Normalized Overpressure Events*: PG&E supports this metric but suggests that the number of events should be normalized by the number of SCADA pressure transducer reading points instead of by pipeline miles. Staff agrees that the number of pipeline pressure transducer points is an appropriate figure for normalizing overpressure events. The detection of overpressure conditions is performed by the transducer devices installed along the length of a pipeline. If there are more transducers, there will be more opportunities for an overpressure to be found; and the total number of transducers will be roughly proportional to system size. Staff accepts the PG&E proposed modification.
- SOM 4.5, *Gas Emergency Response Time*: PG&E states that SOM 4.5 is the same as 4.9, so they should be condensed to one SOM. Staff agrees that as presented in the Staff Proposal these two are erroneously the same, and recommends the issue be resolved with the solution offered in the response to the Cal Advocates comments which differentiates time to arrive on site, and time to render the situation non-hazardous.
- SOM 4.6, *Gas Shut-In Time, Mains*: PG&E supports this metric but recommends median, rather than average, time. Staff notes that use of the response time metrics defined in GO 112-F, as recommended in the Cal Advocates discussion, would include shut-in time in a more granular fashion and so dismiss the question of median vs average.
- SOM 4.7, *Gas Shut-In Time, Services*: PG&E also recommends use of median, rather than average, time. As previously noted in 1.1.1 above, adoption of the GO 112-F response time metrics would include shut-in time in a more granular fashion.

PG&E also suggested modifications to SPMs 13 and 44, which are discussed in the SPM section (Part II of this document).

8.4 Staff Recommendations on Natural Gas System Related SOMs

Based on parties' informal comments on the Draft Staff Proposal, Staff has modified the following natural gas system related SOMs:

Staff Proposed SOM Name	Definition
Number of Gas Dig-Ins per 1000 USA tickets on Transmission and Distribution pipelines	Number of Excavation Damages per 1000 Underground Service Alert (USA) tickets by any party on all pipelines.
Number of Overpressure Events	Overpressure events as reportable under GO112-F 122.2 (d)(5).
Normalized Overpressure Events	Number of OP Events normalized by the number of pressure transducers on the system
Time to Respond on Site to Emergency Notification	Reported in increments per GO 112-F 123.2 (c), time to arrive on site.
Time to Resolve Hazardous Condition	Reported in increments per GO 112-F 123.2 (c), time to confirm non-hazardous condition.
Gas Shut-In Time, Mains	Reported in increments per GO 112-F 123.2 (c), time to shut-in gas when gas release occurs on a main.
Gas Shut-In Time, Services	Reported in increments per GO 112-F 123.2 (c), time to shut-in gas when gas release occurs on a service.

9 Quality of Service, Quality of Management & Affordability

D.20-05-053 states that "the Commission will consider metrics to measure PG&E's quality of service and quality of management in the proceeding addressing Safety and Operational Metrics described above.[208]" Accordingly, the Assigned Commissioner's Ruling issued on November 17, 2020 states that PG&E should consider guidance in D.20-05-053 on "quality of service and quality of management metrics, which should constitute a significant portion of the proposed 'operational' metrics. PG&E should include metrics on customer engagement, satisfaction, and welfare in its proposed quality of service and management metrics."[209] Additionally, as noted previously, D.20-05-053 articulates that SOMs should be a means to "ensure that PG&E provides safe, reliable and affordable service consistent with California's clean energy goals."[210]

9.1 Quality of Service

For a Quality of Service SOM, Staff only recommends one metric – *Average Speed to Answer for Emergencies.* Several other metrics, which are fundamental to quality of service such as reliability and emergency response time are included in prior metrics. This section also discusses other alternatives that Staff considered, and Staff requests that parties propose additional quality of service metrics if they feel they would be beneficial.

PG&E proposal on this is as follows:[211]

"The Average Speed of Answer for Emergencies metric is a safety measure relating to multiple risks, as well as a quality of service and management measure, and is defined as follows:

> Average Speed of Answer (ASA) in seconds for Emergency calls handled in Contact Center Operations.

This metric is a leading indicator, outcome-based, benchmarkable, and relies on objective data."

Staff agrees with PG&E that Average Speed of Answer is a good metric for the reasons PG&E articulates.

SCE comments that "this metric should include defining precisely what 'emergency' means in this context. Absent a common definition, it will be very difficult for the IOUs to provide reasonably consistent and comparable metric data that will be useful to the

[208] D.20-05-053 at 90.

[209] Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics, November 17, 2021.

[210] D. 20-05-053 at 38.

[211] PG&E's ACR Response.

Commission."[212] SCE makes a valid point regarding this metric and Staff agrees that a clear definition in the context of this metric is important. In this case, the context is quality of service and, as PG&E uses this metric in their Short-Term Incentive Program (STIP), the metric is intended "to promote prompt handling of emergency calls from customers."[213]

When a customer calls PG&E, the customer is prompted to denote whether the call relates to an emergency. If the customer denotes an emergency, the call is transferred into a queue, at which time a speed-of-answer measurement begins and then ends when the call is answered by a representative. This metric measures the average speed of answer in seconds for emergency calls, thereby promoting expeditious handling of such calls.[214] In this context, this metric would be measuring PG&E's customer service at a critical time – when the customer believes they are experiencing an emergency. For this reason, it is a useful measure of quality of service.

As noted above, TURN accurately points out that "[i]t is important to know that the utility is answering calls in a timely matter, but the [Average Speed of Answer] ASA provides only limited insight on safety. The metric tracks the [Average Speed of Answer] ASA instead of the time from the receipt of the call to the resolution of the potential emergency. The utility could have an effective and efficient call center, but it does not necessarily follow that the resolution of the safety concern at issue in the call will be quickly and efficiently addressed." TURN's observation is entirely correct, but as noted elsewhere in this proposal, SOMs, at the direction of the Commission, should also include metrics on customer engagement and satisfaction.

Other Quality of Service Metrics for Consideration by Parties

Aside from the Average Speed of Answer metric, PG&E did not recommend metrics that directly measure quality of service, but instead argues that their proposed SOMs "provide a representative, objective assessment of PG&E's service and management priorities. As an initial matter, metrics that capture key safety and reliability risks go to the very heart of service and management priorities; taken as a whole, the SOMs appropriately address those issues.[215]" PG&E goes on to point out that their proposal includes electric and gas emergency response time as well as SAIDI (Unplanned). Staff agrees that emergency response time and measurements of reliability are important elements of quality of service and have included them in prior sections. However, in addition to the other SOMs that cover reliability and safety, staff believes other quality of service metrics would be beneficial in promoting improved operations via the EOE process.

---

[212] SCE's Opening Comments on Assigned Commissioner's Ruling (SOMs), January 25, 2021,, at 8.

[213] SCE's Opening Comments on Assigned Commissioner's Ruling (SOMs), January 25, 2021, at 8.

[214] Executive Compensation Approval Request to Wildfire Safety Division, January 15, 2021.f

[215] PG&E's ACR Response at 10.

As discussed in the April 22nd Draft Proposal circulated to parties, Staff evaluated other possibilities that were ultimately rejected here. Staff recommends that further research and discussions both within the Commission and with parties should take place before an additional quality of server operational metric is adopted.

Measuring quality of service will be useful to the Commission in better understanding the customer experience in ways beyond affordability, reliability, safety, and in fielding customer complaints. On the other hand, the reliability and safety SOMs proposed here may be very highly correlated with customer satisfaction obviated the need for a specific customer satisfaction metrics. In any case, at this time, Staff does not have a specific recommendation beyond Average Speed to of Answer.

9.2 Quality of Management

As noted above, D.20-05-053 states that the Commission will consider metrics to measure PG&E's quality of service and quality of management in the proceeding addressing safety and operational metrics. At this time, Staff does not recommend an additional SOM on Quality of Management. As noted above, PG&E did not propose any quality of service or quality of management metrics. Likewise, no parties indicated a need for "quality of management" metrics in their comments on PG&E's SOMs proposal. Staff invites parties to propose potential "quality of management" metrics in comments.

Staff believes that EOE process evaluation of PG&E Quality of Management is important. Fortunately, step 1 of the EOE Process already directly addresses this. If PG&E fails to show "sufficient progress on any metric…resulting from its on-going safety culture assessment"[216] they can be placed into step 1 of the EOE process. The "ongoing safety culture assessment" refers to the PG&E Safety Culture Investigation (I.15-08-019) and the recommendations required under D.18-11-050, *Decision Ordering PG&E to Implement the Recommendations of the NorthStar Report.* These recommendations include several measurable quality of management recommendations.

Examples of the over 60 recommendations that PG&E is required to implement as part of the Safety Culture Assessment include requiring implementation of regular pipeline operator qualification status reports, a requirement to increase the number of supervisors in field operations for all lines of business to limit the span of direct reports to a maximum of 1:20, a requirement to transfer administrative tasks such as scheduling of work, training and paperwork review from supervisors to the office-based staff, reducing travel requirements for field personnel and supervisors, an annual (or biennial) blue sky strategic safety planning exercise to concentrate on the changing environment, potential risks and threats," and

[216] D.20-05-053, Appendix A, at 2.

several other mandatory changes to how PG&E manages their operations in order to improve safety and safety culture.[217]

The Safety Culture and Governance Section within the Commission's Safety Policy Division reviews quarterly reports from PG&E and regularly consults with North Star to ensure progress is being made on these recommendations. The next quarterly report will be submitted before the end of April.

9.3 Affordability

Californians' energy costs and rates are rising and disproportionately impact affordability for low-to-moderate-income residents. The Commission is increasingly concerned that bundled residential rates in the State are higher than the median in national rankings. There are several causes for these rapid rate increases, including the acceleration of transmission and distribution rate base in recent years, and rate impacts are exacerbated by substantial wildfire mitigation plan costs and higher than national average returns on equity. Additionally, Net Energy Metering and Distributed Energy Resources customers are disproportionately wealthier homeowners that can reduce bill impacts by investing in solar, storage technologies, electric vehicles, and other behind-the-meter solutions. The current NEM tariff has allowed wealthier customers to avoid paying for much of the fixed costs of grid maintenance and modernization, which is then shouldered by other customers, thus contributing to affordability and equity concerns. Another contributor is the slightly higher than national average return on equity for California IOUs.[218]

Despite these concerns, Staff does not formally recommend an affordability metric in this proposal but does request further input on this topic from the TWG and in party comments. Basing enforcement on the affordability of rates is problematic on several levels. Foremost is the fact that rates are approved by the Commission. The Commission has direct responsibility for oversight and approval of rates. Subjecting PG&E to the Enhanced Oversight and Enforcement process based on the affordability of rates that were approved by the Commission would be questionable from a policy perspective.

TURN proposes[219] the inclusion of affordability metrics in the SOMs. These include the metrics adopted in D.20-07-032 as part of rulemaking R.18-07-006, which addresses affordability across multiple utility sectors. As ensuring affordable utility services is a core function of the Commission, Safety Policy Division Staff carefully considered TURN's suggestion and consulted with Energy Division staff who worked on this proceeding. The metrics adopted in D.20-07-032 are valuable for the purpose of tracking and understanding

---

[217] Assessment of Pacific Gas and Electric Corporation and Pacific Gas and Electric Company's Safety Culture: First Update/Final Report. Prepared NorthStar Consulting Group for CPUC March 29, 2019.

[218] CPUC En Banc on Rates and Costs

[219] TURN March 1, 2021 Additional Comments, at 13.

utility affordability throughout the state, but Staff does not agree they would be useful for enforcement purposes. Further explanation of the reasoning for rejection of these proposed metrics is laid out in the April 22nd Draft Staff Proposal circulated to the TWG and TURN did not object to their exclusion in their May 11th informal comments. Staff's April 22nd Draft proposal also considered the use of "Greater Affordability for Customers" metric used as a factor in calculating PG&E's Long-Term Incentive Program. In their Executive Compensation Approval Request, but determined it would not be suitable for use as a SOM.[220]

[220] Pacific Gas and Electric Company's Executive Compensation Approval Request Pursuant to Public Utilities Code § 8389(e)(4) and (e)(6).

10 Clean Energy Goals

The SOMs are intended to "ensure that PG&E provides safe, reliable, and affordable service consistent with California's clean energy goals."[221] The PCF observed that "despite the express direction provided by the Commission in D.20-05-053 and by the Assigned Commissioner's Ruling in this proceeding, PG&E's proposed SOMs fail to provide metrics that would enable the Commission to ensure the utilities are meeting California's clean energy goals. PCF recommends that the Commission adopt metrics to enable the Commission to assess whether the utilities can more quickly reduce their GHG emissions, as required to avoid the most catastrophic change impacts."[222]

Pursuant to the California Global Warming Solution Act of 2006, Assembly Bill (AB) 32, California is implementing numerous programs to achieve the 2030 and 2050 state's GHG emissions reduction goals of 40 percent and 80 percent, emissions reductions below 1990 levels, respectively. This program mandates a firm economy-wide cap on various GHG emissions sources in California, including the industrial sector, and generators and deliverers of electric and gas energy. Other policies continue to advance clean energy and reduction in emissions, including, amongst others, energy efficiency, energy storage, low carbon fuels, and zero-emission vehicles.

The state established aggressive mandatory clean energy procurement targets through the Renewable Portfolio Standard (RPS) established in 2002. In 2018, the legislature increased RPS targets to 60 percent by 2030 and established a goal for 100 percent of the State's electricity to come from renewable and carbon-free resources by 2045. Under the current proceeding, the Commission oversees the regulated utilities' activities towards meeting the state's RPS goals.[223]

In addition, the Clean Energy and Pollution Reduction Act (Senate Bill 350) established 2030 targets for energy efficiency and renewable electricity, amongst other activities, to reduce the use of fossil fuel energy and GHG emissions. Accordingly, in coordination with the California Air Resource Board (CARB) and the California Energy Commission, the Commission initiated the Integrated Resource Planning proceeding (R.20-05-003),[224] requiring utilities to set 2030 GHG emissions targets for the electricity sector, while maintaining system reliability need in each year based on the CEC's demand forecasts.[225]

---

[221] D.20-05-053, at 38.

[222] PCF Comments on PG&E Workshop, at 2.

[223] Order Instituting Rulemaking To Continue Implementation and Administration, and Consider Further Development, of California Renewables Portfolio Standard Program (R.18-07-003).

[224] Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements (R.20-05-003).

[225] SB 350 Integrate Resource Planning 2020 Update.

In their IRP plans, utilities must show how they are going to meet their customers' demand, while achieving the emissions targets in a cost-effective manner. As part of each IRP cycle, the Commission adopts a GHG planning target for the electric sector and identifies a portfolio with the optimal mix of resources needed to meet state policy goals.[226]

The Commission has set rigorous procurement policies in place prior to approving funding for utilities' programs (including clean energy, energy efficiency and GHG reduction programs), and approving the revenue requirement associated with the procurement and delivery of electric and gas energy required to fulfil utilities' obligations to serve and meet the need of their customers, through the Energy Resource Recovery Account (ERRA) mechanism.

Prior to approving IOUs' revenue requirements (recovered in rates), the Commission requires utilities to submit annual ERRA procurement applications forecasting their revenue requirements and detailing in their programs implementation plans how they will comply with the State's policies, while addressing safety, reliability, just cost, clean energy, and emissions reduction goals.[227] Utilities are then required to file ERRA compliance applications indicating their actual compared to forecasted costs, program outcomes, and their compliance with the Commission's and state's regulations and goals, including but not limited to, from energy efficiency and demand response programs, GHG emissions reductions and other air pollutants, solar and renewable energy, amongst other compliance requirements.

In addition, to the ERRA mechanism, the Commission established reporting requirements to ensure that the Commission and stakeholders are able to rigorously evaluate utilities' applications to determine if utilities are implementing their programs prudently, in compliance with state's and commissions laws and regulations, and their estimated GHG emissions and costs are reasonable. Pursuant to D.14-10-033, which implements a part of the GHG reduction program envisioned by AB 32 to further improvements in the health and safety of California residents, utilities are required to use specific methodologies consistent with CARB regulations, to calculate their forecasted and recorded (actuals) GHG emissions and compliance costs that are associated with electric procurement to meet customers' energy demand. Similarly, the Commission established standard procedures and rules

[226] 2019-2020 Electric Resource Portfolios to Inform Integrated Resource Plans and Transmission Planning, D.20-03-028. See Fact Sheet on D.20-03-028.

[227] Pursuant to D.02-10-062, the Commission requires the regulated electric and gas utilities to track fuel and purchased power billed revenues against actual recorded costs of these items, established the ERRA balancing account mechanism. In the annual ERRA forecast application, a utility requests adoption of the utility's forecast of its expected annual fuel and purchased power costs for the upcoming 12 months. Approval of the forecast allows utilities to recover their ERRA revenue requirement in rates. The Commission is required to perform a compliance review of the ERRA balancing account and related regulatory accounts and certain non-ERRA accounts. A compliance review considers whether a utility complied with all applicable rules, regulations, opinions and laws.

necessary for natural gas investor-owned utilities to comply with the California Air Resources Board's Cap-and-Trade Program.

In addition to the energy efficiency and customer distributed energy programs, the Commission adopts new clean energy and energy efficiency projects funded with Cap-and-Trade Program funds, including the Solar on Multifamily Affordable Housing (SOMAH) program, and buildings' decarbonization. Another relevant Commission proceeding is R.13-02-008, which adopts standard and requirements relative to health, safety, and integrity for biomethane injected into common carrier pipelines.

10.1 Discussion

In the initial Draft Staff Proposal, which was circulated to the TWG on April 22, 2021 for informal written comments, Staff did not recommend specific Clean Energy Goals SOMs, but sought further suggestions and discussion with the TWG on this topic. Staff invited suggestions around a discrete set of key energy targets, such as those set out in specific statutory provisions and/or particular Commission proceedings, such as the RPS (R.18-07-003) or IRP (R.20-05-003).

In their Informal Comments on the Draft Staff Proposal, PCF recommends some clean energy related metrics related to measurement of emissions associated with leaks, social costs associated with methane emissions from all operations, including mitigation measures, honmes retrofitted to operate independently from the grid in HFTD for durations of PSPS events, percentage of projected underway utilizing zero carbon-emitting resources. PCF also recommends that the Commission prepare a GHG emissions reduction plan under the California Environmental Quality Act (CEQA) to ensure GHG emissions reductions and climate change impacts are considered in all of the Commission's decisions, including both gas-related and electric-related decisions.

UCAN made similar recommendations and advocates for the inclusion of the following three safety related metrics in the context of global warming, from all large gas-supply-to-customer utilities: (1) utilities should report total utility GHG emissions caused from its customer footprint. A hypothetical gas burn-rate may be needed to translate natural gas supplied to specific GHG impacts from total utility gas sales; (2) a metric is needed based on the total estimated utility gas losses as a result of its customer footprint, defined in therm or BTU terms. The total gas input into the utility system would be compared to the total gas output sold to customers to determine this net residual amount of gas losses; (3) for each utility, based on its entire customer footprint, that total methane losses to the environment be estimated as a percentage of total utility gas losses. UCAN states that the "reason is simply that methane is an extremely potent global greenhouse gas which should be a focus point, monitored and minimized. The impacts of GHG emissions are direct, the results from natural gas burn and natural gas losses, as well as methane emissions." UCAN also claims that "these three simple metrics are not directly reported by utilities to date but should be in this utility/customer risk-based proceeding" as the risks of gas use and methane appear more evident by the day. In fact, the Commission requires utilities to track, measure and report these specific metrics, (refer to the NGLA and Cap-and-Trade proceedings discussed above).

In this report, Staff has discussed that PG&E's SOMs will be considered as "indicator light" to evaluate if PG&E's is making insufficient progress in its safety and operational performance. Staff has described that it will pursue qualitative and quantitative assessment of PG&E's performance as reflected reported data in lieu of setting specific targets at this time. It is technically infeasible to attribute GHG emissions to a single originating source in order to assess PG&E's safety and operational performance. As discussed, the requirements of energy procurement policies to maintain system reliability cost-effectively add another layer of technical complexity in determining PG&E's specific future emissions targets.

As such, Staff declines to adopt PCF and UCAN's suggested metrics as Triggering Events SOMs. Per Commission directives, the purpose of the EOE process is to allow the Commission to take additional steps to ensure PG&E is improving its safety and operational performance if Triggering Events occur. Under this framework, PCF and UCAN's suggested metrics do not fit the purpose of the EOE under Step 1 of the EOE process.

However, in the context of safety performance metrics associated with GHG emissions reduction, it is possible to estimate GHG emissions resulting from wildfires or large ignitions associated with gas explosions, which could be considered as a researchable topic in Phase II of this proceeding.[228]

10.2 Staff Recommendations on Clean Energy Goals SOMs

Staff recommends that PG&E report on any Commission established clean energy targets that it has failed to meet during the reporting period, as a SOM for the purpose the EOE process.

In addition, within the context of the RDF proceeding, Staff has proposed in the Staff Proposal on RDF clarifications that the Commission consider refining the RDF adopted in D.18-12-014 to develop a framework for assessing risks and identifying mitigation measures associated with climate change impacts on utility electric and natural gas infrastructure and operation, as well as customer impacts in a later phase of this proceeding.

[228] Refer to Appendix A for further discussion on Staff recommendations on the treatment Climate Change Impacts in RDF.

Part II

11 Modifications to Adopted Safety and Performance Metrics

The Scoping Memo includes the following issues related to modifications of adopted SPMs:

- Issue (d): Should the Commission refine any of the 26 safety performance metrics adopted in D.19-04-020? Should the Commission adopt additional safety performance metrics to those adopted in D.19-04-020?
- Issue (e) Should the Commission develop a method to streamline safety performance metrics development and reporting across proceedings? If so, what methods should be considered?

On issue (e), Staff believes Commission staff should work to better collaborate and coordinate across Divisions on the development, organization, storage, and use of data it collects. Analysis and enforcement could be streamlined if data were stored in an accessible repository for use by the public, parties, and the Commission. In reviewing the SPMs, Staff has looked closely at data collected by other Divisions and, where possible, seeks to align definitions and requirements with other Divisions within the Commission, to avoid partially overlapping, but essentially redundant data collection. This streamlining effort would not require a directive from a decision, but rather continued, focused, collaborative effort by Staff.

On issue (d), Staff recommends both the revision and expansion of Safety Performance Metrics.

Staff proposes additions and modifications to the 26 SPMs adopted in D.19-04-020. The additional SPMs listed below were among dozens proposed by members of the Technical Working Group convened following D.19-04-020 and proposed here for further evaluation and refinement.

As the SPMs are applicable to all IOUs (rather than just PG&E), these metrics overlap with SOMs. They provide both a useful oversight tool and can be used to spur investigations and inform enforcement actions.

11.1 Background

In D.19-04-020, the Commission indicated that SPMs provide both a useful oversight tool and can be used to spur investigations and inform enforcement actions.[229] Ordering Paragraph 4 of D.19-04-020 also authorized Safety Enforcement Division (SED) staff to reconvene the S-MAP Technical Working Group to develop an updated electric overhead conductor index (EOCI) and additional safety performance metrics as feasible.[230] Ordering Paragraph 5 directed the three large electric utilities (PG&E, SCE, and SDG&E) to provide an updated proposal of electric overhead safety index.[231] The initial EOCI was proposed by SED and included:

1. Circuit miles of electric distribution infrared inspections completed,
2. Circuit miles of distribution electric conductor upgraded/replaced, and
3. Number of trees trimmed/removed as part of the vegetation management program.

As D.19-04-020 indicated, TURN and the three electric utilities were opposed to adopting the SED-proposed EOCI and the component metrics that made up the EOCI. Besides SED, the former Office of Safety Advocates was the only other entity that favored adopting the SED-proposed EOCI. In light of parties' respective positions, the Commission directed SED staff to reconvene the S-MAP Technical Working Group to develop an updated electric overhead safety index and any additional safety performance metrics as feasible.

Following the D.19-04-02 decision, SED staff reconvened the S-MAP TWG and on June 30, 2019, the three large electric IOUs submitted alternative electric overhead conductor metrics to the TWG. The three IOUs reiterated their opposition to using an index to gauge the safety performance of electric overhead conductors and proposed several safety metrics. These proposed EOCI metrics could be considered as either standalone safety metrics or as component metrics to be used in an updated EOCI.

PG&E Proposal

PG&E proposed the following leading indicator metrics as the Electric Overhead Conductor Index:

Miles of System Hardened, defined as miles of circuits with potential fire risk components within HFTD areas, having wildfire risk mitigated through either (1) rebuilding of overhead circuitry to current design standards; (2) targeted undergrounding; or (3) elimination of overhead circuitry.

---

[229] D.19-04-020 at 33.

[230] D.19-04-020 at 33.

[231] D.19-04-020 at 33.

Miles of Enhanced Vegetation Management (EVM) Work Completed, defined as completed distribution circuit miles of vegetation cleared under the EVM Program scope within high-fire risk areas to reduce wildfire risk through (1) overhang clearing 4 feet vertical from conductor and (2) high-risk species mitigation.

SCE Proposal

SCE proposed adding the following metric to the set of approved safety performance metrics: Percentage of Small Conductor on the Overhead Distribution System. This metric is defined as the total length of distribution primary conductor that is smaller than 1/0 ACSR or #2 Copper divided by the total length of distribution primary conductor of all sizes. Conductor lengths will be measured in circuit miles for primary conductor (i.e., >600V).

SDG&E Proposal

SDG&E proposed adding the following metric to the set of approved safety performance metrics: Percentage of Small Conductor on the Overhead Distribution System. This metric is defined as the total length of distribution primary conductor that is size #4 and smaller divided by the total length of distribution primary conductor of all sizes. Conductor lengths will be measured in circuit miles for primary conductor (i.e. >600V).

Subsequent to the utilities' proposals, the S-MAP TWG met over several meetings to discuss the proposed electric overhead safety metrics. Alternatives to these proposals were also introduced by various intervenor parties and were also discussed. Besides considering electric overhead safety metrics proposed by the three electric utilities, the TWG also considered additions to the original 26 safety performance metrics that were adopted in D.19-04-020. Over 40 additional electric overhead metrics were introduced by various members of the TWG. Parties then submitted informal comments and reply comments to the TWG to discuss the original proposals and alternative proposals.

Generally speaking, there was little consensus between the utilities on one side and the intervenor groups on the other side. Of the over 40 proposed metrics, there was only one metric (the wire down percentages by cause metric) that received a somewhat high-level consensus, but even this metric received dissenting votes from PG&E and SDG&E. There were six proposed metrics that received partial consensus of at least one vote each from the utilities and the intervenors. The remaining proposed metrics received no overlapping votes between utilities and the intervenor groups.

Staff viewed the composite index as a problematic approach to assess the safety performance of a utility. A single deficiency in one critical metric can cause a catastrophic event. An index that is made up of component safety metrics can mask deficiencies and fail to accurately reflect safety performance because an index calculated as an average of multiple composite metrics can easily mask the deficiency in critical areas. For this reason, Staff recommends against using an index approach to gauge safety.

The following recommendations considered the initial list of over 40 proposed additional safety metrics and narrowed them down in light of the discussions held with the TWG. To accomplish this, Staff considered parties' explanations for their proposed metrics as well as the TWG's guiding principles for safety performance metrics.[232] Staff selected 17 of the metrics proposed by the D.19-40-020 Technical Working Group for further consideration in this proceeding. The proposed additional safety performance metrics, along with modifications to several currently adopted 26 metrics, are included in the Table 3, below.

Staff also recommends that parties consider updating terminology and definitions in the existing SPMs and Staff's selection of the S-MAP Technical Working Group's proposed SPMs, to align with the definitions of the Staff's proposed SOMs, where applicable. This will enable systematic assessment and evaluation of a utilities' safety performance.

Updates to the definitions of the adopted SPMs will provide consistency in definitions of performance metrics reported under the various Commission's proceedings. This approach allows for comparison across utilities, drawing from lessons learnt and best practices amongst utilities, which can result in improvement in the performance of utilities' operations and maintenance of its assets.

Refer to Appendix D for recommended modifications and additions to the adopted SPMs.

11.2 Discussion

On April 21, 2021, Staff circulated the Draft Staff Proposal including suggested additions and modifications to the 26 adopted SPMs in D.19-04-02. On May 11, 2021, parties provided their informal comments on the Draft Staff Proposal. Staff has modified some of the SPMs initially recommended in the Draft Staff Proposal.

Cal Advocates suggests that SPM definitions should match the SOM definitions for the same metric.[233] Staff agrees the SOMs and SPMs descriptions should match for the same metric. Cal Advocates also suggested an entirely new SPMs which did not appear in the Staff Proposal: Amount of Methane Lost Due to Leaks. Staff recommends that consideration of new SPM proposals, including methane metrics, should be deferred to Phase II. Methane emission measurements are already reported on, as discussed in Section 2.6.5.

UCAN suggested GHG emissions related metrics. Staff recommends that consideration of new SPM topics, such as methane metrics, should be deferred to Phase II.[234] Methane

[232] See: S-MAP Metrics Technical Working Group Guiding Principles - August 14, 2017 available here: https://www.cpuc.ca.gov/General.aspx?id=9099

[233] Cal Advocates TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021.

[234] UCAN TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021.

emission measurements are already extensively reported under the Commission's Natural Gas Leak Abatement Program, as discussed in response to comments in Section 2.6.5.

PCF recommends modifications to the Staff Proposal to include gas operations in some of the metrics:[235]

- SPM 27 and 28, "Median Time to Correct Inspection Findings", should be modified to include gas pipeline operations.
- SPM 29, "CPUC-Reportable Overhead Conductor Failure Incidents Excluding Media Attention," should be broadened to include any reportable incidents, such as on a gas pipeline, excluding media attention.
- SPM 31, "Wires Down Root Cause Analysis" should be modified to include gas incidents, such as gas leaks, because of global warming.

Staff does not agree with the PCF-proposed modifications. These SPMs were developed to address specific wildfire risk elements unique to electrical systems. Inclusion of gas information will dilute the usefulness of these metrics as tools for wildfire risk management. The most recent RAMP filings report that the magnitude of wildfire risk is far greater than gas system risk, so it is reasonable to overweight the metrics in favor of electric systems.

PG&E recommends the elimination of certain gas operations SPMs (SPMs #5, 8, 9,11, and 43) if the same metrics are adopted as SOMs.[236] Staff disagrees. SPMs which duplicate Staff's proposed SOMs should be retained for consistency. PG&E and Sempra suggest modifications to the definitions of Staff proposed SPMs, which Staff incorporated in its revisions, as summarized in Table x.[237]

As discussed in Part I, Staff modified the definition of Wires-Down SOMs to address gaps in the IOUs proposed definitions in response to the Draft Staff Proposal. Likewise, Staff modified the Wires-Down SPMs to address these gaps.

Refer to Appendix D for recommended modifications and additions to the adopted SPMs.

[235] PCF's TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021.

[236] PG&E's TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021.

[237] Sempra TWG Track 2 informal comments on Draft Staff Proposal, May 11, 2021.

Table 3: Revisions to Staff Recommended SPMs based on Parties' Informal Comments

SPM #	Metric Name (Adopted in D.19-04-020)	Description of Revisions
Revisions to SPMs Adopted in D.19-04-020		
1	Transmission & Distribution (T&D) Overhead Wires Down Non-Major Event Days	New definition for wires down
2	Transmission & Distribution (T&D) Overhead Wires Down - Major Event Days	New definition for wires down
5	Gas Dig-in	Description changed to match SOM 4.1. Staff clarified that the SPM measures dig-ins by any party.
6	Gas In-Line Inspection	PG&E suggests replacement with the count of missed compliance dates, due to variable intervals. Staff agrees and clarifies in-line inspection percentage metric.
7	Gas In-Line Inspection Upgrade	Staff clarified this number of inspectable miles metric.
8	Shut In The Gas Time-Mains	Cal Advocates recommends use of time increments for reporting response times instead of one average (or median time as Sempra recommends). Staff modified SPM to match the increment reporting requirements of GO 112-F.
9	Shut In The Gas Time-Services	Cal Advocates recommend use of time increments for reporting response times instead of one average (or median time as other parties commented). Staff modified SPM to match the increment reporting requirements of GO 112-F.
10	Cross-Bore Intrusions	Staff clarifies that the number of cross-bore intrusions per 1000 inspections should be reported annually.
11	Gas Emergency Response	Cal Advocates recommend use of time increments for reporting response times instead of one average (or median time as other parties commented). Staff modified SPM to match the increment reporting requirements of GO 112-F.
12	Natural Gas Storage Baseline Assessments Performed	PG&E indicates that there are no targets for storage well assessments yet established by CalGEM. Staff modified SPM to measure #assessments/planned assessments until targets are established.

SPM #	Metric Name (Adopted in D.19-04-020)	Description of Revisions
13	Gas System Internal Inspection Status	PG&E commented there is no requirement for a consistent program of upgrades for inline inspection ("pigging"). Staff modified SPM to measure total miles inspected and percentage of system that is "piggable."
Revisions on the Additional SPMs (Not Currently Adopted in a decision)		
27	Median Time to Correct Inspection Findings, by Tiers or Grades	PCF pointed out that the descriptions for SPMs #27 and #28 appear to apply only to electric safety, but the proposed metrics were intended for both electric, gas, and dam safety. Sempra and PG&E request clarifications on the definitions of SPMs #27 and #28, as the requirement for calculation of median time is unclear given the tiers and grades have their own permitted time ranges. Staff clarifies that median time is calculated within each tier or grade; changed the definition to reflect that this metric applies to electric safety, gas safety, and dam safety inspection findings.
28	Median Time to Correct Inspection Findings, no Segregation by Tiers or Grades	Same changes as in SPM #27
29	CPUC-Reportable Overhead Conductor Failure Incidents	Removed dam and generation from SPM and added gas safety to metric.
30	Electric Overhead, wildfire	Reworded the definition of the SPM to refer to de-energization of downed conductors by automatic circuit protection devices, including fuses, circuit breakers, or reclosers.
32	Wires Down by Cause	Deleted mention of "imprudence" in description and changed wording to "areas of safety concern."
33	Missed Inspections and Patrols for Electric Circuits	Changed units for missed electric inspections to structures instead of circuit miles. Retained circuit miles for vegetation management inspections.
34	Missed Vegetation Management Inspections	Rearranged ordering of terms HFTD, requirement, and compliance in the metric and descriptions to clarify the definition of the metric.

SPM #	Metric Name (Adopted in D.19-04-020)	Description of Revisions
35	Overhead Conductor Wire Size Compliance in HFTD	Rearranged ordering of terms HFTD, requirement, and compliance in the metric and descriptions to make meaning clearer.
43	GO-95 Corrective Actions in HFTDs	This metric measures how quickly the utilities correct GO 95 deficiencies in HFTDs This metric is calculated as the percentage of corrective actions completed in the past calendar year divided by the total number of corrective actions identified in the past calendar year in patrols and detailed inspections per GO95 in HFTD. Separate metrics are provided for patrols and detailed inspections. Separate metrics are provided for distribution and transmission systems.
44	Gas Overpressure Events	Sempra commented that these are reported quarterly under General Order 112-F; reports should be streamlined rather than given in multiple reports. Staff recommends this metric should be reported annually as an SPM, at the same time increments of the quarterly GO 112-F requirement.

11.3 Staff Recommendations on Modifications to SPMs

Staff recommends that the Commission adopts its final recommendation on modifications and additions to the adopted SPMs in D.19-04-020, provided in Appendix D.

Appendix C

Summary Table of Staff Proposed Safety and Operational Metrics

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
1	SIF related SOMs		
1.1	Rate of SIF Actual (Employee)	Rate of SIF Actual[1] (Employee) is calculated using the formula: Number of SIF-Actual cases among employees x 200,000/employee hours worked, where SIF Actual is counted using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.	√ *SPM 17*
1.2	Rate of SIF Actual (Contractor)	Rate of SIF Actual (Contractor) is calculated using the formula: Number of SIF-Actual cases among contractors x 200,000/contractor hours worked, where SIF Actual is counted using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.	√ *SPM 18*

[1] A SIF Actual case as determined using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
1.3	Rate of SIF Potential (Employee)	Rate of SIF Potential (Employee) is calculated using the formula: Number of SIF Potential cases among employees x 200,000/employee hours worked, where a SIF incident, in this case would be events that could have led to a reportable SIF. Potential SIF incidents are identified using the Edison Electric Institute Safety Classification and Learning (SCL) Model.[2] As a supplemental reporting requirement to the Potential SIF Rate (Employee), PG&E is also expected to provide information on the program area where the SIF Potential occurred, and the lesson learned from the event.	N/A
1.4	Rate of SIF Potential (Contractor)	Rate of SIF Potential (Contractor) is calculated using the formula: Number of SIF Potential incidents among contractors x 200,000/contractor hours worked, where a SIF incident, in this case would be events that could have led to a reportable SIF. Potential SIF incidents are identified using the Edison Electric Institute Safety Classification and Learning (SCL) Model.	N/A

[2] Edison Electric Institute Safety Classification and Learning Model by Dr. Matthew Hallowell https://esafetyline.net/eei/docs/eeiSCLmodel.pdf

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		As a supplemental reporting requirement to the Potential SIF Rate (Contractor), PG&E is also expected to provide information on the program area where the SIF Potential occurred, and the lesson learned from the event.	
2	Reliability Related SOMs		
Sustained interruption is defined as: "Any interruption not classified as a part of a momentary event. That is, any interruption that lasts more than five minutes."[3]			
2.1	System Average Interruption Duration (SAIDI) (Unplanned) [1]	SAIDI (Unplanned) = average duration of sustained interruptions per metered customer due to all unplanned outages, excluding on Major Event Days, in a calendar year. [4] "Average duration" is defined as: Sum of (duration of interruption * # of customer interruptions) / Total number of customers served.	N/A

[3] *IEEE 1366- Reliability Indices* Presentation, February 19, 2019, at 6.

[4] January 15, 2021 Response of Pacific Gas and Electric Company to Assigned Commissioner's Ruling Regarding Development of Safety and Operational Metrics available here: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M359/K864/359864708.PDF

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Duration" is defined as: Customer hours of outages. Includes all transmission and distribution outages.	
2.2	System Average Interruption Duration (SAIDI) (All Outages)	SAIDI (All Outages) = average duration of all sustained interruptions per metered customer due to all outages, including, but not limited to, unplanned outages, planned outages, PSPS outages, and outages on Major Event Days, in a calendar year. "Average duration" is defined as: Sum of (duration of interruption * # of customer interruptions) / Total number of customers served. "Duration" is defined as: Customer hours of outages. Includes all transmission and distribution outages.	N/A
2.3	System Average Interruption Frequency (SAIFI) (Unplanned)	SAIFI (Unplanned) = average frequency of sustained interruptions due to all unplanned outages per metered customer, except on Major Event Days, in a calendar year. "Average frequency" is defined as: Total # of customer interruptions / Total # of customers served. Includes all transmission and distribution outages.	N/A
2.4	System Average Interruption	SAIFI (All Outages) = average frequency of all sustained interruptions per metered customer due to all outages, including, but not limited to,	N/A

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
	Frequency (SAIFI) (All Outages)	unplanned outages, planned outages, outages due to PSPS, and outages on Major Event Days, in a calendar year. "Average frequency" is defined as: Total # of sustained customer interruptions / Total # of customers served Includes all transmission and distribution outages.	
2.5	Customer Average Interruption Duration Index (CAIDI) (Unplanned)	CAIDI (Unplanned) = average duration of sustained outages per impacted metered customer due to all unplanned outages, excluding on Major Event Days, in a calendar year. "Average duration" is defined as: Sum of (duration of interruption * # of customer interruptions) / Total number of impacted customers. "Duration" is defined as: Customer hours of outages. Includes all transmission and distribution outages. This metric can be calculated as: SAIDI (All Outages) / SAIFI (All Outages).	N/A
2.6	Customer Average Interruption Duration Index (CAIDI) (All Outages)	CAIDI (All Outages) = average duration of sustained outages per impacted metered customer due to all outages, including, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to Major Event Days, in a calendar year.	N/A

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Average duration" is defined as: Sum of (duration of interruption * # of customer interruptions) / Total number of impacted customers "Duration" is defined as: Customer hours of outages. Includes all transmission and distribution outages. This metric can be calculated as: SAIDI (All Outages) / SAIFI (All Outages).	
2.7	System Average Customers Impacted (All Outages)	System Average Customers Impacted (All Outages) = average number of all metered customers experiencing sustained interruptions due to all outages, including, but not limited to, unplanned outages, planned outages, outages due to PSPS, and outages due to Major Event Days, in a calendar year; "Average customers" is defined as: Number of customers impacted / total number of customers served. Includes all transmission and distribution outages.	N/A

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
PSPS Related SOMs Pursuant to D.15-05-042, "[t]he electric investor-owned utilities must report on lessons learned from each de-energization event, including instances when de-energization protocols are initiated, but de-energization does not occur, in order to further refine de-energization practices."[5] The reporting period for a PSPS event begins with the first notification of an impending power shut-off. The PSPS ends when the last circuit is restored and customers and critical facilities are notified.[6]			
2.8	Number of PSPS events in a calendar year		N/A
2.9	Duration of each PSPS Event in hours in a calendar year		N/A
2.10	Number of Customers Impacted by each PSPS Event in a calendar year		N/A

[5] D.19-05-042, Appendix A, at A3.

[6] D.19-05-042 Appendix A, at A8-A9.

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
System Average Outages due to Vegetation and Equipment Damage in HFTD Areas Report *System Average Outages due to Vegetation and Equipment Damage* SOMs specific to Tier 2 and 3 High Fire Threat District.[7] For Vegetation and Equipment Damage *in HFTD (Major Event Days & (Non-Major Event Days)* SOMs, PG&E should delineate outages due to contact with vegetation versus outages caused by equipment, and distribution versus transmission assets. For equipment damage-related outages, the metrics should also be segregated by overhead versus underground.			
2.11	System Average Outages due to Vegetation and Equipment Damage in HFTD Areas (Major Event Days)	Average number of sustained outages on Major Event Days per 100 circuit miles in HFTD per metered customer, in a calendar year, where each sustained outage is defined as: total number of customers interrupted / total number of customers served	N/A
2.12	System Average Outages due to Vegetation and Equipment Damage in HFTD Areas (Non-Major Event Days)	Average number of sustained outages on Non-Major Event Days per 100 circuit miles in HFTD per metered customer, in a calendar year, where each sustained outage is defined as: total number of customers interrupted / total number of customers served	N/A

[7] Decision for Adopting the Work Plan for the Development of Fire Map 2 (D.17-01-009), as modified by Decision Amending the Work Plan for the Development of Fire Map 2 (D.17-06-024). Additional Tier information.

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
3	**Electricity Related SOMs**		
Wires Down Related SOMs **A *Wires Down* event is defined as follows:** A Wires Down event occurs when a normally energized overhead primary or secondary distribution or transmission conductor satisfies one or more of these conditions: 1. A conductor or splice becomes broken, 2. A conductor is dislodged from its intended design position due to either malfunction of its attachment points and/or supporting structures or contact with foreign objects (including vegetation), 3. A conductor's distance from the ground, structures, or foreign objects (not including vegetation) falls below applicable minimum clearances specified in General Order 95, 4. A conductor comes into contact with communication circuits, guy wires, or conductors of a lower voltage, or 5. A power pole carrying normally energized conductors leans by more than 45 degrees in any direction relative to the vertical reference when measured at ground level. This Wires Down events definition excludes vegetation growth-related clearance violations in which the conductor does not otherwise violate the five conditions listed above. This definition includes service drops. Primary distribution and transmission circuit miles are counted separately, and then added together even if they are found on the same spans. This definition applies to **all Wires Down** related metrics.			
3.1	Wires Down Major Event Days in HFTD Areas	Number of Wires Down events on Major Event Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by total circuit miles of overhead primary distribution and transmission lines x 1,000, in HFTD Areas in a calendar year.	√ *(Except that SPM #2 does not specify HFTD and is reported as number instead of*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
			rate of Wire-Down events)
3.2	Wires Down Non-Major Event Days in HFTD Areas	Number of Wires Down events on Non-Major Event Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by (Total circuit miles of overhead primary distribution and transmission lines) x 1,000, in HFTD Areas, in a calendar year. Distribution and transmission circuit miles are counted separately and then added together even if they are found on the same spans.	√ (*Except that SPM #1 does not specify HFTD and is reported as number instead of rate of Wire-Down events)*
3.3	Wires Down Red Flag Warning Days in HFTD Areas	Number of Wires Down events on Red Flag Warning Days involving either overhead primary or secondary distribution or overhead transmission circuits divided by total circuit miles of overhead primary distribution and transmission lines x 1,000, in HFTD, in a calendar year.	N/A
Patrols, Inspections & Compliance Related SOMs			
3.4	Overhead Distribution Patrols Compliance in HFTD Areas	Overhead Distribution Patrols Compliance in HFTD: Total number of overhead electric distribution structures that fell below the minimum patrol frequency requirements divided by the total number of overhead electric distribution structures that required patrols, in HFTD area in past calendar year. where,	√ (*Except that SPM #33 includes all areas)*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Minimum patrol frequency" refers to the frequency of patrols as specified in GO 165. "Structures" refers to electric assets such as transformers, switching protective devices, capacitors, lines, poles, etc.	
3.5	Overhead Distribution Detailed Inspections Compliance in HFTD Areas	Overhead Distribution Detailed Inspections Compliance in HFTD: Total number of structures that fell below the minimum inspection frequency requirements divided by the total number of structures that required inspection, in HFTD area in past calendar year. where, "Minimum inspection frequency" refers to the frequency of scheduled inspections as specified in GO 165. "Structures" refers to electric assets such as transformers, switching protective devices, capacitors, lines, poles, etc.	√ *(Except that SPM #33 includes all areas)*
3.6	Overhead Transmission Patrols Compliance in HFTD Areas	Same as SOM #3.4 definition, except for Transmission instead of Distribution. Overhead Transmission Patrols Compliance in HFTD: Total number of structures that fell below the minimum patrol frequency requirements divided by the total number of structures that required patrols, in HFTD area in past calendar year. where,	√ *(Except that SPM #33 includes all areas)*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Minimum patrol frequency" refers to the frequency of patrols requirements, as applicable. "Structures" refers to electric assets such as transformers, switching protective devices, capacitors, lines, poles, etc.	
3.7	Overhead Transmission Detailed Inspections Compliance in HFTD Areas	Overhead Transmission Detailed Inspections Compliance in HFTD: Total number of structures that fell below the minimum inspection frequency requirements divided by the total number of structures that required inspection, in HFTD area in past calendar year. where, "Minimum inspection frequency" refers to the frequency of scheduled inspections requirements, as applicable. "Structures" refers to electric assets such as transformers, switching protective devices, capacitors, lines, poles, etc.	√ (E*xcept that SPM #33 includes all areas)*
3.8	*Distribution Vegetati on/Conductor Clearance Inspections in HFTD Areas*	Distribution Vegetation/Conductor Clearance Inspections Compliance in HFTD Areas*:* Total circuit miles of Vegetation/Conductor Clearance Inspections on distribution circuits that fell below the minimum Vegetation/Conductor Clearance Inspections frequency divided by the total distribution circuit miles that required vegetation Vegetation/Conductor Clearance Inspections, in HFTD area, in past calendar year.	√ *SPM #34 for distribution* *Except that SPM #34 includes all areas*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Vegetation/Conductor Clearance Inspections frequency" refers to the frequency of utilities' scheduled inspections, as applicable. GO 95 specifies the minimum Vegetation/Conductor Clearance requirements.	
3.9	*Transmission Vegetation/Conductor Clearance Inspections in HFTD Areas*	Transmission Vegetation/Conductor Clearance Inspections Compliance in HFTD Areas*:* Total circuit miles of Vegetation/Conductor Clearance Inspections on transmission circuits that fell below the minimum Vegetation/Conductor Clearance Inspections frequency divided by the total transmission circuit miles that required vegetation Vegetation/Conductor Clearance Inspections, in HFTD area, in past calendar year. "Vegetation/Conductor Clearance Inspections frequency" refers to the frequency of utilities' scheduled inspections, as applicable. GO 95 specifies the minimum Vegetation/Conductor Clearance requirements.	√ *SPM #34* *for transmission Except that SPM #34 includes all areas*
3.10	Backlog Compliance Metrics in HFTD	Total number of overdue overhead electric work orders in high fire threat districts that exceeded the maximum allowable/allotted time frame to complete the work order divided by the total number of closed or still-open overhead electric work orders in high fire threat districts in past calendar year, evaluated at the end of the year. where,	√ *SPM #42*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		"Work Orders" include maintenance, and corrective work orders (including those generated as a result of patrols and detailed inspections), electric system hardening, and Enhanced Vegetation Management programs.	
3.11	Electric Emergency Response Time[1]	Percentage of time that utility personnel respond (are on site) within 60 minutes after receiving a 911 call (electric related), with onsite defined as arriving at the premises to which the call relates.	√ *(Except that SPM #3 is worded slightly different)*
Ignitions & Wildfires Related SOMs "Ignition" refers to the number of CPUC-Reportable ignitions and any other ignitions determined by the Authority Having Jurisdiction to originate from utility infrastructure.[8]			
3.12	Number of CPUC-Reportable Ignitions in HFTD Areas (Distribution)	Number of CPUC-Reportable Ignitions involving overhead distribution circuits in HFTD Areas	√ *(Except that SPM #4 in all areas and does not include the updated SOM definition)*

[8] The number of powerline-involved fire incidents annually reportable to the CPUC per Decision 14-02-015. A reportable fire incident includes all of the following: 1) Ignition is associated with a utility's powerlines and 2) something other than the utility's facilities burned and 3) the resulting fire traveled more than one meter from the ignition point.

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
3.13	Percentage of CPUC-Reportable Ignitions in HFTD (Distribution)	Number of CPUC-reportable Ignitions involving overhead transmission circuits in HFTD Areas.	N/A
3.14	Number of CPUC-Reportable Ignitions in HFTD (Transmission)	Same as 3.12, except for Transmission instead of Distribution	√ *(Except that SPM #4 in all areas and does not include the updated SOM definition)*
3.15	Percentage of CPUC-Reportable Ignitions in HFTD (Transmission)	Same as 3.13, except for Transmission instead of Distribution	N/A
4	**Natural Gas Related SOMs**		
4.1	Number of Gas Dig-Ins per 1000 USA tickets on Transmission and Distribution pipelines	Number of Excavation Damages per 1000 Underground Service Alert (USA) tickets by any party on all pipelines.	√ *SPM #5*
4.2	Number of Overpressure (OP) Events	Overpressure events as reportable under GO112-F 122.2(d)(5).	.√ *SPM #44*

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
4.3	Normalized Overpressure Events	Number of Large Overpressure Events normalized to the number of pressure transducers on the gas system. (Overpressure events as reportable under GO112-F 122.2(d)(5)).	N/A
4.4	Time to Respond On-site to Emergency Notification	Time to Respond On-site to Gas Emergency Notification, reported in increments as per GO 112-F 123.2 (c).	√ *SPM #11*
4.5	Gas Shut-In Time, Mains	Time to shut-in gas when gas release occurs on a main,-reported in increments per GO 112-F 123.2 (c).	√ *SPM #8*
4.6	Gas Shut-In Time, Services	Time to shut-in gas when gas release occurs on a service, reported in increments per GO 112-F 123.2 (c).	√ *SPM #9*
4.7	Uncontrolled Release of Gas on Transmission Pipelines	The number of leaks, ruptures, or other loss of containment on transmission lines for the reporting period.	N/A
4.8	Time to Resolve Hazardous Conditions	Time starts when the utility first receives the report and ends when a utility's qualified representative determines, per the utility's emergency standards, that the reported leak is not hazardous or the utility's representative completes actions to mitigate a hazardous leak and render it as being non-hazardous (i.e., by shutting-off gas supply, eliminating subsurface	N/A

Number Index	Staff Proposed SOMs	Definition	Staff Proposed Modification or Additional SPMs
		leak migration, repair, etc.) per the utility's standards. Response time is reported in increments per GO 112-F 123.2 (c).	
5	**Clean Energy Goals**		
5.1	Clean Energy Goals Compliance Metrics	Commission established clean energy targets that it has failed to meet during the reporting period	N/A

END APPENDIX C

Appendix D

Summary Table of Staff Recommended Modifications/Additions to Safety Performance Metrics

Developed Pursuant to D.19-04-020

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
1. Transmission & Distribution (T&D) Overhead Wires Down Non-Major Event Days	Wildfire Transmission Overhead Conductor Distribution Overhead Conductor Primary	Electric	Number of wire-down events	~~Number of instances where an electric transmission or primary distribution conductor is broken and falls from its intended position to rest on the ground or a foreign object; excludes down secondary distribution wires and "Major Event Days" (typically due to severe storm events) as defined by the IEEE.~~ Number of instances where an overhead primary or secondary distribution or transmission conductor suffers from a wires-down event on non-Major Event Days. A Wire Down event occurs when a normally energized overhead primary or secondary distribution or transmission conductor satisfies one or more of these conditions: 1) A conductor or splice becomes broken; 2) A conductor is dislodged from its intended design position due to either malfunction of its attachment points and/or supporting structures or contact with foreign objects (including vegetation); 3) A	Lagging	PG&E, SCE, SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				conductor's distance from the ground, structures, or foreign objects (not including vegetation) falls below applicable minimum clearances specified in General Order 95; 4) A conductor comes into contact with communication circuits, guy wires, or conductors of a lower voltage; or 5) A power pole carrying normally energized conductors leans by more than 45 degrees in any direction relative to the vertical reference when measured at ground level. This wires down definition excludes vegetation growth-related clearance violations in which the conductor does not otherwise violate the five conditions listed above. This definition includes service drops.		
2. Transmission & Distribution (T&D) Overhead Wires Down - Major Event Days	Wildfire Transmission Overhead Conductor Distribution Overhead Conductor Primary	Electric	Number of wire down events	~~Number of instances where an electric transmission or primary distribution conductor is broken and falls from its intended position to rest on the ground or a foreign object; includes down secondary distribution wires. Includes "Major Event Days" (typically due to severe storm events) as defined by the IEEE.~~ Number of instances where an overhead primary or secondary distribution or transmission conductor suffers from a wires-down event on a Major Event Day as defined by IEEE. A Wire Down event occurs when a normally energized overhead primary or secondary distribution or transmission conductor satisfies one or more of these conditions:	Lagging	PG&E, SCE, SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				1) A conductor or splice becomes broken; 2) A conductor is dislodged from its intended design position due to either malfunction of its attachment points and/or supporting structures or contact with foreign objects (including vegetation); 3) A conductor's distance from the ground, structures, or foreign objects (not including vegetation) falls below applicable minimum clearances specified in General Order 95; 4) A conductor comes into contact with communication circuits, guy wires, or conductors of a lower voltage; or 5) A power pole carrying normally energized conductors leans by more than 45 degrees in any direction relative to the vertical reference when measured at ground level. This wires down definition excludes vegetation growth-related clearance violations in which the conductor does not otherwise violate the five conditions listed above. This definition includes service drops.		
3. Electric Emergency Response	Wildfire Overhead Conductor Public Safety Worker Safety	Electric	Percentage of time response is within 60 mins	The percent of time utility personnel respond (are on-site) within one hour after receiving a 911 (electric related) call, with on-site defined as arriving at the premises to which the 911 call relates.	Lagging	PG&E, SCE, SDG&E
4. Fire Ignitions	Overhead Conductor Wildfire Public Safety Worker Safety Catastrophic	Electric	Number of ignitions	The number of powerline-involved fire incidents annually reportable to the CPUC per Decision 14-02-015. A reportable fire incident includes all of the following: 1) Ignition is associated with a utility's powerlines and 2) something other than the utility's facilities burned and 3) the resulting fire	Lagging	PG&E, SCE, SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
	Event Preparedness			traveled more than one meter from the ignition point.		
5. Gas Dig-in	Transmission Pipeline Failure - Rupture with Ignition Distribution Pipeline Rupture with Ignition (non-Cross Bore) Catastrophic Damage involving Gas Infrastructure (Dig-Ins)	Gas	~~The number of 3rd party gas dig-ins per 1,000 USA tags/tickets~~ The number of gas dig-ins by any party per 1,000 USA tags/tickets	The number of ~~3rd party~~ gas dig-ins per 1,000 Underground Service Alert (USA) tags/tickets for gas. Excludes fiber and Electric tickets. A gas dig-in refers to any damage (impact or exposure) that results in a repair or replacement of underground gas facility as a result of an excavation. ~~A third party dig-in is damage caused by someone other than the utility or a utility contractor~~.	Lagging	PG&E, SDG&E, SoCalGas
6. Gas In-Line Inspection	Catastrophic Damage Involving High-Pressure Pipeline Failure	Gas	~~Total number of inspections scheduled/ Total number of targeted inspections~~ <u>Total number of miles of inspections performed and percentage inspected by ILI.</u>	~~Total miles of transmission pipe inspected by inline inspection.~~ <u>Total miles of transmission pipelines inspected annually by inline inspection (ILI) and percentage of transmission pipelines inspected by inline inspection annually.</u>	Leading	PG&E, SDG&E, SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
7. Gas In-Line Inspection Upgrade	Catastrophic Damage Involving High-Pressure Pipeline Failure	Gas	Miles	Miles upgraded to permit inline inspections.	Leading	PG&E
8. Gas Shut-In Time - Mains	Distribution Pipeline Rupture with Ignition (non-Cross Bore)	Gas	Time in minutes required to stop the flow of gas for Distribution Mains	The time reported in increments per GO 112-F 123.2 (c) required for the utility to stop the flow of gas during incidents involving mains when responding to any unplanned/uncontrolled release of gas. The timing for the response starts when the utility first receives the report and ends when the utility's qualified representative determines, per the utility's emergency standards, that the reported leak is not hazardous or the utility's representative completes actions to mitigate a hazardous leak and render it as being non-hazardous (i.e., by shutting-off gas supply, eliminating subsurface leak migration, repair, etc.) per the utility's standards.	Lagging	PG&E, SDG&E, SoCalGas
9. Gas Shut-In Time - Services	Distribution Pipeline Rupture with Ignition (non-Cross Bore)	Gas	Time in minutes required to stop the flow of gas for Distribution Services	The time reported in increments per GO 112-F 123.2 (c) required for the utility to stop the flow of gas during incidents involving services when responding to any unplanned/uncontrolled release of gas. The timing for the response starts when the utility first receives the report and ends when the utility's qualified representative determines, per the utility's emergency standards, that the reported leak is not hazardous or the utility's representative completes actions to mitigate a hazardous leak and render it as being non-hazardous (i.e., by shutting-	Lagging	PG&E, SDG&E, SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				off gas supply, eliminating subsurface leak migration, repair, etc.) per the utility's standards.		
10. Cross Bore Intrusions	Catastrophic Damage Involving Medium Pressure Pipeline Failure	Gas	Number of cross bore intrusions per 1,000 inspections	Cross bore intrusions found per 1,000 inspections, <u>reported on an annual basis</u>.	Leading	PG&E, SDG&E, SoCalGas
11. Gas Emergency Response	Distribution Pipeline Rupture with Ignition	Gas	~~Average response time in minutes, additionally: response times in five-minute intervals, segregated first by business hours (0800 – 1700 hours), after business hours and weekends/legal state holidays. The intervals start with 0-5 minutes, all the way to 40-45 minutes, an interval of 45-60 minutes and then all~~	~~The average time that a Gas Service Representative or a qualified first responder takes to respond after receiving a call which results in an emergency order.~~ <u>As required in GO 112-F 123.2 (c): Response times in five-minute intervals, segregated first by business hours (0800 – 1700 hours), after business hours and weekends/legal state holidays. The intervals start with 0-5 minutes, all the way to 40-45 minutes, an interval of 45-60 minutes and then all response times greater than 60 minutes</u>	Lagging	PG&E, SDG&E, SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
			~~response times greater than 60 minutes.~~ The time that a Gas Service Representative or a qualified first responder takes to respond after receiving a call which results in an emergency order.			
12. Natural Gas Storage Baseline Assessments Performed	Gas storage	Gas	~~Number of Inspections~~ Number of Assessments completed/Number scheduled or targeted. .	Until CalGEM establishes a required number, reports the percentage of well assessments completed compared to the number scheduled. When targets are established, compare number completed to number targeted.	Lagging	PG&E, SDG&E, SoCalGas
13. Gas System Internal Inspection Status	Catastrophic Damage Involving High-Pressure Pipeline Failure	Gas	Percentage of pipeline miles which can be internally inspected.	~~The ratio of transmission pipe miles that can be inspected internally ("pigged") to all transmission pipe miles.~~ Total miles inspected and percent of system that is piggable.	Leading	PG&E SDG&E, SoCalGas
14. Employee Serious Injuries and Fatalities	Employee Safety	~~Injuries~~ Injuries and Fatalities	~~Number of Serious Injuries and Fatalities~~ Employee SIF Actual Number.	~~A work-related injury or illness that results in a fatality, inpatient hospitalization for more than 24 hours (other than for observation purposes), a loss of any member of the body, or any serious degree of permanent disfigurement.~~ SIF Actual refers to Cal OSHA reportable serious injuries or fatalities.	Lagging	PG&E, SCE, SDG&E, SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
15. Employee Days Away, Restricted and Transfer (DART) Rate	Employee Safety	Injuries	DART Cases times 200,000 divided by employee hours worked	DART Rate is calculated based on number of OSHA-recordable injuries resulting in Days Away from work and/or Days on Restricted Duty or Job Transfer, and hours worked.	Lagging	PG&E, SCE, SDG&E, SoCalGas
16. Employee Lost Workday Case Rate	Employee Safety	Injuries	Number of LWD Cases / productive hours worked x 200,000.	This measures the number of LWD cases incurred for employees and staff augmentation (excluding contractors) per 200,000 hours worked, or for approximately every 100 employees. A LWD Case is a current year OSHA Recordable incident that has resulted in at least one lost workday. An OSHA Recordable incident is an occupational (job related) injury or illness that requires medical treatment beyond first aid, or results in work restrictions, death or loss of consciousness. The formula is: LWD Case Rate = Number of LWD Cases / productive hours worked x 200,000.	Lagging	PG&E
17. ~~Employee OSHA Recordables Rate~~ Rate of SIF Actual (Employee)	Employee Safety	Injuries	~~OSHA recordable times 200,000 divided by employee hours worked associated with work for the reporting utility.~~ Number of SIF-Actual cases among employees x 200,000/employee hours worked	~~An OSHA recordable incident is an occupational (job-related) injury or illness that requires medical treatment beyond first aid, or results in work restrictions, death or loss of consciousness. OSHA recordable rate is calculated as OSHA recordable times 200,000 divided by employee hours worked.~~ Rate of SIF Actual[1] (Employee) is calculated using the formula: Number of SIF-Actual cases among employees x 200,000 / employee hours worked, where SIF Actual is counted using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.	Lagging	PG&E, SCE, SDG&E, SoCalGas

[1] A SIF Actual case as determined using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee. Available here: https://app.esafetyline.net/eeisafetysurvey/Downloads/h_sif.pdf.

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
18. ~~Contractor OSHA Recordables Rate~~ Rate of SIF Actual (Contractor)	Contractor Safety	Injuries	~~OSHA recordable times 200,000 divided by contractor hours worked associated with work for the reporting utility.~~ Number of SIF-Actual cases among contractors x 200,000/contractor hours worked	~~An OSHA recordable incident is an occupational (job-related) injury or illness that requires medical treatment beyond first aid, or results in work restrictions, death or loss of consciousness. OSHA recordable rate is calculated as OSHA recordable times 200,000 divided by contractor hours worked.~~ Rate of SIF Actual[2] (Contractor) is calculated using the formula: Number of SIF-Actual cases among contractors x 200,000 / contractor hours worked, where SIF Actual is counted using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee.	Lagging	PG&E, SCE, SDG&E, SoCalGas
19. Contractor Days Away, Restricted Transfer (DART)	Contractor Safety	Injuries	~~OSHA recordable times 200,000 divided by contractor hours worked associated with work for the reporting utility.~~ OSHA DART Rate.	DART Rate: Days Away, Restricted and Transfer (DART) Cases include OSHA-recordable Lost Work Day Cases and injuries that involve job transfer or restricted work activity. DART Rate is calculated as DART Cases times 200,000 divided by contractor hours worked.	Lagging	PG&E
20. Contractor Serious Injuries and Fatalities	Contractor Safety	Injuries	~~Number of work-related injuries or illnesses associated with work for the reporting utility.~~ Contractor SIF Actual Number.	~~A work-related injury or illness that results in a fatality, inpatient hospitalization for more than 24 hours (other than for observation purposes), a loss of any member of the body, or any serious degree of permanent disfigurement.~~ SIF Actual refers to Cal OSHA reportable serious injuries or fatalities.	Lagging	PG&E, SCE, SDG&E, SoCalGas
21. Contractor Lost Work Day Case Rate	Contractor Safety	Injuries	Number of Lost Workday (LWD) cases incurred for contractors per	This measures the number of Lost Workday (LWD) cases incurred for contractors per 200,000 hours worked (for approximately every 100 contractors). A Lost Workday Case is a current year OSHA	Lagging	PG&E, SCE, SDG&E, SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
			200,000 hours worked associated with work for the reporting utility.	Recordable incident that has resulted in at least one lost workday. An OSHA Recordable incident is an occupational (job related) injury or illness that requires medical treatment beyond first aid, or results in work restrictions, death or loss of consciousness. The formula is: LWD Case Rate = Number of LWD Cases / productive hours worked x 200,000.		
22. Public Serious Injuries and Fatalities	Public Safety	Injuries	Number of Serious Injuries and Fatalities	A fatality or personal injury requiring in-patient hospitalization involving utility facilities or equipment. Equipment includes utility vehicles used during the course of business.	Lagging	PG&E, SCE, SDG&E, SoCalGas

[2] A SIF Actual case as determined using the methodology approved by the Edison Electrical Institute's Occupational Health and Safety Committee. Available here: https://app.esafetyline.net/eeisafetysurvey/Downloads/h_sif.pdf.

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
23. Helicopter/ Flight Accident or Incident	Aviation Safety Helicopter Operations Public Safety Worker Safety Employee Safety	Vehicle	Number of accidents or incidents (as defined in 49 CFR Section 830.5 "Immediate Notification") per 100,000 flight hours.	Defined by Federal Aviation Regulations (FARs), reportable to FAA per 49-CFR-830.	Lagging	PG&E, SCE, SDG&E, SoCalGas
24. Serious Injury and Fatality Corrective Actions Completed on Time.	Employee Safety Contractor Safety Public Safety	Injuries	Total number of SIF corrective actions completed on time (as measured by the due date accepted by Line of Business Corrective Action Review Boards (CARB)) divided by the total number of SIF corrective actions past due or completed.	The percentage of SIF corrective actions completed on time. A SIF corrective action is one that is tied to a SIF actual or potential injury or near hit.	Leading	PG&E
25. Hard Brake Rate	Motor Vehicle Safety	Vehicle	Total number of hard braking events per thousand miles driven in a given period	The total number of hard braking events (>=8 mph per second decrease in speed) per thousand miles driven in a given period.	Leading	PG&E
26. Driver's Check Rate	Motor Vehicle Safety	Vehicle	Total number of Driver Check complaint calls received per 1 million miles driven	This measures the total number of Driver Check complaint calls received per 1 million miles driven by vehicles included in the Driver Check program.	Leading	PG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
Recommended Additional SPMs						
27. Median Time to Correct Inspection Findings, by Tiers or Grades	Electric, Gas, Dam Safety	Electric, Gas, Dam Safety	Median number of days to correct.	This metric measures the median number of days it takes after the discovery of a flaw, a finding, or a deficiency during patrol, regular maintenance, or inspections of utility infrastructures, until the time when the corresponding corrective actions are completed. This metric only reports on corrective actions that were completed in the prior calendar year. **Separate metrics are provided for each tier (or grade)** of priority. Separate metrics are provided for electric and gas, for distribution and transmission, and for dam safety inspections. For the purposes of this metric, inspections are an umbrella term that includes patrols. Gas leak findings are separated by leak grades. Medians are calculated within each tier or grade.	Leading	PG&E SCE SDG&E SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
28. Median Time to Correct Inspection Findings, no Segregation by Tiers or Grades	Electric, Gas, Dam Safety	Electric, Gas, Dam Safety	Median number of days to correct.	This metric measures the median number of days it takes after the discovery or realization of a flaw, a finding, or a deficiency during patrol, regular maintenance, or inspections of utility infrastructures, until the time when the corresponding corrective actions are completed. This metric only reports on corrective actions that were completed in the prior calendar year. **There are no segregations into tiers or grades.** Separate metrics are provided for electric and gas, for distribution and transmission, and for dam safety inspections. For the purposes of this metric, inspections are an umbrella term that includes patrols. Gas leaks of the lowest grade, which only require periodic monitoring, are not included in this metric.	Leading	PG&E SCE SDG&E SoCalGas
29. CPUC-Reportable Overhead Conductor Failure Incidents	Electric, Gas	Electric, Gas	Number of reportable incidents	This metrics measures the number of CPUC-reportable electric and gas incidents in the past calendar year. This metric shows the frequency of incidents which cause moderately severe consequences.	Lagging	PG&E SCE SDG&E SoCalGas
30. Wires Down Remaining Energized	Electric Overhead, wildfire	Electric	Percentage of wires down occurrences that remain energized.	This metric is limited to only wire down events that did not result in automatic de-energization by circuit protection devices such as fuses, circuit breakers, and reclosers. Metric excludes secondary conductors and service drops. The metric is reported as a percentage of all wire down events in the past calendar year.	Lagging	PG&E SCE SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				Separate metrics are provided for transmission and distribution systems. This metric measures how effective circuit protection devices are in de-energizing downed conductors.		
31. Wires Down Root Cause Analysis	Electric Overhead, wildfire	Electric	Percentage of root cause analyses performed.	This metric is expressed as percentage of all wire down events in the past calendar year. Metric excludes secondary conductors and service drops.	Leading	PG&E SCE SDG&E
32. Wires Down by Cause	Electric Overhead, wildfire	Electric	Percentage of wires down occurrences	This lagging metric shows the leading drivers for wire down events and the effectiveness of a utility vegetation management. This will show whether utilities are having a large percent of wires down due to maintenance issues. Report metrics separately for distribution and transmission. Metric excludes secondary conductors and service drops. Report metric using the same cause categories listed in the reporting template for Wildfire Safety Plans. "Causes" may need to be defined and standardized.	Lagging	PG&E SCE SDG&E
33. Missed Inspections and Patrols for Electric Circuits	Electric Overhead, wildfire	Electric	Percentage of structures that missed inspection relative to total required structures.	Metrics are calculated as number of overhead electric structures that did not comply with the inspection frequency requirements divided by total number of overhead electric structures with inspections due in the past calendar year. Separate metrics are provided for patrols, detailed inspections.	Lagging and Leading	PG&E SCE SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				Separate metrics are provided for primary distribution and transmission overhead circuits.		
34. Missed Vegetation Management Inspections	Electric Overhead, wildfire	Electric; Vegetation Management	Percentage of missed inspection miles relative to required circuit miles.	Metrics are calculated as total miles of overhead circuits that did not comply with vegetation/conductor clearance inspection frequency requirements divided by total miles of overhead electric structures with vegetation management inspections due in the past calendar year. Separate metrics are provided for primary distribution and transmission overhead circuits.	Lagging and Leading	PG&E SCE SDG&E
35. Overhead Conductor Wire Size Compliance in HFTD	Electric Overhead, wildfire	Electric	Percentage non-compliant relative to total circuit miles	Percentage of overhead conductors in HFTD that no longer meet current standards of conductor size requirements.	Leading	PG&E SCE SDG&E
36. Overhead Conductor Wire Size Compliance in non-HFTD	Electric Overhead, wildfire	Electric	Percentage non-compliant relative to total circuit miles	Percentage of overhead conductors in non-HFTD that no longer meet current standards of conductor size requirements.	Leading	PG&E SCE SDG&E
37. Infrared Inspections on Electric Distribution Circuits in HFTD	Electric Overhead, wildfire	Electric	Percentage relative to total circuit miles	Metric measures how extensively infrared inspection is used to inspect distribution circuits in HFTD. Metric is reported as the Percentage of circuit miles of electric distribution infrared inspections completed in HFTD in the past calendar year.	Leading	PG&E SCE SDG&E
38. System Hardening in HFTD Areas	Electric Overhead, wildfire	Electric	Circuit miles	Metric measures hardening of overhead circuits to current standards in HFTD areas.	Leading	PG&E SCE SDG&E

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
39. System Undergrounding in HFTD Areas	Electric	Electric	Circuit miles	Metric measures undergrounding of overhead circuits in HFTD areas.	Leading	PG&E SCE SDG&E
40. Enhanced Vegetation Management (EVM) Work Completed	Electric	Electric	Circuit miles	Defined as completed distribution circuit miles of vegetation cleared under the EVM Program scope within high-fire risk areas to reduce wildfire risk through (1) overhang clearing 4 feet vertical from conductor and (2) high-risk tree species mitigation.	Leading	PG&E SCE SDG&E
41. Work Order Backlog	Electric and Gas safety risk	Electric and Gas	Percentage of work orders past due for completion in the past calendar year	Total number of overdue work orders that exceeded the maximum allowable/allotted time frame to complete the work order divided by the total number of closed or still-open work orders in past calendar year, evaluated at the end of the year. Separate metrics are provided for electric overhead distribution, electric overhead transmission, electric underground distribution, electric underground transmission, gas distribution, and gas transmission. For each type of patrol, inspection, or maintenance program, this metric will report on the number of occurrences of overdue work orders in the prior calendar year. Overdue work orders are those for which the originally established time frame for completion of the work order was exceeded.	Lagging and Leading	PG&E SCE SDG&E SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
42. Electric Work Order Backlog in HFTD	Electric Overhead	Electric	Percentage of work orders past due for completion in the past calendar year	Total number of overdue overhead electric work orders that exceeded the maximum allowable/allotted time frame to complete the work order divided by the total number of closed or still-open overhead electric work orders in HFTD areas in the past calendar year, evaluated at the end of the year. Separate metrics are provided for overhead distribution and overhead transmission systems. "Work Orders" include maintenance, and corrective work orders (including those generated as a result of patrols and inspections), electric system hardening, and Enhanced Vegetation Management programs.	Lagging and Leading	PG&E SCE SDG&E
43. GO-95 Corrective Actions in HFTDs	Electric safety and wildfire	Electric	Percentage of corrective actions completed	This metric is calculated as the percentage of corrective actions completed in the past calendar year divided by the total number of corrective actions identified in the past calendar year in patrols and detailed inspections per GO95 in HFTD. Separate metrics are provided for patrols and detailed inspections. Separate metrics are provided for distribution and transmission systems. This metric measures how quickly the utilities correct GO 95 deficiencies in HFTDs.	Lagging and Leading	PG&E SCE SDG&E
44. Gas Overpressure Events	Gas Transmission and Distribution	Gas	Number of occurrences,	CPUC-reportable overpressure events are those that met the conditions specified in GO112-F, 122.2(d)(5), but reported on same frequency as the other SPMs.	Lagging and Leading	PG&E SDG&E SoCalGas

Metric Name	Risks	Category	Units	Metric Description	Leading or lagging indicator?	IOUs Required to Report
				Separate metrics are provided for distribution and transmission systems. The metric measures both gas operational performance and the integrity of gas pipelines.		
45. Gas In-Line Inspections Missed	Gas Transmission	Gas	Number of Missed Inspections	The number of gas pipeline in-line inspections missed that were scheduled to be completed.	Leading	PG&E SDG&E SoCalGas

END APPENDIX D

Appendix E

Phase 1 Track 1 Technical Working Group

PG&E Proposal to Address Transparency and Uncertainty in RDF Filings

Proposal to Address Transparency and Uncertainty in IOU's Risk-Based Filings

Pacific Gas and Electric Co. (PG&E), after consultation with the Technical Working Group (TWG), presents for the consideration of the Commission a framework to address transparency and uncertainty of assumptions and estimates for risk-based ("RDF") filings, consisting of the two Elements below, and an associated Implementation Schedule.

1. *Standard Workpaper Templates*; comprised of three (3) data tables per Risk, corresponding to the input parameters, output calculations, and the list of models used in quantifying the Risk.
2. *Estimate Quality Criteria*; a set of criteria, to be developed by the TWG, to objectively assess the Estimate Quality associated with the information presented in the data tables above.

Implementation Schedule:

Date	Milestone	Description
Q3-Q4, 2021	Decision on Phase 1, R.20-07-013.	Tentative expected decision on Phase 1 issues.
Q3-2021 to Q2-2022	Develop sample Transparency framework report.	Post Decision, PG&E to prototype the Transparency framework on an existing Risk.
Q2 to Q3-2022	Report on Prototyping Results.	PG&E to issue a report on the results of the prototyping.
May 15th, 2024	PG&E files first RAMP with Transparency framework.	PG&E files first risk filing with transparency framework incorporated.
May 15th, 2025	Sempra files first RAMP with Transparency framework.	Sempra files first risk filing with transparency framework incorporated.
May 15th, 2026	SCE files first RAMP with Transparency framework.	SCE files first risk filing with transparency framework incorporated.

Background

In the Assigned Commissioner's Scoping Memo and Ruling in R.20-07-013, Phase 1, Track 1 of the proceeding was established to "…consider whether there are discreet technical questions regarding the RDF that the Commission should clarify in the short term". While the ruling contained specific issues, it also noted, as Track 1: Clarifying RDF Technical Requirements, Item f.[1] "Other related clarifications as needed".

In PG&E's 2020 RAMP filing, A.20-06-012, Safety Policy Division (SPD), The Utility Reform Network (TURN) and other parties highlighted issues with understanding assumptions, calculations, and outputs, and noted that the filing could benefit from increased transparency. PG&E likewise desires providing clarity and enabling parties to perform their own risk analyses using PG&E's data and outputs in order to produce more streamlined proceedings and reduce overhead surrounding each filing.

On March 10th, 2021, a session of the TWG was convened under Phase 1, Track 1 of R.20-07-013 in which TURN presented on "Transparency of Estimates and Assumptions". The presentation reiterated the Safety Model Assessment Proceeding (S-MAP) Settlement Agreement requirements, provided

---

[1] R.20-07-013, Assigned Commissioner's Scoping Memo and Ruling, pp 4-5.

guidelines for addressing transparency and uncertainty, and proposed a "Streamlined Format for Reporting Estimates and Assumptions".

On the topic of uncertainty, while PG&E agrees in principle with TURN's approach to quantify it rigorously and mathematically, it is concerned that the necessary data and consistent policies to do so are lacking. Whether such an approach can be scaled up to deal with the large amount of information, technical computation feasibility, and interpretation of results are also areas of concern. Furthermore, PG&E agrees with Dr. Schulman's comment in the TWG meeting that in the process of quantifying too soon, many organizations end up losing information; and that the process of understanding uncertainty must begin not with formal numbers, but with narratives. The proposal in this document keeps with this approach and supplements it with the inclusion of a quantitative Sensitivity calculation to help parties understand the importance of specific assumptions to the risk analysis.

Transparency Proposal Element #1: *Standard Workpaper Templates*

In the aforementioned TWG meeting, PG&E agreed to pilot the use of TURN's Streamlined Format on one of the existing Risks from its 2020 RAMP report. Based on this experience, PG&E recommends that Standard Workpaper Templates be developed as relational data tables, consisting of a Risk Results table, a Risk Sensitivity Analysis, and a Model Listing table. These tables would be amenable to analysis with Excel Pivot Tables or Filter to generate the report envisioned in pages 10 & 11 of TURN's presentation, as well as other reports.

Accordingly, the analysis results for each Risk would be captured in separate data tables as listed:

- Risk Results Table
- Risk Sensitivity Analysis Table
- Risk Model Listing Table

It is envisioned that the three tables be produced for each Risk modeled by the IOU using the S-MAP Settlement Agreement framework.

Risk Results Table

The Risk Results Table collects the model outputs associated with a Risk. It also represents the epistemic uncertainty[2] (due to data quality, etc.) inherent in the calculations in the Estimate Quality field, which is determined based on the criteria described in the Estimate Quality section below. The Risk Results table contains one row per Tranche-Year-Mitigation-Attribute-Result Type. The columns of the table are:

Column	Description
Risk	Name of Risk
Tranche	Name of Tranche
Year	Year for which the Value pertains to
Mitigation	One of: • Name of Mitigation

[2] "Epistemic uncertainties arise when making statistical inferences from data and, perhaps more significantly, from incompleteness in the collective state of knowledge ... The epistemic uncertainties relate to the degree of belief that the analysts possess regarding the representativeness or validity of the … model and in its predictions." *NUREG-1855, Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision making, pp 12. United States Nuclear Regulatory Commission.*

	• “Baseline”: The Values represent baseline estimates • “All”: Values are for Post Mitigation estimates assuming all the proposed mitigations are in place.
Attribute	One of: • Name of MAVF Attribute: e.g., for PG&E, “Safety”, “Electric Reliability” • “Overall”: Values represent the overall MARS score, or are not related to Attributes (e.g., likelihood estimates are not related to Attributes)
Value	Numerical value
Result Type	See table below for valid Result Types
Estimate Quality	“High”, “Medium”, “Low”. The qualitative degree of certainty/confidence associated with the output. See discussion in the Estimate Quality section below.
Confidence Interval	Quantitative confidence interval of estimate/calculation. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise “N/A”.

Result Types

PG&E proposes the following Result Types. Additional Result Types can be added as necessary.

Result Type	Description
Risk Before	MARS value, present valued, before proposed mitigations are applied. If the Mitigation column is set to “Baseline”, the value represents the Baseline risk score, calculated as *Present-Value(Attribute Weight x Program Exposure x LoRE Before x CoRE Before)* for a given Risk-Tranche-Year-Mitigation-Attribute. If the Attribute is “Overall”, the Value is the same as the sum of Risk Scores over all Attributes.
LoRE Before	Likelihood of Risk Event before proposed mitigations are applied. If the Mitigation column is set to “Baseline”, the value represents the Baseline Likelihood.
CoRE Before	Expected Consequence in Scaled Units. If the Mitigation column is set to “Baseline”, the value represents the Baseline CoRE.
Exposure Before	Total # of units (miles, etc.) for the Risk/Tranche/Year in the Baseline.
Risk After	MARS value, present valued, after Mitigation is applied. This result is only available if Mitigation column is not “Baseline”. This is calculated as *Present-Value (Attribute Weight x Program Exposure x LoRE After x CoRE After)* for a given Risk-Tranche-Year-Mitigation-Attribute. If the Attribute is “Overall”, the Value is the sum of Risk Scores over all Attributes.
LoRE After	Likelihood after Mitigation is applied. This result is only available if Mitigation column is not “Baseline”. Note that the

	LoRE here is different from Tranche LoRE when the mitigation is not implemented for the entire tranche.
CoRE After	CoRE after Mitigation is applied. This result is only available if Mitigation column is not “Baseline”.
Exposure After	Total # of units (miles, etc.) for the Risk/Tranche/Year after Mitigation is applied.
Mitigation Program Exposure Scope	The # of units (miles, etc.) for the Risk/Tranche/Year that the Mitigation will be applied to.
Cost	Present valued expected cost for the Year.

An example with illustrative values is provided in the Excel file titled “pge_std_wp_proposal_2.xlsx”. Note that not all combinations of Mitigation, Attribute, and Result Type are valid. For example, the combination of “Baseline”, “Safety”, and “LoRE Before” is not valid and will not be reported, because the likelihood of a risk event is separate from the consequence in the S-MAP Settlement Agreement framework.

Risk Sensitivity Analysis Table

The purpose of the Risk Sensitivity Analysis Table is to collect all the assumptions and input parameters used in Risk calculations. It also represents the epistemic uncertainty (due to data quality, etc.) inherent in the parameter in the Estimate Quality field, which is determined based on the criteria described in the Estimate Quality section below. Parameters are described in the “Parameter” field and grouped into two general types, Baseline or Mitigation Program, depending on whether they are used to calculate Baseline Risk Scores, or represent the effectiveness of mitigation programs (e.g., the amount of reduction, in percentages, that a mitigation will reduce the mean by). The sensitivity of the Risk score to changes in the value of the parameter is also provided. This is obtained by determining Upper and Lower Test Values for the parameter (e.g., current value +/- 25%), calculating the Risk Score using these values, and normalizing the difference in Scores:

φ: The reported parameter

φ_l, φ_u: Lower and Upper Test Values for the reported parameter, to be established by the IOU. The range reflected by the Lower and Upper Test Values should be wide enough to capture a variety of plausible scenarios for the parameter

$\lambda_1, \lambda_2, \ldots$: Other parameters used to calculate the Risk score

$R(\varphi, \lambda_1, \lambda_2, \ldots)$: Calculated Risk score

Sensitivity = $\frac{R(\varphi_u,\lambda_1,\lambda_2,\ldots)-R(\varphi_l,\lambda_1,\lambda_2,\ldots)}{\varphi_u-\varphi_l}$, the change in the Risk Score per unit change in the reported parameter over the range established by the Lower and Upper Test Values

Column	Description
Risk	Name of Risk
Tranche	Name of Tranche
Outcome	Outcome or “Overall”

Attribute or Driver/Sub-Driver	One of: • Name of MAVF Attribute: e.g., for PG&E it can be "Safety", "Reliability – Electric" "Overall": Values represent the overall MARS score, Driver/Sub-Driver: Name of Driver/Sub-Driver
Year	Year
Mitigation	One of: • Name of Mitigation • "Baseline": The Values represent baseline estimates
Distribution	E.g., "Poisson", "Log-normal", "N/A"
Parameter	The type of parameter and what it applies to: • Baseline LoRE mean • Baseline CoRE mean • Baseline CoRE stdev • Mitigation LoRE Effectiveness • Mitigation CoRE Effectiveness • Etc.
Value	Assumed value of the Parameter
Sensitivity	Numerical value representing the change in Risk score when the Parameter is changed by an incremental amount
Estimate Quality	"High", "Medium", "Low". The degree of confidence associated with the estimate/calculation. See discussion in the Estimate Quality section below
Justification	Tag that contains the criteria that lead to the Estimate Quality determination. E.g., "Quantitative-Limited Internal Data". See Estimate Quality section below
Reference	Text field providing reference to further documentation, if necessary.
Comments	Column for SME input to allow information not otherwise captured, to be captured and shared, if available. This could include references to narratives in workpapers. For example, this may include SME concerns about the best way to use the data, or its limits, or opportunities to gather more or improve the data or its use.
Confidence Interval	Quantitative confidence interval of output. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise "N/A".

Risk Model Listing Table

PG&E presented its initial proposal in the TWG workshop on Transparency, held on April 14th, 2021. During this meeting Utility Consumers Action Network (UCAN) stressed that model uncertainty[3] should be captured in any proposal to address transparency and data quality. PG&E believes that this issue can

[3] "Model uncertainty is related to an issue for which no consensus approach or model exists and where the choice of approach or model is known to have an effect on the … model." *NUREG-1855, Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision making, pp 15. United States Nuclear Regulatory Commission.*

be addressed by listing all models (e.g., statistical distributions used for consequences) used for each Risk in a table.

Column	Description
Risk	Name of Risk
Tranche	Name of Tranche
Outcome	Outcome or “Overall”
Attribute or Driver/Subdriver	One of: • Name of MAVF Attribute: e.g., for PG&E it can be “Safety”, “Reliability – Electric”, “Overall”: Values represent the overall MARS score, or are not related to Attributes (e.g., likelihood estimates are not related to Attributes) • Name of Driver/sub-driver
Year	Year
Distribution	“Log-normal”, “normal”, etc
Description	E.g., “Distribution of Safety Consequences”
Estimate Quality	“High”, “Medium”, “Low”. The degree of confidence associated with the data inputs. See discussion in the Estimate Quality section below
Justification	Tag that contains the criteria that lead to the Estimate Quality determination. E.g., “Industry Consensus Model”
Reference	Text field providing reference to further documentation, if necessary.

Recommended Approach for Standard Workpaper Templates

PG&E recommends the adoption of the tables described above, subject to technical, computability implementation concerns that might arise due to the Sensitivity (or other) calculation(s). This is addressed by a Prototyping period (incorporated into the Implementation Schedule) where the calculations will be developed and tested, and the results, together with modifications to calculations, if any, will be issued.

Transparency Framework Element #2: Estimate Quality

PG&E proposes the use of a qualitative Estimate Quality to describe the uncertainty inherent in Risk models, calculations, and input parameters. This is a valid incremental step towards a more rigorous treatment of data and modeling uncertainty and will provide parties with valuable experience and perspective for developing a more comprehensive and quantitatively-based methodology. Accordingly, each input parameter, risk calculation, and model will be categorized as having a "High", "Medium", or "Low" Estimate Quality, based on pre-established, transparent, and objective criteria as described below.

Discussion

In the aforementioned TWG workshop on Transparency, PG&E proposed the following sets of criteria for input parameters and risk calculations.

PG&E's Original Proposed Criteria for Input Parameters

Overall, How Parameter was Determined	Detailed Description of Method Used	Estimate Quality
Quantitative	Bayesian or other formal analysis incorporating industry data with internal data.	High
	Internal data only, no available industry data or industry data was not used.	High
	Limited internal data.	Medium
SME-Judgment	Multiple SMEs with consensus utilizing proxy data.	High
	Multiple SMEs with uncertainty, or single SME with high confidence in proxy data.	Medium
	Single SME with uncertainty or high level of interpretation of proxy data.	Low

PG&E also envisioned that the criteria could be expanded by IOUs to incorporate other methods used to determine parameters.

Parties commented that PG&E's proposal would require refinement. For example, Dr Schulman pointed out that retrospective accident data shows that companies have been deceived by their own internal data, and hence using only Internal data should not necessarily warrant a High Estimate Quality, per PG&E's proposal. PG&E agrees that refinement is needed and believes that instead of its original proposal, the objective criteria used to attribute the Estimate Quality to input parameters should be developed by the TWG. PG&E also subsequently supplemented the Standard Workpaper Templates to include a Risk Model Listing table (as documented above), which also includes an Estimate Quality categorization for all the models used for quantifying a Risk. This approach would entail a corresponding set of criteria to use in determining the Estimate Quality for models.

PG&E's Proposed Criteria for Risk Calculations

PG&E's original proposal noted that the Estimate Quality of calculations that depend on input parameters are directly related to the Estimate Quality of the input parameters themselves. For example, if the CoRE of a Risk uses input parameters that have a Low Estimate Quality, the CoRE will have a Low Estimate Quality itself, i.e., the Estimate Quality of the CoRE will be the same as the lowest Estimate Quality of its input parameters. For Post-Mitigated Risk scores, the Estimate Quality depends on both the Mitigation program input parameters and the Baseline risk distribution parameters and is set to the lowest Estimate Quality of its inputs, as follows.

Estimate Quality of Post-Mitigated Risk Scores	**Type: Mitigation Parameter Estimate Quality**		
Type: Driver or Baseline Parameter Estimate Quality	**High**	**Medium**	**Low**
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Low

PG&E did not receive comments during the TWG session on its approach for output/calculations. Nevertheless, it recognizes that its approach here could require modifications based on how the development of criteria for inputs proceeds.

Recommended Approach for Estimate Quality

Based on the discussion above, PG&E recommends that the Commission, in adopting the Estimate Quality proposal, establish future TWG working sessions to develop separate sets of criteria to categorize Estimate Quality associated with:

- Inputs
- Calculations; and
- Models.

The in-depth topics to be covered in such workshop(s) include, but are not limited to:

- Understanding the different ways in which input parameters are developed.
- Recognizing the limitations and pitfalls associated with the different ways that parameters are developed.
- Considering practices adopted by other industries, and situations that are specific only to the IOUs, if any.
- Whether to adopt the criteria PG&E proposed for determining the Estimate Quality *for calculations* based on the Estimates for the inputs. If not, to develop an alternative.
- Consider what factors (e.g., degree of industry adoption,) should be used to determine the Estimate Quality *for models*.
- Developing flow-charts, questionnaires, etc. to be used in the Estimate Quality determination.

Next Steps

The applicable procedural schedule for the data transparency portion of Phase 1, Track 1 of R.20-07-013, as communicated via e-mail from SPD to the TWG on April 16th, 2021 is reproduced below.

Date	Milestone	Description
May 7th, 2021	TWG feedback on proposal due to SPD and TWG members	TWG members submit written feedback to the TWG and SPD on PG&E's documents. Feedback will include areas in the proposal of agreement and/or disagreement

Accordingly, PG&E requests that TWG members provide any feedback, in the manner determined by SPD, on its proposal herewith, a Framework to Address Transparency and Uncertainty consisting of the two Elements, and the Implementation Schedule above.

Change Log

“Confidence Level” renamed to “Estimate Quality” per MGRA.

Sensitivity calculation changed to use large increments to incorporate higher order effects (i.e., incorporating 2nd, 3rd, and higher partial derivatives into calculation) per MGRA.

Added “Confidence Interval” column per Cal Advocates & MGRA.

Added “Comments” column per Cal Advocates & Dr. Schulman.

Replaced Confidence Level Tiered Criteria with proposal for the TWG to jointly develop objective criteria for categorizing data into “Estimate Quality” levels, per Dr Schulman & UCAN.

Added a Risk Model Listing table to address how Model Uncertainty should be factored into “Estimate Quality”, which was brought up by UCAN.

Clarified (as requested by TURN) that Attribute Weights and Discount Factors (Present Value) are included in the Risk Before and Risk After calculations.

Included Transparency Proposal and Background sections, including implementation schedule.

Added Next Steps section.

Risk Results Table Data Dictionary

Column	Description	input # of items	# of rows
Risk	Name of RAMP Risk	1	8000
Tranche	Name of Tranche of RAMP Risk	8	
Year	Year for which the value pertains to	50	
Mitigation	{Name of mitigation, or Baseline, All}	5	
Attribute	{Name of MAVF Attribute (PGE: Safety, Reliability - Electric, Reliabilit	5	
Value	Numerical value, discounted if applicable	1	
Result Type	The type of result being reported. One of the following: - Risk Before (Discounted) - LoRE Before - CoRE Before - Risk After (Discounted) - CoRE After - LoRE After - Cost (Discounted) - Exposure Before - Exposure After - Mitigation Program Exposure Scope	9	
Estimate Quality	"High", "Medium", "Low"		
Confidence Interval	Quantitative confidence interval of estimate/calculation. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise “N/A”.		

Valid Mitigation/Attribute/Result Type Combinations

Mitigation	Attribute	Result Type
Mitigation Program	MAVF Attribute (e.g. Safety)	Risk After
Mitigation Program	MAVF Attribute (e.g. Safety)	CoRE After
Mitigation Program	Overall	Risk After
Mitigation Program	Overall	CoRE After
Mitigation Program	Overall	LoRE After
Mitigation Program	Overall	Cost
Mitigation Program	Overall	Mitigation Program Exposure Scope
Baseline	MAVF Attribute (e.g. Safety)	CoRE Before
Baseline	MAVF Attribute (e.g. Safety)	Risk Before
Baseline	Overall	Risk Before
Baseline	Overall	LoRE Before
Baseline	Overall	Core Before
Baseline	Overall	Exposure Before
All	MAVF Attribute (e.g. Safety)	Risk After
All	MAVF Attribute (e.g. Safety)	CoRE After
All	Overall	Risk After
All	Overall	LoRE After
All	Overall	CoRE After
All	Overall	Cost
All	Overall	Exposure After

Risk Sensitivity Analysis Table Data Dictionary

Column	Description	input # of items	# of rows
Risk	Name of RAMP Risk	1	800000
Tranche	Name of Tranche of RAMP Risk	8	
Outcome	Name of Outcome, or "Overall"	4	
Attribute	{Name of MAVF Attribute (PGE: Safety, Reliability - Electric, Reliability - Gas, Financial), Overall}	5	
Year	Year for which the value pertains to	50	
Mitigation	{Name of mitigation, or Baseline, All}	5	
Distribution	Type of Distribution, e.g.: "Poisson", "Log-normal", "N/A", etc.	4	
Value	Assumed Value of the parameter		
Sensitivity	Numerical value representing the change in Risk score when the Parameter is changed by an incremental amount.		
Estimate Quality	"High", "Medium", "Low"		
Justification	Text tag that contains the criteria that lead to the Confidence Level determination.		
Reference	Text field providing reference to further documentation, if necessary.		
Parameter	The type of parameter. Valid types include: - Baseline LoRE Mean - Baseline Core Mean - Baseline CoRE stdev - Mitigation LoRE Effectiveness - Mitigation CoRE Effectiveness - etc.		
Comments			
Confidence Interval	Quantitative confidence interval of estimate/calculation. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise "N/A".		

Risk Results Table- ILLUSTRATIVE VALUES ONLY

Risk	Tranche	Year	Mitigation	Attribute	Result Type	Value	Estimate Quality	Confidence Interval
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Safety	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Reliability - Electric	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Financial	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Overall	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Overall	LoRE After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	Spillway	Overall	Cost	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2023	LLO	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2023	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2023	Spillway	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A

Risk	Tranche	Year	Mitigation	Attribute	Result Type	Value	Estimate Quality	Confidence Interval
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2023	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2023	Seismic	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Safety	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Reliability - Electric	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Financial	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Overall	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Overall	LoRE After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	Spillway	Overall	Cost	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2024	LLO	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A

Risk	Tranche	Year	Mitigation	Attribute	Result Type	Value	Estimate Quality	Confidence Interval
Large Uncontrolled Water Release	McCloud	2024	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2024	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2024	Spillway	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2024	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2024	Seismic	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Safety	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Reliability - Electric	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Financial	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Overall	Risk After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Overall	LoRE After	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Fordyce	2025	Spillway	Overall	Cost	1.00E-05	Medium	#N/A

Risk	Tranche	Year	Mitigation	Attribute	Result Type	Value	Estimate Quality	Confidence Interval
Large Uncontrolled Water Release	Fordyce	2025	LLO	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	LLO	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	LLO	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	LLO	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	LLO	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Fordyce	2025	LLO	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	McCloud	2025	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	McCloud	2025	Spillway	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Safety	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Reliability - Electric	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Financial	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Overall	Risk Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Safety	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Reliability - Electric	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Financial	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Overall	LoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Safety	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Reliability - Electric	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Financial	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Baseline	Overall	CoRE Before	1.00E-05	Medium	#N/A
Large Uncontrolled Water Release	Pit 6	2025	All	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	All	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	All	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	All	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	All	Overall	Cost	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Safety	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Reliability - Electric	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Financial	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Overall	Risk After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Overall	LoRE After	1.00E-05	Low	#N/A
Large Uncontrolled Water Release	Pit 6	2025	Seismic	Overall	Cost	1.00E-05	Low	#N/A

Risk Sensitivity Analysis Table- ILLUSTRATIVE VALUES ONLY

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2023	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2024	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2025	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2026	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2027	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2028	Baseline	Poisson	Baseline LoRE Mean	8.29E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2029	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2030	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2031	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2032	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2033	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2034	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2035	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2036	Baseline	Poisson	Baseline LoRE Mean	8.30E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2037	Baseline	Poisson	Baseline LoRE Mean	8.31E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2038	Baseline	Poisson	Baseline LoRE Mean	8.31E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2039	Baseline	Poisson	Baseline LoRE Mean	8.31E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2040	Baseline	Poisson	Baseline LoRE Mean	8.31E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2041	Baseline	Poisson	Baseline LoRE Mean	8.31E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2042	Baseline	Poisson	Baseline LoRE Mean	8.32E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2043	Baseline	Poisson	Baseline LoRE Mean	8.32E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2044	Baseline	Poisson	Baseline LoRE Mean	8.32E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2045	Baseline	Poisson	Baseline LoRE Mean	8.32E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2046	Baseline	Poisson	Baseline LoRE Mean	8.33E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2047	Baseline	Poisson	Baseline LoRE Mean	8.33E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2048	Baseline	Poisson	Baseline LoRE Mean	8.33E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2049	Baseline	Poisson	Baseline LoRE Mean	8.33E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2050	Baseline	Poisson	Baseline LoRE Mean	8.34E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2051	Baseline	Poisson	Baseline LoRE Mean	8.34E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2052	Baseline	Poisson	Baseline LoRE Mean	8.34E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2053	Baseline	Poisson	Baseline LoRE Mean	8.35E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2054	Baseline	Poisson	Baseline LoRE Mean	8.35E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2055	Baseline	Poisson	Baseline LoRE Mean	8.35E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2056	Baseline	Poisson	Baseline LoRE Mean	8.36E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2057	Baseline	Poisson	Baseline LoRE Mean	8.36E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2058	Baseline	Poisson	Baseline LoRE Mean	8.37E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2059	Baseline	Poisson	Baseline LoRE Mean	8.37E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2060	Baseline	Poisson	Baseline LoRE Mean	8.38E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2061	Baseline	Poisson	Baseline LoRE Mean	8.38E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2062	Baseline	Poisson	Baseline LoRE Mean	8.39E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2063	Baseline	Poisson	Baseline LoRE Mean	8.39E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2064	Baseline	Poisson	Baseline LoRE Mean	8.40E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2065	Baseline	Poisson	Baseline LoRE Mean	8.41E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2066	Baseline	Poisson	Baseline LoRE Mean	8.41E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2067	Baseline	Poisson	Baseline LoRE Mean	8.42E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2068	Baseline	Poisson	Baseline LoRE Mean	8.43E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2069	Baseline	Poisson	Baseline LoRE Mean	8.44E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2070	Baseline	Poisson	Baseline LoRE Mean	8.44E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2071	Baseline	Poisson	Baseline LoRE Mean	8.45E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2072	Baseline	Poisson	Baseline LoRE Mean	8.46E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2073	Baseline	Poisson	Baseline LoRE Mean	8.47E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2074	Baseline	Poisson	Baseline LoRE Mean	8.48E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2075	Baseline	Poisson	Baseline LoRE Mean	8.49E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2076	Baseline	Poisson	Baseline LoRE Mean	8.50E-05	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2023	Spillway	N/A	Mitigation CoRE Effectiveness	1.184685911	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2024	Spillway	N/A	Mitigation CoRE Effectiveness	1.053380807	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2025	Spillway	N/A	Mitigation CoRE Effectiveness	1.04262496	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2026	Spillway	N/A	Mitigation CoRE Effectiveness	1.042778966	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2027	Spillway	N/A	Mitigation CoRE Effectiveness	1.043005074	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2028	Spillway	N/A	Mitigation CoRE Effectiveness	1.04322364	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2029	Spillway	N/A	Mitigation CoRE Effectiveness	1.043432308	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2030	Spillway	N/A	Mitigation CoRE Effectiveness	1.062745661	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2031	Spillway	N/A	Mitigation CoRE Effectiveness	1.082214328	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2032	Spillway	N/A	Mitigation CoRE Effectiveness	1.101839389	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2033	Spillway	N/A	Mitigation CoRE Effectiveness	1.121963113	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2034	Spillway	N/A	Mitigation CoRE Effectiveness	1.133705939	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2035	Spillway	N/A	Mitigation CoRE Effectiveness	1.145466875	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2036	Spillway	N/A	Mitigation CoRE Effectiveness	1.145751843	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2037	Spillway	N/A	Mitigation CoRE Effectiveness	1.14605106	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2038	Spillway	N/A	Mitigation CoRE Effectiveness	1.146365237	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2039	Spillway	N/A	Mitigation CoRE Effectiveness	1.146695124	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2040	Spillway	N/A	Mitigation CoRE Effectiveness	1.147041504	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2041	Spillway	N/A	Mitigation CoRE Effectiveness	1.147405204	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2042	Spillway	N/A	Mitigation CoRE Effectiveness	1.147787089	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2043	Spillway	N/A	Mitigation CoRE Effectiveness	1.148188068	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2044	Spillway	N/A	Mitigation CoRE Effectiveness	1.148609096	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2045	Spillway	N/A	Mitigation CoRE Effectiveness	1.149051175	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2046	Spillway	N/A	Mitigation CoRE Effectiveness	1.149515358	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2047	Spillway	N/A	Mitigation CoRE Effectiveness	1.15000275	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2048	Spillway	N/A	Mitigation CoRE Effectiveness	1.150514512	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2049	Spillway	N/A	Mitigation CoRE Effectiveness	1.151051862	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2050	Spillway	N/A	Mitigation CoRE Effectiveness	1.15161608	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2051	Spillway	N/A	Mitigation CoRE Effectiveness	1.152208508	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2052	Spillway	N/A	Mitigation CoRE Effectiveness	1.152830558	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2053	Spillway	N/A	Mitigation CoRE Effectiveness	1.153483711	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2054	Spillway	N/A	Mitigation CoRE Effectiveness	1.16444855	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2055	Spillway	N/A	Mitigation CoRE Effectiveness	1.165155321	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2056	Spillway	N/A	Mitigation CoRE Effectiveness	1.16589743	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2057	Spillway	N/A	Mitigation CoRE Effectiveness	1.166676645	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2058	Spillway	N/A	Mitigation CoRE Effectiveness	1.16749482	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2059	Spillway	N/A	Mitigation CoRE Effectiveness	1.168353905	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2060	Spillway	N/A	Mitigation CoRE Effectiveness	1.169255943	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2061	Spillway	N/A	Mitigation CoRE Effectiveness	1.170203083	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2062	Spillway	N/A	Mitigation CoRE Effectiveness	1.171197581	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2063	Spillway	N/A	Mitigation CoRE Effectiveness	1.172914849	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2064	Spillway	N/A	Mitigation CoRE Effectiveness	1.174009909	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2065	Spillway	N/A	Mitigation CoRE Effectiveness	1.175159722	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2066	Spillway	N/A	Mitigation CoRE Effectiveness	1.176367025	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2067	Spillway	N/A	Mitigation CoRE Effectiveness	1.177634694	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2068	Spillway	N/A	Mitigation CoRE Effectiveness	1.178965745	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2069	Spillway	N/A	Mitigation CoRE Effectiveness	1.18036335	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2070	Spillway	N/A	Mitigation CoRE Effectiveness	1.181830835	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2071	Spillway	N/A	Mitigation CoRE Effectiveness	1.183371694	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2072	Spillway	N/A	Mitigation CoRE Effectiveness	1.184989596	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2073	Spillway	N/A	Mitigation CoRE Effectiveness	1.186688393	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2074	Spillway	N/A	Mitigation CoRE Effectiveness	1.305958094	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2075	Spillway	N/A	Mitigation CoRE Effectiveness	1.307408664	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2076	Spillway	N/A	Mitigation CoRE Effectiveness	1.308931762	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2023	Spillway	N/A	Mitigation LoRE Effectiveness	8.29E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2024	Spillway	N/A	Mitigation LoRE Effectiveness	8.21E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2025	Spillway	N/A	Mitigation LoRE Effectiveness	8.21E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2026	Spillway	N/A	Mitigation LoRE Effectiveness	8.21E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2027	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2028	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2029	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2030	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2031	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2032	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2033	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2034	Spillway	N/A	Mitigation LoRE Effectiveness	8.22E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2035	Spillway	N/A	Mitigation LoRE Effectiveness	8.23E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2036	Spillway	N/A	Mitigation LoRE Effectiveness	8.23E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2037	Spillway	N/A	Mitigation LoRE Effectiveness	8.23E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2038	Spillway	N/A	Mitigation LoRE Effectiveness	8.23E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2039	Spillway	N/A	Mitigation LoRE Effectiveness	8.23E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2040	Spillway	N/A	Mitigation LoRE Effectiveness	8.24E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2041	Spillway	N/A	Mitigation LoRE Effectiveness	8.24E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2042	Spillway	N/A	Mitigation LoRE Effectiveness	8.24E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2043	Spillway	N/A	Mitigation LoRE Effectiveness	8.24E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2044	Spillway	N/A	Mitigation LoRE Effectiveness	8.24E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2045	Spillway	N/A	Mitigation LoRE Effectiveness	8.25E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2046	Spillway	N/A	Mitigation LoRE Effectiveness	8.25E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2047	Spillway	N/A	Mitigation LoRE Effectiveness	8.25E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2048	Spillway	N/A	Mitigation LoRE Effectiveness	8.25E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2049	Spillway	N/A	Mitigation LoRE Effectiveness	8.26E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2050	Spillway	N/A	Mitigation LoRE Effectiveness	8.26E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2051	Spillway	N/A	Mitigation LoRE Effectiveness	8.26E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2052	Spillway	N/A	Mitigation LoRE Effectiveness	8.27E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2053	Spillway	N/A	Mitigation LoRE Effectiveness	8.27E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2054	Spillway	N/A	Mitigation LoRE Effectiveness	8.35E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2055	Spillway	N/A	Mitigation LoRE Effectiveness	8.35E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2056	Spillway	N/A	Mitigation LoRE Effectiveness	8.36E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2057	Spillway	N/A	Mitigation LoRE Effectiveness	8.36E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2058	Spillway	N/A	Mitigation LoRE Effectiveness	8.37E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2059	Spillway	N/A	Mitigation LoRE Effectiveness	8.37E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2060	Spillway	N/A	Mitigation LoRE Effectiveness	8.38E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2061	Spillway	N/A	Mitigation LoRE Effectiveness	8.38E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2062	Spillway	N/A	Mitigation LoRE Effectiveness	8.39E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2063	Spillway	N/A	Mitigation LoRE Effectiveness	8.39E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2064	Spillway	N/A	Mitigation LoRE Effectiveness	8.40E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2065	Spillway	N/A	Mitigation LoRE Effectiveness	8.41E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2066	Spillway	N/A	Mitigation LoRE Effectiveness	8.41E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2067	Spillway	N/A	Mitigation LoRE Effectiveness	8.42E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2068	Spillway	N/A	Mitigation LoRE Effectiveness	8.43E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2069	Spillway	N/A	Mitigation LoRE Effectiveness	8.44E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2070	Spillway	N/A	Mitigation LoRE Effectiveness	8.44E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2071	Spillway	N/A	Mitigation LoRE Effectiveness	8.45E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2072	Spillway	N/A	Mitigation LoRE Effectiveness	8.46E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2073	Spillway	N/A	Mitigation LoRE Effectiveness	8.47E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2074	Spillway	N/A	Mitigation LoRE Effectiveness	8.48E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2075	Spillway	N/A	Mitigation LoRE Effectiveness	8.49E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	N/A	2076	Spillway	N/A	Mitigation LoRE Effectiveness	8.50E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2023	Spillway	Log-Normal	Baseline CoRE mean	1.21263161	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2024	Spillway	Log-Normal	Baseline CoRE mean	1.212781812	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2025	Spillway	Log-Normal	Baseline CoRE mean	1.212922661	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2026	Spillway	Log-Normal	Baseline CoRE mean	1.213050519	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2027	Spillway	Log-Normal	Baseline CoRE mean	1.213183692	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2028	Spillway	Log-Normal	Baseline CoRE mean	1.213322496	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2029	Spillway	Log-Normal	Baseline CoRE mean	1.213468239	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2030	Spillway	Log-Normal	Baseline CoRE mean	1.235699281	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2031	Spillway	Log-Normal	Baseline CoRE mean	1.258104409	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2032	Spillway	Log-Normal	Baseline CoRE mean	1.280684512	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2033	Spillway	Log-Normal	Baseline CoRE mean	1.280871403	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2034	Spillway	Log-Normal	Baseline CoRE mean	1.281067638	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2035	Spillway	Log-Normal	Baseline CoRE mean	1.281273685	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2036	Spillway	Log-Normal	Baseline CoRE mean	1.281490035	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2037	Spillway	Log-Normal	Baseline CoRE mean	1.281717202	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2038	Spillway	Log-Normal	Baseline CoRE mean	1.281955727	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2039	Spillway	Log-Normal	Baseline CoRE mean	1.282206179	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2040	Spillway	Log-Normal	Baseline CoRE mean	1.282469153	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2041	Spillway	Log-Normal	Baseline CoRE mean	1.282745276	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2042	Spillway	Log-Normal	Baseline CoRE mean	1.283035205	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2043	Spillway	Log-Normal	Baseline CoRE mean	1.283339631	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2044	Spillway	Log-Normal	Baseline CoRE mean	1.283659278	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2045	Spillway	Log-Normal	Baseline CoRE mean	1.283994907	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2046	Spillway	Log-Normal	Baseline CoRE mean	1.284347318	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2047	Spillway	Log-Normal	Baseline CoRE mean	1.284717349	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2048	Spillway	Log-Normal	Baseline CoRE mean	1.285105881	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2049	Spillway	Log-Normal	Baseline CoRE mean	1.285513841	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2050	Spillway	Log-Normal	Baseline CoRE mean	1.285942198	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2051	Spillway	Log-Normal	Baseline CoRE mean	1.286391973	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2052	Spillway	Log-Normal	Baseline CoRE mean	1.286864237	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2053	Spillway	Log-Normal	Baseline CoRE mean	1.287360114	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2054	Spillway	Log-Normal	Baseline CoRE mean	1.287880785	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2055	Spillway	Log-Normal	Baseline CoRE mean	1.28842749	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2056	Spillway	Log-Normal	Baseline CoRE mean	1.28900153	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2057	Spillway	Log-Normal	Baseline CoRE mean	1.289604272	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2058	Spillway	Log-Normal	Baseline CoRE mean	1.290237151	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2059	Spillway	Log-Normal	Baseline CoRE mean	1.290901673	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2060	Spillway	Log-Normal	Baseline CoRE mean	1.291599422	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2061	Spillway	Log-Normal	Baseline CoRE mean	1.292332059	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2062	Spillway	Log-Normal	Baseline CoRE mean	1.293101327	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2063	Spillway	Log-Normal	Baseline CoRE mean	1.293909059	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2064	Spillway	Log-Normal	Baseline CoRE mean	1.294757177	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2065	Spillway	Log-Normal	Baseline CoRE mean	1.295647701	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2066	Spillway	Log-Normal	Baseline CoRE mean	1.296582751	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2067	Spillway	Log-Normal	Baseline CoRE mean	1.297564554	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2068	Spillway	Log-Normal	Baseline CoRE mean	1.298595447	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2069	Spillway	Log-Normal	Baseline CoRE mean	1.299677885	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2070	Spillway	Log-Normal	Baseline CoRE mean	1.300814444	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2071	Spillway	Log-Normal	Baseline CoRE mean	1.302007832	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2072	Spillway	Log-Normal	Baseline CoRE mean	1.303260889	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2073	Spillway	Log-Normal	Baseline CoRE mean	1.304576598	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2074	Spillway	Log-Normal	Baseline CoRE mean	1.305958094	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2075	Spillway	Log-Normal	Baseline CoRE mean	1.307408664	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2076	Spillway	Log-Normal	Baseline CoRE mean	1.308931762	0.1	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2023	Spillway	Log-Normal	Baseline CoRE mean	2.346147429	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2024	Spillway	Log-Normal	Baseline CoRE mean	2.346438033	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2025	Spillway	Log-Normal	Baseline CoRE mean	2.346710542	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2026	Spillway	Log-Normal	Baseline CoRE mean	2.346957916	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2027	Spillway	Log-Normal	Baseline CoRE mean	2.347215574	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2028	Spillway	Log-Normal	Baseline CoRE mean	2.347484125	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2029	Spillway	Log-Normal	Baseline CoRE mean	2.347766103	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2030	Spillway	Log-Normal	Baseline CoRE mean	2.348591095	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2031	Spillway	Log-Normal	Baseline CoRE mean	2.349322836	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2032	Spillway	Log-Normal	Baseline CoRE mean	2.349949565	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2033	Spillway	Log-Normal	Baseline CoRE mean	2.350292495	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2034	Spillway	Log-Normal	Baseline CoRE mean	2.35065257	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2035	Spillway	Log-Normal	Baseline CoRE mean	2.35103065	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2036	Spillway	Log-Normal	Baseline CoRE mean	2.351427633	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2037	Spillway	Log-Normal	Baseline CoRE mean	2.351844466	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2038	Spillway	Log-Normal	Baseline CoRE mean	2.35228214	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2039	Spillway	Log-Normal	Baseline CoRE mean	2.352741698	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2040	Spillway	Log-Normal	Baseline CoRE mean	2.353224234	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2041	Spillway	Log-Normal	Baseline CoRE mean	2.353730897	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2042	Spillway	Log-Normal	Baseline CoRE mean	2.354262892	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2043	Spillway	Log-Normal	Baseline CoRE mean	2.354821488	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2044	Spillway	Log-Normal	Baseline CoRE mean	2.355408013	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2045	Spillway	Log-Normal	Baseline CoRE mean	2.356023865	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2046	Spillway	Log-Normal	Baseline CoRE mean	2.356670509	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2047	Spillway	Log-Normal	Baseline CoRE mean	2.357349486	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2048	Spillway	Log-Normal	Baseline CoRE mean	2.358062411	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2049	Spillway	Log-Normal	Baseline CoRE mean	2.358810982	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2050	Spillway	Log-Normal	Baseline CoRE mean	2.359596983	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2051	Spillway	Log-Normal	Baseline CoRE mean	2.360422283	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2052	Spillway	Log-Normal	Baseline CoRE mean	2.361288848	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2053	Spillway	Log-Normal	Baseline CoRE mean	2.362198741	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2054	Spillway	Log-Normal	Baseline CoRE mean	2.363154129	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2055	Spillway	Log-Normal	Baseline CoRE mean	2.364157286	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2056	Spillway	Log-Normal	Baseline CoRE mean	2.365210602	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2057	Spillway	Log-Normal	Baseline CoRE mean	2.366316583	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2058	Spillway	Log-Normal	Baseline CoRE mean	2.367477863	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2059	Spillway	Log-Normal	Baseline CoRE mean	2.368697207	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2060	Spillway	Log-Normal	Baseline CoRE mean	2.369977518	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2061	Spillway	Log-Normal	Baseline CoRE mean	2.371321845	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2062	Spillway	Log-Normal	Baseline CoRE mean	2.372733388	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2063	Spillway	Log-Normal	Baseline CoRE mean	2.374215509	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2064	Spillway	Log-Normal	Baseline CoRE mean	2.375771735	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2065	Spillway	Log-Normal	Baseline CoRE mean	2.377405773	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2066	Spillway	Log-Normal	Baseline CoRE mean	2.379121513	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2067	Spillway	Log-Normal	Baseline CoRE mean	2.380923039	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2068	Spillway	Log-Normal	Baseline CoRE mean	2.382814642	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2069	Spillway	Log-Normal	Baseline CoRE mean	2.384800825	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2070	Spillway	Log-Normal	Baseline CoRE mean	2.386886317	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2071	Spillway	Log-Normal	Baseline CoRE mean	2.389076084	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2072	Spillway	Log-Normal	Baseline CoRE mean	2.391375339	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2073	Spillway	Log-Normal	Baseline CoRE mean	2.393789557	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2074	Spillway	Log-Normal	Baseline CoRE mean	2.396324486	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2075	Spillway	Log-Normal	Baseline CoRE mean	2.398986161	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2076	Spillway	Log-Normal	Baseline CoRE mean	2.40178092	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2023	Spillway	N/A	Mitigation CoRE Effectiveness	2.332576709	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2024	Spillway	N/A	Mitigation CoRE Effectiveness	2.095009856	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2025	Spillway	N/A	Mitigation CoRE Effectiveness	2.094681621	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2026	Spillway	N/A	Mitigation CoRE Effectiveness	2.094942193	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2027	Spillway	N/A	Mitigation CoRE Effectiveness	2.095396443	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2028	Spillway	N/A	Mitigation CoRE Effectiveness	2.095835542	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2029	Spillway	N/A	Mitigation CoRE Effectiveness	2.096254757	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2030	Spillway	N/A	Mitigation CoRE Effectiveness	2.097659391	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2031	Spillway	N/A	Mitigation CoRE Effectiveness	2.098756251	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2032	Spillway	N/A	Mitigation CoRE Effectiveness	2.099679327	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2033	Spillway	N/A	Mitigation CoRE Effectiveness	2.100528809	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2034	Spillway	N/A	Mitigation CoRE Effectiveness	2.101179409	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2035	Spillway	N/A	Mitigation CoRE Effectiveness	2.101825916	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2036	Spillway	N/A	Mitigation CoRE Effectiveness	2.102359341	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2037	Spillway	N/A	Mitigation CoRE Effectiveness	2.102908379	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2038	Spillway	N/A	Mitigation CoRE Effectiveness	2.103484868	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2039	Spillway	N/A	Mitigation CoRE Effectiveness	2.104090182	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2040	Spillway	N/A	Mitigation CoRE Effectiveness	2.104725762	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2041	Spillway	N/A	Mitigation CoRE Effectiveness	2.105393121	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2042	Spillway	N/A	Mitigation CoRE Effectiveness	2.106093847	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2043	Spillway	N/A	Mitigation CoRE Effectiveness	2.10682961	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2044	Spillway	N/A	Mitigation CoRE Effectiveness	2.107602161	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2045	Spillway	N/A	Mitigation CoRE Effectiveness	2.10841334	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2046	Spillway	N/A	Mitigation CoRE Effectiveness	2.109265077	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2047	Spillway	N/A	Mitigation CoRE Effectiveness	2.110159402	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2048	Spillway	N/A	Mitigation CoRE Effectiveness	2.111098442	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2049	Spillway	N/A	Mitigation CoRE Effectiveness	2.112084435	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2050	Spillway	N/A	Mitigation CoRE Effectiveness	2.113119727	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2051	Spillway	N/A	Mitigation CoRE Effectiveness	2.114206784	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2052	Spillway	N/A	Mitigation CoRE Effectiveness	2.115348194	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2053	Spillway	N/A	Mitigation CoRE Effectiveness	2.116546674	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2054	Spillway	N/A	Mitigation CoRE Effectiveness	2.136666243	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2055	Spillway	N/A	Mitigation CoRE Effectiveness	2.137963109	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2056	Spillway	N/A	Mitigation CoRE Effectiveness	2.139324818	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2057	Spillway	N/A	Mitigation CoRE Effectiveness	2.140754612	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2058	Spillway	N/A	Mitigation CoRE Effectiveness	2.142255896	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2059	Spillway	N/A	Mitigation CoRE Effectiveness	2.143832244	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2060	Spillway	N/A	Mitigation CoRE Effectiveness	2.145487409	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2061	Spillway	N/A	Mitigation CoRE Effectiveness	2.147225333	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2062	Spillway	N/A	Mitigation CoRE Effectiveness	2.149050153	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2063	Spillway	N/A	Mitigation CoRE Effectiveness	2.152201198	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2064	Spillway	N/A	Mitigation CoRE Effectiveness	2.154210541	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2065	Spillway	N/A	Mitigation CoRE Effectiveness	2.156320352	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2066	Spillway	N/A	Mitigation CoRE Effectiveness	2.158535653	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2067	Spillway	N/A	Mitigation CoRE Effectiveness	2.160861719	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2068	Spillway	N/A	Mitigation CoRE Effectiveness	2.163304089	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2069	Spillway	N/A	Mitigation CoRE Effectiveness	2.165868577	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2070	Spillway	N/A	Mitigation CoRE Effectiveness	2.16856129	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2071	Spillway	N/A	Mitigation CoRE Effectiveness	2.171388638	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2072	Spillway	N/A	Mitigation CoRE Effectiveness	2.174357353	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2073	Spillway	N/A	Mitigation CoRE Effectiveness	2.177474504	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2074	Spillway	N/A	Mitigation CoRE Effectiveness	2.396324486	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2075	Spillway	N/A	Mitigation CoRE Effectiveness	2.398986161	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2076	Spillway	N/A	Mitigation CoRE Effectiveness	2.40178092	0.25	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2023	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.03E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2024	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.56E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2025	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.56E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2026	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.57E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2027	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.57E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2028	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.57E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2029	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.58E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2030	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.58E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2031	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.58E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2032	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.59E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2033	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.59E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2034	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.60E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2035	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.60E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2036	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.61E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2037	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.61E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2038	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.62E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2039	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.62E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2040	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.63E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2041	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.63E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2042	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.64E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2043	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.65E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2044	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.66E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2045	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.66E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2046	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.67E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2047	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.68E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2048	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.69E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2049	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.70E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2050	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.71E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2051	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.72E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2052	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.73E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2053	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.74E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2054	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.75E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2055	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.76E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2056	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.78E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2057	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.79E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2058	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.80E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2059	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.82E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2060	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.84E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2061	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.85E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2062	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.87E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2063	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.94E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2064	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.96E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2065	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.98E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2066	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.00E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2067	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.02E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2068	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.04E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2069	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.07E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2070	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.09E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2071	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.12E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2072	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.15E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2073	Internal Erosion	N/A	Mitigation LoRE Effectiveness	2.18E-06	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2074	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.08E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2075	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.08E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Overall	2076	Internal Erosion	N/A	Mitigation LoRE Effectiveness	1.08E-05	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	Frequencies.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2023	Internal Erosion	Log-Normal	Baseline CoRE mean	1.21263161	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2024	Internal Erosion	Log-Normal	Baseline CoRE mean	1.212781812	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2025	Internal Erosion	Log-Normal	Baseline CoRE mean	1.212922661	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2026	Internal Erosion	Log-Normal	Baseline CoRE mean	1.213050519	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2027	Internal Erosion	Log-Normal	Baseline CoRE mean	1.213183692	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2028	Internal Erosion	Log-Normal	Baseline CoRE mean	1.213322496	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2029	Internal Erosion	Log-Normal	Baseline CoRE mean	1.213468239	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2030	Internal Erosion	Log-Normal	Baseline CoRE mean	1.235699281	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2031	Internal Erosion	Log-Normal	Baseline CoRE mean	1.258104409	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2032	Internal Erosion	Log-Normal	Baseline CoRE mean	1.280684512	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2033	Internal Erosion	Log-Normal	Baseline CoRE mean	1.280871403	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2034	Internal Erosion	Log-Normal	Baseline CoRE mean	1.281067638	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2035	Internal Erosion	Log-Normal	Baseline CoRE mean	1.281273685	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2036	Internal Erosion	Log-Normal	Baseline CoRE mean	1.281490035	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2037	Internal Erosion	Log-Normal	Baseline CoRE mean	1.281717202	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2038	Internal Erosion	Log-Normal	Baseline CoRE mean	1.281955727	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2039	Internal Erosion	Log-Normal	Baseline CoRE mean	1.282206179	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2040	Internal Erosion	Log-Normal	Baseline CoRE mean	1.282469153	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2041	Internal Erosion	Log-Normal	Baseline CoRE mean	1.282745276	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2042	Internal Erosion	Log-Normal	Baseline CoRE mean	1.283035205	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2043	Internal Erosion	Log-Normal	Baseline CoRE mean	1.283339631	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2044	Internal Erosion	Log-Normal	Baseline CoRE mean	1.283659278	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2045	Internal Erosion	Log-Normal	Baseline CoRE mean	1.283994907	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2046	Internal Erosion	Log-Normal	Baseline CoRE mean	1.284347318	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2047	Internal Erosion	Log-Normal	Baseline CoRE mean	1.284717349	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2048	Internal Erosion	Log-Normal	Baseline CoRE mean	1.285105881	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2049	Internal Erosion	Log-Normal	Baseline CoRE mean	1.285513841	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2050	Internal Erosion	Log-Normal	Baseline CoRE mean	1.285942198	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2051	Internal Erosion	Log-Normal	Baseline CoRE mean	1.286391973	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2052	Internal Erosion	Log-Normal	Baseline CoRE mean	1.286864237	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2053	Internal Erosion	Log-Normal	Baseline CoRE mean	1.287360114	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2054	Internal Erosion	Log-Normal	Baseline CoRE mean	1.287880785	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2055	Internal Erosion	Log-Normal	Baseline CoRE mean	1.28842749	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2056	Internal Erosion	Log-Normal	Baseline CoRE mean	1.28900153	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2057	Internal Erosion	Log-Normal	Baseline CoRE mean	1.289604272	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2058	Internal Erosion	Log-Normal	Baseline CoRE mean	1.290237151	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2059	Internal Erosion	Log-Normal	Baseline CoRE mean	1.290901673	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2060	Internal Erosion	Log-Normal	Baseline CoRE mean	1.291599422	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2061	Internal Erosion	Log-Normal	Baseline CoRE mean	1.292332059	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2062	Internal Erosion	Log-Normal	Baseline CoRE mean	1.293101327	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2063	Internal Erosion	Log-Normal	Baseline CoRE mean	1.293909059	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2064	Internal Erosion	Log-Normal	Baseline CoRE mean	1.294757177	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2065	Internal Erosion	Log-Normal	Baseline CoRE mean	1.295647701	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2066	Internal Erosion	Log-Normal	Baseline CoRE mean	1.296582751	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2067	Internal Erosion	Log-Normal	Baseline CoRE mean	1.297564554	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2068	Internal Erosion	Log-Normal	Baseline CoRE mean	1.298595447	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2069	Internal Erosion	Log-Normal	Baseline CoRE mean	1.299677885	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2070	Internal Erosion	Log-Normal	Baseline CoRE mean	1.300814444	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2071	Internal Erosion	Log-Normal	Baseline CoRE mean	1.302007832	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2072	Internal Erosion	Log-Normal	Baseline CoRE mean	1.303260889	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2073	Internal Erosion	Log-Normal	Baseline CoRE mean	1.304576598	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2074	Internal Erosion	Log-Normal	Baseline CoRE mean	1.305958094	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2075	Internal Erosion	Log-Normal	Baseline CoRE mean	1.307408664	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2076	Internal Erosion	Log-Normal	Baseline CoRE mean	1.308931762	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2023	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.184685911	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2024	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.053380807	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2025	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.04262496	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2026	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.042778966	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2027	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.043005074	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2028	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.04322364	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2029	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.043432308	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2030	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.062745661	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2031	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.082214328	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2032	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.101839389	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2033	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.121963113	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2034	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.133705939	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2035	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.145466875	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2036	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.145751843	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2037	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.14605106	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2038	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.146365237	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2039	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.146695124	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2040	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.147041504	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2041	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.147405204	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2042	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.147787089	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2043	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.148188068	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2044	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.148609096	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2045	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.149051175	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2046	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.149515358	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2047	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.15000275	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2048	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.150514512	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2049	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.151051862	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2050	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.15161608	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2051	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.152208508	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2052	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.152830558	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2053	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.153483711	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2054	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.16444855	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2055	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.165155321	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2056	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.16589743	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2057	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.166676645	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2058	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.16749482	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2059	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.168353905	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2060	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.169255943	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2061	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.170203083	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2062	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.171197581	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2063	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.172914849	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2064	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.174009909	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2065	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.175159722	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2066	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.176367025	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2067	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.177634694	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2068	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.178965745	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2069	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.18036335	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2070	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.181830835	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2071	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.183371694	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2072	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.184989596	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2073	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.186688393	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2074	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.305958094	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2075	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.307408664	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Safety	2076	Internal Erosion	N/A	Mitigation CoRE Effectiveness	1.308931762	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2023	Internal Erosion	Log-Normal	Baseline CoRE mean	2.346147429	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2024	Internal Erosion	Log-Normal	Baseline CoRE mean	2.346438033	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2025	Internal Erosion	Log-Normal	Baseline CoRE mean	2.346710542	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2026	Internal Erosion	Log-Normal	Baseline CoRE mean	2.346957916	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2027	Internal Erosion	Log-Normal	Baseline CoRE mean	2.347215574	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2028	Internal Erosion	Log-Normal	Baseline CoRE mean	2.347484125	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2029	Internal Erosion	Log-Normal	Baseline CoRE mean	2.347766103	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2030	Internal Erosion	Log-Normal	Baseline CoRE mean	2.348591095	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2031	Internal Erosion	Log-Normal	Baseline CoRE mean	2.349322836	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2032	Internal Erosion	Log-Normal	Baseline CoRE mean	2.349949565	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2033	Internal Erosion	Log-Normal	Baseline CoRE mean	2.350292495	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2034	Internal Erosion	Log-Normal	Baseline CoRE mean	2.35065257	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2035	Internal Erosion	Log-Normal	Baseline CoRE mean	2.35103065	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2036	Internal Erosion	Log-Normal	Baseline CoRE mean	2.351427633	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2037	Internal Erosion	Log-Normal	Baseline CoRE mean	2.351844466	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2038	Internal Erosion	Log-Normal	Baseline CoRE mean	2.35228214	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2039	Internal Erosion	Log-Normal	Baseline CoRE mean	2.352741698	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2040	Internal Erosion	Log-Normal	Baseline CoRE mean	2.353224234	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2041	Internal Erosion	Log-Normal	Baseline CoRE mean	2.353730897	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2042	Internal Erosion	Log-Normal	Baseline CoRE mean	2.354262892	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2043	Internal Erosion	Log-Normal	Baseline CoRE mean	2.354821488	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2044	Internal Erosion	Log-Normal	Baseline CoRE mean	2.355408013	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2045	Internal Erosion	Log-Normal	Baseline CoRE mean	2.356023865	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2046	Internal Erosion	Log-Normal	Baseline CoRE mean	2.356670509	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2047	Internal Erosion	Log-Normal	Baseline CoRE mean	2.357349486	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2048	Internal Erosion	Log-Normal	Baseline CoRE mean	2.358062411	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2049	Internal Erosion	Log-Normal	Baseline CoRE mean	2.358810982	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2050	Internal Erosion	Log-Normal	Baseline CoRE mean	2.359596983	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2051	Internal Erosion	Log-Normal	Baseline CoRE mean	2.360422283	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2052	Internal Erosion	Log-Normal	Baseline CoRE mean	2.361288848	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2053	Internal Erosion	Log-Normal	Baseline CoRE mean	2.362198741	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2054	Internal Erosion	Log-Normal	Baseline CoRE mean	2.363154129	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2055	Internal Erosion	Log-Normal	Baseline CoRE mean	2.364157286	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2056	Internal Erosion	Log-Normal	Baseline CoRE mean	2.365210602	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2057	Internal Erosion	Log-Normal	Baseline CoRE mean	2.366316583	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2058	Internal Erosion	Log-Normal	Baseline CoRE mean	2.367477863	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2059	Internal Erosion	Log-Normal	Baseline CoRE mean	2.368697207	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2060	Internal Erosion	Log-Normal	Baseline CoRE mean	2.369977518	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2061	Internal Erosion	Log-Normal	Baseline CoRE mean	2.371321845	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2062	Internal Erosion	Log-Normal	Baseline CoRE mean	2.372733388	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2063	Internal Erosion	Log-Normal	Baseline CoRE mean	2.374215509	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2064	Internal Erosion	Log-Normal	Baseline CoRE mean	2.375771735	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2065	Internal Erosion	Log-Normal	Baseline CoRE mean	2.377405773	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2066	Internal Erosion	Log-Normal	Baseline CoRE mean	2.379121513	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2067	Internal Erosion	Log-Normal	Baseline CoRE mean	2.380923039	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2068	Internal Erosion	Log-Normal	Baseline CoRE mean	2.382814642	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2069	Internal Erosion	Log-Normal	Baseline CoRE mean	2.384800825	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2070	Internal Erosion	Log-Normal	Baseline CoRE mean	2.386886317	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2071	Internal Erosion	Log-Normal	Baseline CoRE mean	2.389076084	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2072	Internal Erosion	Log-Normal	Baseline CoRE mean	2.391375339	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2073	Internal Erosion	Log-Normal	Baseline CoRE mean	2.393789557	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2074	Internal Erosion	Log-Normal	Baseline CoRE mean	2.396324486	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2075	Internal Erosion	Log-Normal	Baseline CoRE mean	2.398986161	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2076	Internal Erosion	Log-Normal	Baseline CoRE mean	2.40178092	0.15	Medium	Risk-Element Confidence Medium/Mitigation Confidence: N/A	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2023	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.332576709	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2024	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.095009856	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2025	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.094681621	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2026	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.094942193	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2027	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.095396443	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2028	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.095835542	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2029	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.096254757	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2030	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.097659391	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2031	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.098756251	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2032	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.099679327	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2033	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.100528809	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2034	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.101179409	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2035	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.101825916	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2036	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.102359341	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2037	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.102908379	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2038	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.103484868	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2039	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.104090182	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2040	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.104725762	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2041	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.105393121	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2042	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.106093847	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2043	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.10682961	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2044	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.107602161	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2045	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.10841334	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2046	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.109265077	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2047	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.110159402	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2048	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.111098442	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2049	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.112084435	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2050	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.113119727	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2051	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.114206784	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2052	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.115348194	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2053	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.116546674	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2054	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.136666243	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2055	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.137963109	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2056	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.139324818	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2057	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.140754612	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2058	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.142255896	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2059	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.143832244	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2060	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.145487409	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2061	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.147225333	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2062	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.149050153	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Risk	Tranche	Outcome	Attribute or Driver/Sub-Driver	Year	Mitigation	Distribution	Parameter	Value	Sensitivity	Estimate Quality	Justification	Reference	Comments	Confidence Interval
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2063	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.152201198	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2064	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.154210541	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2065	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.156320352	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2066	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.158535653	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2067	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.160861719	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2068	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.163304089	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2069	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.165868577	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2070	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.16856129	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2071	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.171388638	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2072	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.174357353	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2073	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.177474504	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2074	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.396324486	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2075	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.398986161	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A
Large Uncontrolled Water Release	Fordyce	Large Uncontrolled Water Release	Financial	2076	Internal Erosion	N/A	Mitigation CoRE Effectiveness	2.40178092	0.2	Medium	Risk-Element Confidence Medium/Mitigation Confidence: Medium	RiskScore.csv	Column for SME input to allow information not otherwise captured, to be captured and shared, if available.	#N/A

Mitigation	LLO
Tranche	Fordyce

Sum of Value	Column Labels			
Row Labels	2023	2024	2025	Grand Total
Cost	**0.00001**	**0.00001**	**0.00001**	**0.00003**
Overall	0.00001	0.00001	0.00001	0.00003
LoRE After	**0.00001**	**0.00001**	**0.00001**	**0.00003**
Overall	0.00001	0.00001	0.00001	0.00003
Risk After	**0.00004**	**0.00004**	**0.00004**	**0.00012**
Financial	0.00001	0.00001	0.00001	0.00003
Overall	0.00001	0.00001	0.00001	0.00003
Reliability - Electric	0.00001	0.00001	0.00001	0.00003
Safety	0.00001	0.00001	0.00001	0.00003
Grand Total	**0.00006**	**0.00006**	**0.00006**	**0.00018**

April 14, 2021 Technical Working Group
Discussion Points & Feedback

Party	Comment	(Party) Reaction
TURN	What is the driver for not providing the data now? TURN has been identifying problems with risk analysis for years and is surprised that utilities cannot provide certainty this far along in the process	(PG&E) Our proposal today goes beyond the requirements of the SMAP Settlement Agreement. As we work through the process we need more data or rigor to solve sensitivity.
		(TURN) Line 30 of the settlement for sensitivity says utility will identify critical parameters and assumptions in the risk analysis and explain why the analysis is critical.
		(PG&E) Not disputing that but to do that in a quantitative manner - the SA doesn't require us to do so
		(TURN) Don't utilities have an obligation to do things in the most detail-oriented way? Just because the settlement doesn't say it needs to be quantative right now doesn't mean it shouldn't have been done.
		(PG&E) This is a new need in risk analysis and we must do this in intermediate steps.
		(POC) Quantification is already required by the Settlement Agreement.
		(UCAN) It seems difficult to model accurately and when we have confidence and sensitivity and worried about confidence level to explain the level. Isn't that what you're saying is difficult?
		(PG&E) Yes, our models are quantative but make point estimates and that's something the settlement did not address. As we are doing our modeling, we are starting to realize this is an issue and we want to move away from point estimates. The question is how do we describe distribution around input parameters? Not possible without further discussion. We are proposing to provide numbers on sensitivity.
		(UCAN) There should be some way for the utilities to describe their confidence in their confidence level. The confidence level cannot be stated without sophisticated modeling and lots of data. What does probability distribution look like for sequencing - are we asking for things that wouldn't represent reality enough that shows the right approach for cost effect analysis.
		(TURN) Either there is too much data or too much uncertainty and we have nothing to judge forward looking investments. We continue to hear that more work needs to happen and we need to understand how utilities are making cost effective work decisions.
		(TURN) Utilities must show their work. 1) The third bullet of this slide came because IOUs said RSE is itself uncertain and we wanted a confidence interval and the only way to do that is to address uncertainty on input parameters. 2) The 3x3 matrix that provides a confidence level in words is a step backwards - used to do a color coded matrix that could not be used to calculate RSE. 3) Well-known procedures encoding experts' uncertainty on probability distribution.
		(TURN) We provided the utilities thorough methodologies - the IOUs have seen this demonstrated
		(Dr. Paul Schulman) In the Decision the Commission foresaw a series of improvements in the uncertainty analysis associated with the filings the IOUs would make in the RAMP process. That issue of improving uncertainty is important because many organizations realize if they try to quantify too soon they lose information. The process of understanding uncertainty actually is related to breaking down types of epistemic uncertainty but not with formal numbers with but with narratives. Example: What are you uncomfortable with? What are those unstudied conditions? Back-and-forth analysis helped developed a more formal way to understand uncertainty and can/has led to better variables and more formal measurements. I think there is a process here. We spend so much time thinking about MAVF and other methods we've forgotten to realize that these are instruments of learning. It's important to think about this in natural language and then push into metrics. This is the case now. We are thrilled with the progress that people see in quantitative measurement - but the uncertainty is staggering. There are no safety management metrics - and that is a huge a gap. This should be a huge project to develop better metrics for understanding the risks of managing for safety including the information people have and its accuracy. We are not advancing by simply moving ahead to quantitative approaches without doing our homework.
		(UCAN) Without qualitative we cannot advance quantitative.
		(TURN) Want to refocus on presenting work in a GRC and defending their investing positions. We can have a discussion about learning but we need to see work shown. Agree with Dr. Schulman on Safety Management metric and needs to be developed. In RAMP, we were pushing back about operator error and couldn't see that as a RAMP risk. We need to identify and understand in a qualitative way uncertainty but we need to understand those investment decisions.
		(PG&E) Clarify this is not an update to the method to which we justify our GRC. What we are providing here is another dimension to that decision making process.
		(TURN) We are trying to get more information in the GRC to understand investment decisions and their impacts.
		(PG&E) Our proposal here meets that objective
		(MGRA) I can see a path for quantification improvement and qualitative analysis that can be incorporated into a model in the form you've presented. How do you incorporate external drivers that affect risk? There you have some event with certain probability distribution which triggers risk event. Example: Wildfire weather risk has a statistical probability which affects the probability of an ignition. PG&E went bankrupt because of a causal change - there has to be a mechanism to incorporate that into the analysis. Have you thought about it?
		(PG&E) Not sure I completely understand the question, but I think that the incorporating events as random variable is something we already do, and that's a little different question than epistemic risk. But your point is taken and we will think about how to address.

Party	Comment	(Party) Reaction
		(MGRA) Risk and a consequence. If your probability is a function of external events (complicated with background noise) but you have periodic or driver events with a distribution…
		(PG&E) You are right this is uncertainty but there are different types of uncertainty. Uncertainty in random variation and the other is lack of knowledge. Even within log-normal what should it be? How do we know those parameters are correct? It's important to be clear on the TYPE of uncertainty we are addressing here.
TURN	CalAdv Question 1	(TURN) If you have two programs and you have to chose between the two. 1 has an RSE of 3 but low confidence; 2 has an RSE of 2 but high confidence. How do you use information choose the program?
		(PG&E) This is risk-based decision making. We need to look at other inputs aside from RSE before we move any further. That's sound decision making.
CalAdv	CalAdv Questions (General)	(CalAdv) Understand you don't have data but suggest to keep your color coded uncertainty but add a field that provides a field of quantitative uncertainty to the extent you have it. 2) On hardening - where there are several types of mitigations - to the extent they can be broken up or more granular that might be more meaningful as applied to the rate case.
Various	Tiered Selection Slide	(UCAN) Question on the viability of SME judgement in a population that you can't define or provide a statistical measure for. I don't know how any multiple SMEs stack up on anything. I'm not comfortable with that.
		(Dr. Paul Schulman) With respect to the internal data - retrospective accident data shows that companies have been deceived by their own internal data. Internal data does not increase uncertainty - here again it would be nice to have metrics and checks on internal information. (UCAN agrees)
		(PG&E) What I'm hearing is that we need to develop this criteria beyond what we are proposing and we think that's a productive use of the Commission's time to develop that criteria.
		(CalAdv) If there are different tiers that can be included in the RAMP, it gives others a chance to bring that forward. Having that information available will be useful to determine best practices now and expedite the development of getting to quantatative analysis.
		(PG&E) Suggesting that we could add another field to the data table to capture quantitative information to develop these tags. (CalAdv) Yes, supported by workpapers.
Various	CalAdv Question 6	(CalAdv) When data is not there and is defaulted to best information available your confidence is low - that could lead to a big difference in how you risk rank. Important that information be captured and used to assess risk.
		(UCAN) Aren't there instances where a model doesn't capture a set of variables that are drivers with a lot of data and well behaved results. That doesn't mean you should feel comfortable. How do we deal with that?
		(PG&E) You are talking about model completeness. We have to think about this and our proposal does not address that. We agree with you that we need to work on that in the SMAP proceeding and address that.
Various	SCE 5 Minute Open Forum	Adopting proposal would have backdoor effect of introducing incremental requirements or restrictions on utilities; SCE will perform a sensitivity analysis in compliance with row 30 of the SA if requested by a party and through reasonable effort.
		No problems identified by any parties that warranted change or course correction on current standards of what's in a RAMP
		Unusual for other parties to dictate how the showing is structured; RAMP decisions give utilities flexibility to provide transparent work products. Utilities are different and should not be shoe-horned into the same format
		Silence on any issue is not agreement, but SCE opposes the confidence level measure. Not a requirement anywhere. Not part of settlement agreement and concerns about these levels.
Sempra	SoCal Gas / SDG&E Open Forum	In agreement with SCE. Object to confidence level and negative repercussions selecting these levels. Also have concerns about sensitivity analysis which could present different results based on estimates that could produce results that are not connected to real life situations.

Discussion Points & Feedback

E-Mail from California Public Advocates (April 12)	PG&E Response on Consideration for Final Proposal
1.Is it possible for the process of ensuring transparency in data uncertainty to be expedited by skipping PG&E's proposed intermediate step of presenting confidence levels in qualitative terms (e.g. low/medium/high)? What is the value of this proposed intermediate step in PG&E's mind?	PG&E does not recommend skipping the data uncertainty (renamed Estimate Quality or EQ) as it will not expedite improving quantification or uncertainty capabilities. PG&E believes including the EQ indicator will help improve insight into derivation of data.
2.Can PG&E and other IOUs begin applying a more rigorous quantitative presentation of data uncertainty now, filling in gaps where needed with PG&E's proposed qualitative approach?	PG&E endeavors to continuously improve its quantitative data analysis and its use in risk filings.
3.How does PG&E envision data uncertainty affecting the risk scoring approach for specific risks and selection of corresponding mitigations?	Currently, PG&E envisions that the EQ would serve as additional information that could be used by decision makers but Parties should determine how to best use the EQ indicator for their own purposes.
4.Is it envisioned that these data transparency guidelines be applied to all risks assessed, or only the top risks identified in the RAMP?	PG&E envisions using the templates demonstrated (Risk Results and Risk Sensitivity) to all risks presented in risk filings.
5.Can PG&E walk us through an exercise where they have incomplete data on an asset, for example an old pipeline with incomplete records, or perhaps an example of an asset where PG&E is unsure of the completeness of their data?	PG&E provided a walk through of the application of the EQ indicator as well as the transparency tables.
6.How does PG&E propose tracking uncertainty in default data entered when they do not have certain data? For example, if PG&E does not know pipeline seam or weld type and defaults it to a certain value based upon an assumption?	PG&E believes the EQ indicator covers indicating when data is derived from lower reliability data versus high reliability data.
7.How may IOUs improve transparency in reporting the uncertainty of detailed asset risk data? For example: segments of pipeline and circuit segments?	PG&E's transparency proposal applies to tranches. As finer granularity of tranches are developed for a Risk, the uncertainty around the assumptions and estimates will be reported.
8.Does PG&E propose providing details regarding data uncertainty for specific mitigations, e.g. independently distinguishing different types of circuit hardening and providing data uncertainty for each of these?	PG&E is recommending providing an EQ indicator for each risk element and mitigation effectiveness which will result in a two-factor indicator for RSEs and other risk results.
9.Does PG&E propose providing details regarding data uncertainty for RSEs and comparative costs for specific mitigations, e.g. replacing conductor with large gage conductor, vs. covered conductor?	Yes, PG&E proposes providing an EQ indicator for RSEs. PG&E provides costs for each mitigations in addition to expected RSEs and EQ indicator.
10.How does PG&E propose reporting on effectiveness of specific mitigations? Can metrics for each mitigation be added and corresponding data uncertainty information computed and reported?	PG&E believes mitigation effectiveness indicators are a separate consideration to be addressed in Phase II of the OIR.
11.Can risk scoring and corresponding data uncertainty information be provided for General Rate Case-level risk mitigation programs?	PG&E intends to provide EQ indicators for all risk results in the GRC.
April 16 E-Mail	
1.Add column(s) to report on metrics used to evaluate risk mitigation effectiveness. This is not just the theoretical risk reduction, but also the hard metrics that the utility is using, or can use, to evaluate the risk reduction effectiveness, such as wires down rates, ignitions, dig-ins, past due work orders, repeat inspection findings, …	PG&E believes mitigation effectiveness indicators are a separate consideration to be addressed in Phase II of the OIR.
2.Add a column to provide information on quantitative uncertainty as it becomes available. This can be left blank when not available, however we would encourage utilities to include what their best estimate of what they suspect to it to be, even it not yet proven. Some utilities may have more data than others, and we can all learn from each other. This field can also be used to explain when data is being defaulted. For example, if data reports pipeline segment is seamless because of installation date, but there is no actual record that it is known seamless.	PG&E will add a column on quantitative uncertainty as it becomes available. Currently, PG&E does not have quantitative uncertainty. PG&E encourages allowing flexibility in the template provided such that other IOUs may provide additional columns or information as their risk programs develop.
3.To address Paul Schulman's important point to provide an exchange of information with SMEs: Add a column for SME input to allow information not otherwise captured, to be captured and shared. This could include references to narratives in workpapers. For example, this may include SME concerns about the best way to use the data, or its limits, or opportunities to gather more or improve the data or its use.	An additional Comments field has been included in the Risk Analysis Table to accommodate this feedback.
4.We support PG&E's suggestions for a column to capture sensitivity. If both uncertainty and sensitivity of data is high, this justifies programs to develop better data.	PG&E agrees.
5.Expand granularity of risk mitigation rows --E.g. circuit hardening should be broken out for each type of mitigation, for example undergrounding, small gage conductor replacement, covered conductor, pole replacement, …	PG&E believes this is separate from the presentation of risk results and risk sensitivity in the transparency tables but notes that its proposal addressed uncertainty for Tranche level inputs.
6.PG&E highlighted an issue on how these calculations will then be used in development of programs. We request that PG&E propose how to expand upon how utilities may convey, or report on how the results of the proposed spreadsheet will be used in development GRC mitigation programs.	PG&E believes that this topic should be addressed in Phase II of the OIR.
7.We encourage all the utilities to continue to provide additional input to help the TWG develop and improve PG&E's proposal so that we may all learn from each other and benefit, regardless of whether it was explicit, or not, in the settlement agreement. This is consistent with D1812014.	PG&E welcomes any feedback on its proposal from all parties

Discussion Points & Feedback

E-mail from Musey Grade Road Alliance (April 16)	PG&E Response on Consideration for Final Proposal
I think some additional thought needs to be put into how cross-cutting risk drivers (and the uncertainties/assumptions associated with them) are to be incorporated into this model. Regarding the specific question I raised during your presentation regarding weather drivers of wildfire ignitions, I think I've answered my own question. The proposal I made in the "Power Law" white paper suggests that wildfire risk be broken into weather severity tranches, and so the uncertainty with respect to frequency of different severity weather events would be captured in the tranche, so I think this would probably be doable within your proposed framework.	PG&E agrees.
While your "confidence level" proposal adds a lot of value, you may want to change "confidence" to another term. "Confidence level" has a specific meaning in statistics, and implies that a sufficiently detailed statistical analysis has been done to allow certain possibilities to be excluded with a certain probability. "Estimate Quality" would be fine, but then again "low quality" might be used pejoratively. Other possibilities: maturity, certitude, comprehension.	PG&E agrees and will re-define the Data Confidence level as Estimate Quality (EQ).
SPD's proposal for adding a statistical distribution corresponding to confidence level would allow direct numerical comparisons of risks. This can start with a generic default distribution per confidence tier and then add risk-specific improvements.	PG&E will continue to consider methods of incorporating statistical distributions and better defined sensitivity in the risk sensitivity table. In the meantime, an additional column called Confidence Interval has been added to accommodate these values as they become available.
Sensitivity - This is a positive addition. However, I see an issue that the derivative of risk as a function of phi is itself a function, and it looks as though you are calculating only the value for the proposed default phi (phi-0?). This function might not be well behaved at larger deviations from the phi-0 value. For example, what if when phi gets to its 95% value it causes a dramatic increase/decrease of risk, even though the sensitivity in the region of phi-0 is well-behaved? I'm not sure of the best way to address this problem, possibly by using a 10-50-90 method or something like that.	PG&E has incorporated this feedback by changing the Sensitivity calculation to use IOU-defined testing ranges.

Discussion Points & Feedback

E-mail from The Utility Reform Network (April 16)	PG&E Response on Consideration for Final Proposal
Using the charts provided in the TURN presentation on Slides 11 and 16, please identify where each of TURN's proposed requirements are found.	**Slide 11:** Cost: Risk Results Table CoRE Before: Risk Results Table CoRE After: Risk Results Table LoRE Before: Risk Results Table LoRE After: Risk Results Table **Slide 16:** Cost: Risk Results Table Risk Before Mitigation: Risk Results Table Risk After Mitigation: Risk Results Table
Please indicate where PG&E intends to present the information identified on Slide 10 (discount rate and time horizon).	PG&E will provide discount rate in the GRC workpapers as PG&E intends to apply the same discount rate across its models. Time horizon will be shown both in the results table by showing all years impacted by the benefit length of mitigations as well as in the RSE Input workpapers that define benefit length of all programs.
Please indicate where the weights and scaling functions for each attribute will be found/presented.	PG&E will provide weights and scaling functions in the GRC workpapers as PG&E intends to apply the same weights and scaling functions to all models. Additionally, the Attribute level Risk Scores in the Risk Results table will include multiplication by the Weight and discount factors (i.e., present-valued).
Why are you using the word "confidence" to describe qualitatively any uncertainty you might have? That word can suggest a confidence interval for a parameter of a distribution and therefore cause confusion. Why not say something that is less ambiguous, such as "level of uncertainty."	PG&E intends to adopt MGRA's suggestion and change the term to "Estimate Quality" (EQ).
Please indicate what the SME or SMEs provided that motivated you to characterize that information with respect to the qualitative descriptors of uncertainty. In other words, what is it that you are uncertain about? Is it a parameter? Is it a probability distribution? Is it some descriptions of a probability distribution? Is it something else?	The proposed Risk Analysis table includes descriptors of the parameter (e.g., "Baseline stdev") and the Risk/Tranche/Year/Attribute/Outcome where it is being used.
If a single SME provided a probability distribution, what is it that motivates that characterization of uncertainty? What characterization is appropriate if that particular SME is the most knowledgeable person available for the phenomenon under study?	PG&E interprets this question as seeking clarity and specificity on PG&E's EQ criteria. PG&E acknowledges that not all scenarios were identified in its original proposal and has thus revised its proposal to task the TWG in the development of the EQ Criteria
In the presentation, PGE mentioned that there is some uncertainty in using observed data to estimate the parameter of a Poisson distribution. Other than the sampling distribution of the statistic, is there any other uncertainty you have in mind? If there is some other uncertainty, then does that cause you to use anything other than the observed sample mean as the estimate of the parameter of the Poisson distribution?	PG&E offered this example to indicate its use of means over distributions that are additionally uncertain. For example, apart from sampling error, whether the samples (historical data) is truly representative of the future risk. PG&E does use data beyond observed data, for instance when needing to approximate an event that has not yet occurred (e.g., physical attack on a dam), an approach that was suggested by SPD in its report on PG&E's 2017 RAMP. However, PG&E agrees with Dr. Schulman's comments regarding uncertainty and would like to limit the proliferation of uncertain inputs as it is doing through its use of EQ.
Regarding the example presented at the April 14 workshop by Dr. Lesser, (Project A RSE=3 with "Low" confidence; Project B RSE = 2 with "High" confidence), state how PG&E would implement "risk-informed decision making" to choose between the two projects. How does PG&E intend to make tradeoffs among projects with different confidence levels?	Currently, PG&E envisions that the EQ would serve as additional information that could be used by decision makers. PG&E has not yet developed formal ways that this information can be incorporated in its Risk-Informed Decision making, and considers any hard criteria to be premature. PG&E's intention is to explore the integration of this information as it continues to adopt RSE and other risk-based measures in decision making.

END APPENDIX E