Pre-Filing RAMP Workshop

December 6, 2021

Agenda

Topic	Presenter	Time (min)
Opening Remarks	Safety Policy Division	5
Safety Moment	Kris Vyas	5
SCE Opening Remarks	David Heller	5
Overview of Pre-RAMP Workshop and Key New RAMP Requirements	Kris Vyas	10
Discussion on MAVF and Risk Quantification	Gary Cheng	20
Preliminary List of Risks from ERR and Preliminary Risk Scores	Kris Vyas/Gary Cheng	10
Break		15
Initial Selection of SCE's 2022 RAMP Risks	Kris Vyas	10
Walk-Through of Preliminary Dam Safety RAMP Risk	Matt Muto	15
Proposed Chapter Outlines	Kris Vyas	5
Q/A		20
Closing Remarks	Kris Vyas	5

Safety Moment - Stay Safe During Holiday Travel

- Prepare your home for optimum safety while you're away.
- Have your car inspected and/or serviced before you leave and keep an emergency kit in it.
- Know how to drive safely in the weather you will be experiencing (e.g., icy roads).
- Plan the drive ahead of time and know alternate routes.
- Make frequent rest stops.
- Carry a cell phone and charger.
- Stay hydrated.
- Wash your hands frequently with soap or antibacterial hand sanitizer.

Opening Remarks from Southern California Edison

David Heller
Vice President Enterprise Risk Management and General Auditor

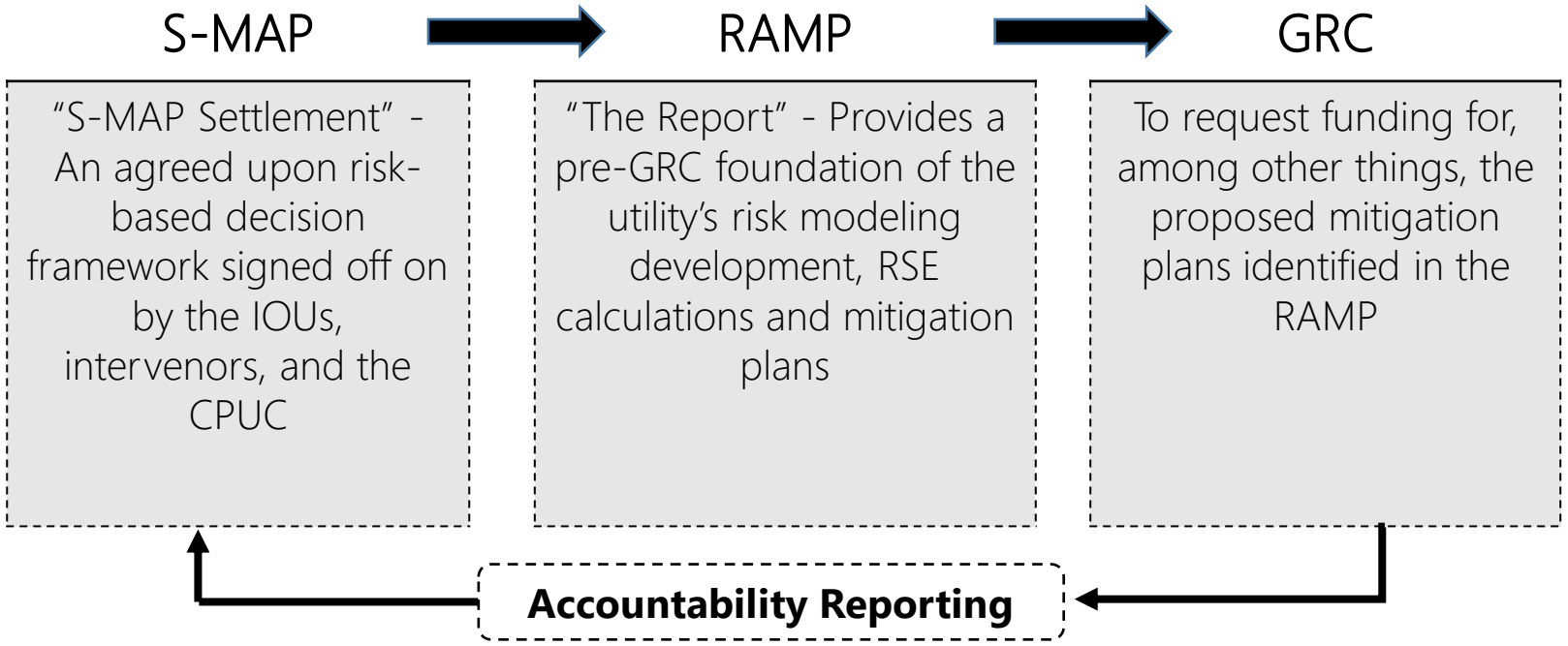
SOUTHERN CALIFORNIA EDISON®

Overview of Pre-RAMP Workshop and New RAMP Requirements

Kris Vyas
Principal Manager of Regulatory Risk
Enterprise Risk Management

Background

- The CPUC modified the GRC process in December 2014 to incorporate a risk-based decision-making framework
- RAMP shows in detail how key safety risks are identified and prioritized, and how the utility manages and mitigates these risks
- RAMP must be filed one year before GRC application
- The RAMP process focuses on developing, reporting, and assessing the risk analysis that will eventually help inform the requested spend and scope in the GRC



S-MAP = Safety Model Assessment Proceeding

Overview of SCE's Pre-RAMP Workshop

- SCE looks forward to the discussion with stakeholders on our 2022 RAMP Risks
- Consistent with the S-MAP Settlement Agreement (SA), SCE will address in our 2022 RAMP Report "the rationale for taking or disregarding input" that stakeholders provide at today's workshop
- SCE complied with the SA[1] by providing the following preliminary information to stakeholders 14 days before this workshop:
  - ✓ Preliminary list of Risk Assessment and Mitigation Phase (RAMP) risks
  - ✓ The preliminary Safety Risk Score for each risk in the Enterprise Risk Register (ERR)
  - ✓ The preliminary Multi-Attribute Value Function (MAVF or "Risk Quantification") for the top 40% of those risks in the ERR that had a preliminary Safety Risk Score greater than zero

[1] *SA, Row 12*

Key New Requirements for SCE's 2022 RAMP Report[1]

Because of timing, SCE's 2018 RAMP Report was exempted from the S-MAP Settlement Agreement (SA) requirements

SCE's 2022 RAMP will comply with the new requirements from the SA and the recent decision in the Risk OIR (D.21-11-009)

- **Risk Spending Efficiency (RSE) Calculations at Tranche Level** – RSEs to be provided at the tranche level and include the total lifetime benefits and costs of each control and/or mitigation

- **Include Foundational Activities in RSE Calculations:[2]** – For foundational programs that support a portfolio of risk mitigations, include the cost of foundational programs when calculating RSEs of mitigations, if the aggregate cost (over the next GRC period) of the foundational programs exceeds prescribed thresholds. Also, explain and justify the chosen distribution of foundational costs to mitigations, and explain rationale and assumptions in categorizing foundational costs

- **Data Transparency Template:[3]** Solely for informational purposes, SCE will be "test-driving" PG&E's Transparency Proposal and will provide results within 60 days after filing RAMP

1) This slide is not intended to serve as an exhaustive listing of all new requirements.
2) D.21-11-009, p. 141, OP 1e and 1g
3) D.21-11-009, p. 143, OP 3

Discussion on MAVF and Risk Quantification

Gary Cheng
Senior Advisor, Regulatory Risk
Enterprise Risk Management

MAVF Summary

SCE has developed the following MAVF, consistent with the S-MAP Settlement guidelines:

Attribute	Unit	Weight	Range	Scaling
Safety	Index[1]	50%	0 - 100	Linear
Reliability	CMI	25%	0 – 2 Billion	Linear
Financial	$	25%	0 – 5 Billion	Linear

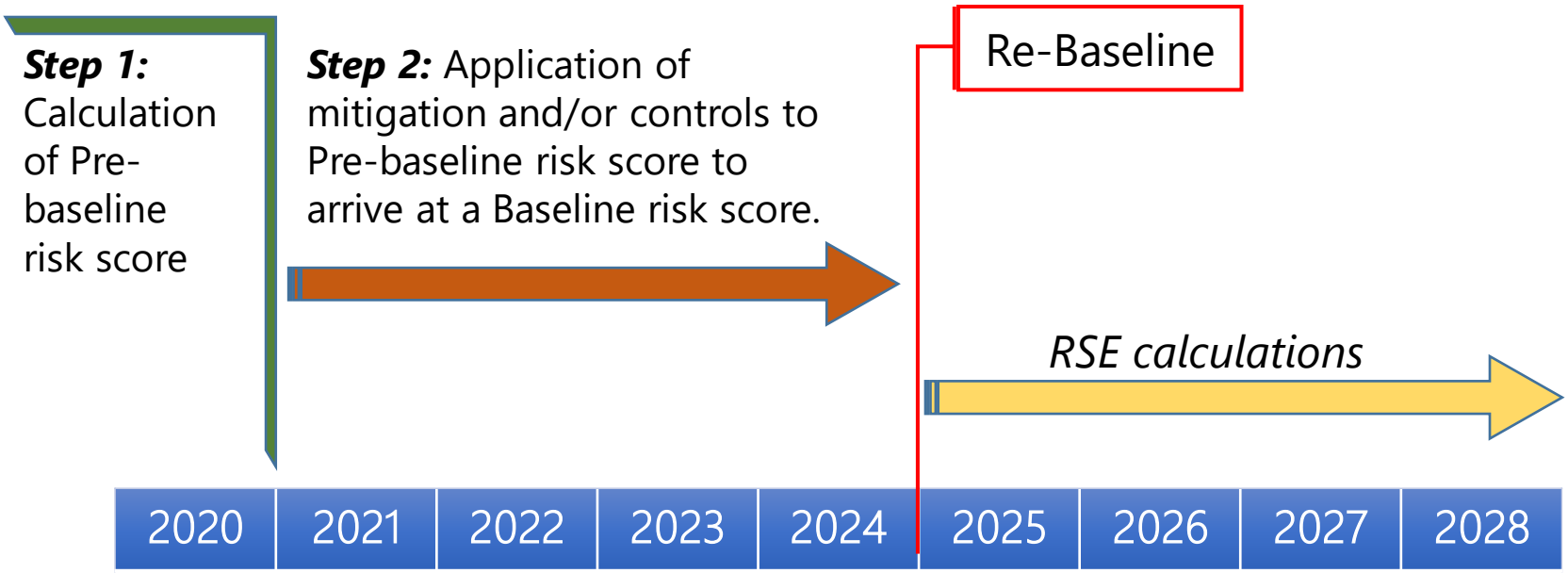
*[1] Safety Index = 1.0 * (# of fatalities) + ¼ * (# of serious injuries)*

- Key change from the previous RAMP filing is a change in the safety scaling function from non-linear to linear (this was previewed and discussed in the 2021 Wildfire Mitigation Plan)
- SCE's safety weighting of 50% meets the minimum threshold of at least 40% as set forth in the S-MAP Settlement
- Weights, ranges, and scaling for Reliability and Financial attributes remain the same as compared to the 2018 RAMP filing

Baseline Risk Methodology

Step 1: Calculate the Pre-Baseline risk score as of the end of 2020. Risk driver frequency and consequences informed by historical data collected over the previous 5 years*

Step 2: Apply mitigations and/or controls, as applicable, to the Pre-Baseline risk score through 2024 to arrive at a Baseline risk score. From this point forward, RSEs will be calculated for the mitigations and/or controls proposed during the GRC period



*There may be variances with respect to certain risks where historical data is not available or is not consistent. These variances will be explained within each chapter

Preliminary List of Risks from ERR and Preliminary Risk Scores

Kris Vyas and Gary Cheng

Material is Preliminary and Subject to Change

- The RAMP Risk and Risk Score material ("Material") presented on the next slide is preliminary and subject to change. It was circulated to stakeholders more than six months before SCE's RAMP will be filed. Over the next six months, SCE reasonably anticipates that changes and refinements may occur as SCE's development of its RAMP progresses, and as SCE considers feedback from stakeholders. The Material has been generated for purposes of the Pre-RAMP Workshop, and accordingly is not for use outside of the RAMP Workshop context.
- Certain risks show a risk score as "TBD." These risks have been given that designation because the preliminary analysis under RAMP rules and parameters resulted in an initial safety score of zero, but the risks have direct safety implications. A risk may have a preliminary RAMP risk score of zero because, for example, there have been no actual safety incidents directly associated with the risk in the relevant historical period. But even if there have been no historical incidents at SCE, safety risks continue to exist. Therefore, SCE will continue to make reasonable efforts to manage and mitigate these risks.
- SCE's Enterprise Risk Register (ERR) is a dynamic and evolving product. Changes and additions occur, including as part of an annual enterprise risk assessment process. Moreover, the ERR is not confined to safety risks, but encompasses other risks as well. SCE considered RAMP risks using the definitions found in the ERR, but certain wording may be condensed or modified in RAMP listings and chapters.

SCE List of **Preliminary** RAMP Risks and Scores Pursuant to D.18-12-014

Not for Use Other than RAMP Pre-Filing Workshop

Line	Risk	Risk Scores		Preliminary RAMP Risk
		Safety Risk Score	Multi-Attribute Risk Score	
1	Catastrophic Wildfire(s) / PSPS	3.43 / 0.01	4.42 / 0.22	Yes
2	Contact with Energized Equipment	2.44	2.75	Yes
3	Contractor Safety	1.51	0.76	Yes
4	Employee Safety	1.06	0.53	Yes
5	Major Physical Security Incident	0.89	**Top 40% of ERR Risks with a Safety Risk Score Greater than Zero**	Yes
6	Catastrophic Earthquake*	0.43		Yes
7	Underground Equipment Failure	0.24		Yes
8	Hydro Asset Failure	0.12		Yes
9	Cyber Attack*	0.09		Yes
10	Battery Energy Storage System Safety	0.002		No
11	Aviation Incident**	TBD		No
12	Climate Change**	TBD		No
13	Electrical Integrity**	TBD		No
14	Generation Asset Failure**	TBD		No
15	Pandemic – Business Impacts Due to COVID-19**	TBD		No
16	Safety Incidents - Public**#	TBD		No
17	SONGS**	TBD		No
18	Systems Recovery**	TBD		No
19	Transmission Asset Failure**	TBD		No
20	Billing Delays and Accuracy	0		No
21	Contract Management	0		No
22	Data and Records Inaccuracy	0		No
23	Planning and Execution Major Projects	0		No
24	Privacy	0		No
25	Significant Rate Increase	0		No
26	Supply and Vendor Risk	0		No
27	Talent Gaps	0		No

** The ERR Widespread Outage is encompassed in the Cyber Attack and Catastrophic Earthquake risk analyses. Catastrophic Earthquake includes the Building Safety ERR Risk*
*** Based on SCE internal historical data*
 # Public Safety consequences are incorporated in other ERRs such as Contact with Energized Equipment and Underground Equipment Failure

Break
15 minutes

Initial Selection of SCE's 2022 Preliminary RAMP Risks

Kris Vyas

RAMP Risk Chapters (Preliminary)

Wildfire/PSPS	Contact with Energized Equipment	Underground Equipment Failure	Employee Safety
Ignition associated with SCE's overhead electrical assets and operation **Including** PSPS –Public Safety Shutoff Events as mitigation and as risk	Human contact with energized equipment potentially causing electrical shock to the public, including wire-down, contact with intact overhead and underground equipment	Asset failure which potentially causes substantial and uncontrolled release of energy from a vault or manhole	Incidents involving SCE employee, potentially exposing workers (self or others) to hazards, including from Construction or Maint. activities, supporting activities, vehicle incidents

Contractor Safety	Cyber Attack	Major Physical Security	Seismic	Hydro Dam Failure
Incidents involving Edison contractors, potentially exposing workers (self or others) to hazards, including from Construction or Maint. activities, supporting activities, vehicle incidents	Disruption of operations from a cyber attack with the ability to damage, destroy systems or interrupt critical business functions	Compromise of SCE physical security which potentially leads to workplace violence, property theft, asset/equipment damage, or loss of control of asset	SCE's inability to effectively respond and recover from a catastrophic earthquake	Failure of Dam leads to uncontrolled rapid release of water potentially causing downstream safety, reliability and financial impacts

Additional Sections / Appendices (Preliminary)

Currently, SCE is preliminarily planning to include the following risks within separate sections or appendices, because, among other reasons, the risks may have an indirect and/or difficult to quantify safety consequence. But further discussion may be warranted due to their importance

Climate Change	Where applicable under RAMP criteria, SCE plans to integrate results from its Climate Change Vulnerability Assessment report into the RAMP report
Battery Energy Storage Systems	Discussion of risk where deployment of BESS assets continue to significantly increase to help meet reliability and clean energy goals
SONGS	Discussion on the updated SONGS risk profile since the 2018 RAMP, and summary of the current state of risks, including dry fuel storage and executing the Dismantling and Decommissioning (D&D) project phase
Transmission Asset Failure / Aging Infrastructure	Although safety impacts from these risks are covered within the main RAMP chapters, SCE may discuss (at a high level) the health of its electrical assets and the need for further infrastructure replacements
Widespread Outage	Discussion of widespread outage to the extent not already covered in the RAMP chapters

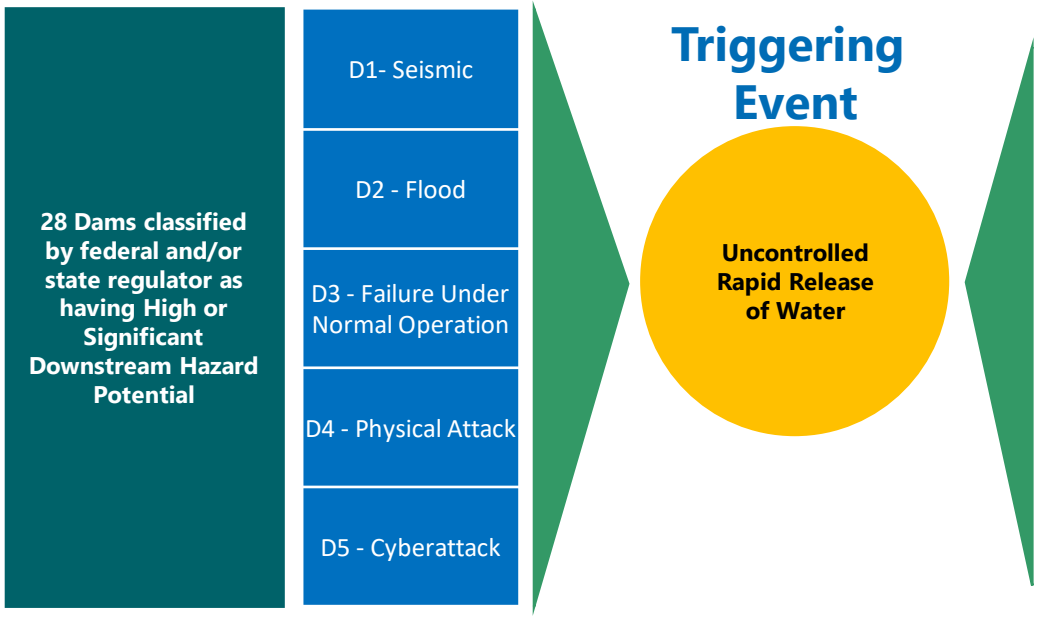
Hydro Dam Failure Preliminary Baseline Risk Calculation

Matthew Muto
Deputy Chief Dam Safety Engineer

Preliminary Hydro Dam Failure Bowtie

Risk Statement

Failure of Dam leads to Uncontrolled Rapid Release of Water potentially causing downstream safety, reliability and financial impacts



Consequences

Outcomes	Safety	Reliability[1]	Financial
O1- Hydro Asset Inoperable; No Significant Inundation	No	Yes	Yes
O2 - Hydro Asset Inoperable; Inundation of Unpopulated Areas	Yes	Yes	Yes
O3 - Hydro Asset Inoperable; Inundation of Populated and Unpopulated Areas	Yes	Yes	Yes

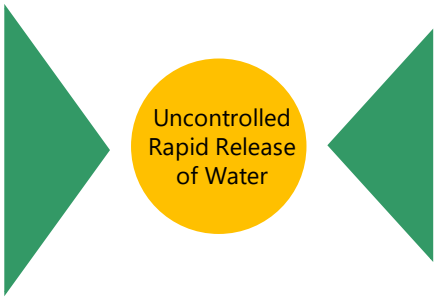
1) Reliability Impact limited to smaller communities that:
- Rely on specific hydropower plants during occasional "islanding" events
- Could have service temporarily disrupted due to damage to T&D assets in the inundation zone of certain dams

Updates from 2018 RAMP

- Semi-Quantitative Risk Assessments (SQRAs) results updated based on completed studies and risk assessments
- Incorporation of International Commission on Large Dams (ICOLD) worldwide dam failure data
  - Equal weighting to SQRA-based driver frequencies
- Inclusion of security-related drivers (physical and cyber attack)
- Safety consequences added to Outcome 2 to represent potential impact on recreators in remote areas
- Inclusion of Controls implemented through end of 2020

Preliminary Risk Calculation

D1 – Seismic	0.00143
D2 – Flood	0.00195
D3 – Normal	0.00112
D4 – Physical Attack	0.00008
D5 – Cyberattack	0.00004



		SI	CMI	$
O1 – Hydro Asset Inoperable; No Significant Inundation	7%	0	321K	2M
O2 – Hydro Asset Inoperable; Inundation of unpopulated areas	36%	0.5	140K	16M
O3 – Hydro Asset inoperable, inundation of populated & unpopulated areas	57%	44.8	646K	361M

Likelihood of Risk Event (LoRE)

$$\underset{D1}{0.00143} + \underset{D2}{0.00195} + \underset{D3}{0.00112} + \underset{D4}{0.00008} + \underset{D5}{0.00004} = 0.00462$$

Consequence of Risk Event (CoRE)

Safety $(\underset{O1}{7\%} \times 0) + (\underset{O2}{36\%} \times 0.5) + (\underset{O3}{57\%} \times 44.8) = 25.7$

Reliability $(\underset{O1}{7\%} \times 321{,}000) + (\underset{O2}{36\%} \times 140{,}000) + (\underset{O3}{57\%} \times 646{,}000) = 441{,}090$

Financial $(\underset{O1}{7\%} \times 2{,}000{,}000) + (\underset{O2}{36\%} \times 16{,}000{,}000) + (\underset{O3}{57\%} \times 361{,}000{,}000) = 211{,}670{,}000$

Annualized Risk (LoRE x CoRE)

Safety $0.00462 \times 25.7 = 0.119$

Reliability $0.00462 \times 441{,}090 = 2{,}038$

Financial $0.00462 \times 211{,}670{,}000 = 977{,}915$

Total Risk (MAVF)

MARS $[\underset{\text{Weight}}{50\%} \times (\underset{\text{Risk}}{0.119}/\underset{\text{Range}}{100}) + \underset{\text{Weight}}{25\%} \times (\underset{\text{Risk}}{2{,}038}/\underset{\text{Range}}{2{,}000{,}000{,}000}) + \underset{\text{Weight}}{25\%} \times (\underset{\text{Risk}}{977{,}915}/\underset{\text{Range}}{5{,}000{,}000{,}000})] \times 100 = 0.064$

Safety *Reliability* *Financial*

Data Sources

- Semi-Quantitative Risk Assessments (SQRAs) of individual dams
  - Used by federal dam owners to estimate risk[1]
  - Proposed FERC regulations will require SQRA for all dams[2]
  - Likelihood and Consequence assigned to each Potential Failure Mode by a diverse team of subject matter experts in facilitated workshops
- 2019 International Commission on Large Dams (ICOLD) Report[3]
  - Database of worldwide large dam failures through May 2018
  - Failure rates adjusted for type and age of construction of SCE portfolio
- US Department of Homeland Security
  - 2012 report on worldwide attacks on dams, 2001-2011[4]
  - 2019 Dams Sector Landscape report[5]

1) FEMA (2015). Federal Guidelines for Dam Safety Risk Management, Report FEMA P-1025
2) FERC (2020). Notice of Proposed Rulemaking, 18 CFR Part 12: Safety of Water Power Projects and Project Works, Docket No. RM20-9-000
3) ICOLD (2019). Statistical Analysis of Dam Failures, Bulletin 188
4) DHS (2012), Worldwide Attacks Against Dams, A Historical Threat Resource for Owners and Operators
5) DHS CISA (2019), Dams Sector Landscape

Preliminary Outline of RAMP Report

Kris Vyas

Preliminary Format of SCE's 2022 RAMP Report

- RAMP Report
  - Overview
  - Risk Model and RSE Methodology
  - Safety Culture, Organizational Structure, Executive and Utility Board Engagement, and Compensation Policies Related to Safety
  - Risk Chapters
- Appendices
- Workpapers

Preliminary Format of SCE's 2020 RAMP Risk Chapters

A. Executive Summary
   - Risk Overview, Risk Definition and Scope, Summary Results (LORE and CORE)

B. Risk Assessment
   - Risk Background, Risk Bow Tie, Drivers, Outcomes, Tranches, Related Factors

C. Controls

D. Mitigations

E. Foundational Programs

F. Proposed Plan
   - Overview, Execution Feasibility, Affordability, Other Constraints Considered

G. Alternative Plans
   - Overview, Execution Feasibility, Affordability, Other Constraints Considered

H. Lessons Learned, Data Collection, & Performance Metrics

I. Incorporation of Stakeholder Feedback

J. Chapter-Specific Appendices (as needed)

Q/A

Closing Remarks

Kris Vyas