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GAS SAFETY RETROSPECTIVE: A DECADE SINCE SAN BRUNO

In October 2017, the same year Pacific Gas and Electric Company (PG&E) was found guilty of violating the federal Natural Gas Pipeline Safety Act and obstructing justice, a vintage pipeline in a remote corner of southeastern California exploded. Fortunately, the pipeline was so remote – about 80 miles northeast of Los Angeles – that its explosion injured no one, and the surrounding desert left little fuel for the resulting fire. It took Southern California Gas Company (SoCalGas) two years to complete repairs to the line, which had – along with an adjacent line – experienced numerous leaks prior to the explosion.

This past September marked a decade since a PG&E pipeline exploded in San Bruno, California. Like the SoCalGas line, the PG&E pipeline that exploded was vintage,¹ part of the natural gas transmission system, and approximately 30-inches in diameter. Unlike the SoCalGas explosion, which was largely unheard of outside of the utility world, the San Bruno Explosion ranks among the most significant pipeline incidents in the country's history in terms of loss of life and property and the public outcry for reform that followed.

The purpose of this hearing is to examine the decade of work since San Bruno. As the 2017 SoCalGas explosion demonstrates, the subsequent reforms to both the utilities and their regulator did not wholly eradicate the risks of operating natural gas infrastructure. However, as this Subcommittee has often discussed, safety is not simply about accidents; it's about maintaining conditions that preclude accidents. In the years following San Bruno, California's

¹ SoCalGas Line 235-2 was installed in 1957. PGE Line 132 was installed in 1956. See: *Report of the Independent Review Panel San Bruno Explosion*, Revised Copy June 24, 2011; https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Natural_Gas_Pipeline/News/Final%20Report.pdf

gas utilities would invest billions in system upgrades and overhauling their recordkeeping and testing practices. The California Public Utilities Commission (CPUC) would form panels to review the events, hire consultants to investigate the financial records and safety culture of the utilities, and themselves be subject to numerous audits and statutory changes related to their regulatory practices. These efforts have improved the condition of California’s natural gas infrastructure. Yet safety is not a static goal. It must be carefully nurtured. This requires continued attention to maintain the gains made in pipeline safety since the San Bruno explosion, as well as renewed focus to ensure lasting change.

Findings

- *Reforms following the San Bruno explosion addressed the recommendations from the federal and independent experts tasked with investigating the blast. These reforms have reduced the risks inherent to California’s natural gas pipeline operations, and mark progress toward safety.*
- *The reforms largely focused on infrastructure and resources – essentially aiming to “fix the old things.” But lasting change requires longer-term organizational safety to ensure the reforms’ continuation and success.*
- *Progress has been made in these longer-term efforts. Yet more attention should be given to not only risk assessments but also safety management systems.*
- *The CPUC should scope safety management systems for electric and gas utilities in a unified proceeding to address gaps in oversight of the utilities’ organizational safety.*
- *Such attention toward safety management is not only critical to maintain safety when energy or public pressure declines, but allows for lessons learned in one sector to be absorbed by other sectors.*

The San Bruno Explosion

On September 9, 2010, in the early evening, a portion of a 30-inch underground natural gas transmission system – known internally at PG&E as Line 132 – ruptured. Line 132 ran underneath a residential area of San Bruno, California. The rupture exploded, propelling segments of a 28-foot long section of Line 132 into the air, and causing a fire.

Within two minutes of the rupture firefighters at the San Bruno Fire Department were on the

Box 1: Quick Definitions -

Transmission Pipelines - generally large diameter pipelines that operate at pressures above 200 psi and transport gas from supply points to the gas distribution system.

Distribution Pipelines - lower pressure pipelines, typically smaller in diameter, that deliver natural gas to individual homes and businesses.

scene.² Temperatures from the fire were so hot that the windshield on the first fire truck cracked, and paint on nearby cars was visibly bubbling.³ The proximity of the neighborhood to San Francisco International Airport led many to speculate that an airplane had crashed.⁴ That speculation lingered, even as the fire refused to be extinguished.

In the hours prior to the rupture – it was later discovered – PG&E had conducted electrical work at the Milpitas natural gas terminal, the origin point of Line 132. This electrical work, for a short period of time, left the natural gas data control center that monitors the pipelines running through the Peninsula without data on the pressures, flows, and valve positions at the terminal. During that work, one of the control panels at the terminal briefly lost power. When the terminal controls reenergized, the data center received erroneous signals. These erroneous signals led regulating valves for the gas lines to fully open, causing pressure in the lines to increase and over 60 error alarms to sound. Forty minutes before the explosion, the data center was not receiving valid data for incoming and outgoing lines. PG&E's operators were effectively in the dark.

Twenty minutes after the explosion an off-duty PG&E gas control mechanic, who lived only a few miles from the accident site, saw media reports and drove immediately to pick up another mechanic and his service truck. Diagnosing from the news reports and maps of the location site, the mechanic quickly recognized a rupture – not a crashed plane – had occurred in Line 132, elevated the diagnosis to a supervisor, and drove to the site of a mainline valve upstream of the rupture to manually close it.

Ninety-five minutes after the explosion, PG&E stopped the flow of natural gas to the rupture site, permitting emergency crews to approach and contain the blaze. This response time was noted as “excessively long” by investigators from the National Transportation Safety Board (NTSB).⁵ It is hard to imagine what descriptor would be suitable had the vision and quick action of the PG&E mechanic not kept the response time from worsening.

The explosion and fire resulted in the loss of eight lives and the total destruction of 38 homes. The individuals who lost their lives were Greg Bullis, Lavonne Bullis, William Bullis, James E. Franco, Janessa Greig, Jacqueline Greig, Jessica Morales, and Elizabeth Torres. Seventy homes also sustained damage and eighteen adjacent homes were left uninhabitable.

² National Transportation Safety Board Accident Report, NTSB/PAR-11/01 PB2011-916501; “Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire San Bruno, California, September 9, 2010;” pg. x

³ N. Karlinsky, et al. “San Bruno Gas Explosion: Responders’ Recordings Released;” ABC News, KGO-TV, and The Associated Press; September 12, 2010; <https://abcnews.go.com/US/san-bruno-gas-explosion-residents-return-destruction/story?id=11631344>

⁴ Citation 3. Karlinsky, et al.

⁵ Citation 2. NTSB Report, pg. x.

Aftermath

Local, state, and federal investigations and enforcement followed the explosion. Two weeks after the accident, the CPUC formed an independent review panel of experts (IRP) to gather and review facts on the incident and to make recommendations for improvement of PG&E's natural gas safety program. The IRP's report was released on June 8, 2011,⁶ and was critical not only of operations at PG&E but also – and equally – at the CPUC. The report criticized the CPUC for operating in a mode of “monitor and compliance,” relying on utilities to report on safety practices instead of challenging their assertions.

A few months later, on September 26, 2011, the NTSB released their investigation report. The NTSB determined the probable cause of the accident was PG&E's inadequate quality control during the original installation of the pipe, PG&E's inadequate pipeline integrity management program, which failed to detect and repair the defective pipe section, and PG&E's inadequate emergency response, which caused unnecessary delays and increased damage. The NTSB also determined that the CPUC “failed to detect the inadequacies in PG&E's integrity management program” and that the Pipeline and Hazardous Materials Safety Administration (PHMSA) needed to incorporate more meaningful metrics into its pipeline safety guidance and improve its oversight of state utility commissions.⁷

The conclusions of these reports did not mark the end of investigations into San Bruno. In January 2011, months before their investigation concluded, the NTSB issued urgent safety

Box 2: A Selection of Recommendations from the IRP report*

PG&E should:

- Enable every employee to recognize and understand how his/her daily actions affect system integrity.
- Streamline and reduce layers of management, rebuilding the core of technical expertise.
- Hire a state-of-the-art risk analysis team.
- Conduct a comprehensive review of records.
- Encourage self-reporting of deviations from company policies and violations of state rules.
- Redo all emergency plans.

CPUC should:

- Develop performance-based regulations of utilities.
- Hire integrity management specialists and engineers
- Provide risk-based regulatory oversight.
- Develop a holistic approach to audits based on intrastate pipeline risk, rather than spot checking operator compliance.
- Empower staff with additional enforcement tools.
- Create a proactive role for safety staff in utility rate cases.

*Appendix A from IRP report, Citation 1

⁶ Note: A “Revised Copy” was released on June 24, 2011. *Report of the Independent Review Panel San Bruno Explosion*, Revised Copy June 24, 2011; https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Natural_Gas_Pipeline/News/Final%20Report.pdf

⁷ Citation 2. NTSB Report, pg. xi

recommendations to the CPUC, PG&E, and PHMSA. After learning that PG&E had been increasing the pressure on certain transmission lines above the maximum allowable operating pressure without knowing the condition or type of pipe they had underground, the NTSB called on PG&E to produce records of their high consequence pipes. The NTSB likewise called on the CPUC to enforce the records production for all the utilities operating high consequence pipelines in the state.⁸

PG&E could not produce the records, finding complete records for about 55% of its pipeline miles.⁹ San Diego Gas & Electric Company (SDG&E) and SoCalGas likewise had trouble finding complete records, with about 69% of SDG&E's and 73% of SoCalGas's pipeline miles accounted.¹⁰ In August of 2011, PG&E, SoCalGas, and SDG&E released their Implementation Plans for testing or replacing lines without sufficient records. PG&E's plan called for approximately \$2.2 billion of work, with shareholders contributing to the 2011 costs, or about 10% of the total.¹¹ SoCalGas and SDG&E's plans were not as expensive, but close.¹² In December 2012, PG&E's plan was approved, at a slightly lesser amount and with some ratepayer-shareholder cost split;¹³ SoCalGas and SDG&E's plans were approved in June 2014 without preauthorized funding.¹⁴

At the CPUC These recordkeeping violations led the CPUC to open an Order Instituting Investigation (OII)¹⁵ against PG&E alongside other OIIs related to the explosion, including the main penalty case.¹⁶ These Investigations spun into more Investigations, as PG&E's *ex parte*

⁸ The NTSB News Release; "NTSB issues urgent Safety Recommendations as a result of preliminary findings in San Bruno pipeline rupture investigation; hearing scheduled for March;" January 3, 2011; https://www.nts.gov/news/press-releases/Pages/NTSB_issues_urgent_Safety_Recommendations_as_a_result_of_preliminary_findings_in_San_Bruno_pipeline_rupture_investigation;.aspx

⁹ "Report of Pacific Gas and Electric Company on Records and Maximum Allowable Operating Pressure Validation;" R. 11-02-019; March 15, 2011. <https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4647>

¹⁰ "Report of Southern California Gas Company (U 904 G) and San Diego Gas & Electric Company (U 902 G) on Actions Taken in Response to the National Transportation Safety Board Safety Recommendations;" R. 11-02-019; April 15, 2011. https://www.sdge.com/sites/default/files/reportInResponseToNTSBrecommendations_1.pdf

¹¹ "Pacific Gas and Electric Company's Natural Gas Transmission Pipeline Replacement or Testing Implementation Plan;" R. 11-02-019; August 26, 2011; <https://docs.cpuc.ca.gov/PublishedDocs/EFILE/CF/142181.PDF>

¹² "Pipeline Safety Enhancement Plan of Southern California Gas Company (U 904-G) and San Diego Gas & Electric Company (U 902-M) Pursuant to D.11-06-017, Requiring all California Natural Gas Transmission Operators to File a Natural Gas Transmission Pipeline Comprehensive Pressure Testing Implementation Plan;" R. 11-02-011; August 26, 2011; <https://docs.cpuc.ca.gov/PublishedDocs/EFILE/CF/142220.PDF> Note: SDG&E and SoCalGas's filing is ultimately transferred to A. 11-11-002 by D. 12-04-021

¹³ For instance, PG&E's approved plan reduced the overall asking price and required the full costs of pressure testing be borne by the shareholders. See D. 12-12-030

¹⁴ Rather D. 14-06-007 directed the utilities to open memorandum accounts to track costs, which would then be subject to a reasonableness review. "Decision Implementing A Safety Enhancement Plan and Approval Process For San Diego Gas & Electric Company And Southern California Gas Company; Denying The Proposed Cost Allocation For Safety Enhancement Costs; And Adopting A Ratemaking Settlement" A. 11-11-002; June 12, 2014

¹⁵ OII 11-02-016 (Recordkeeping Investigation)

¹⁶ OII 12-01-007 investigating violations of PUC Sec. 451 and General Order 112 and OII 11-11-009 investigating PG&E operations in high population density areas, to name a few.

violations and relationships with regulators were uncovered throughout various CPUC proceedings and in the courts.¹⁷

Many of these revelations arose from legal action the City of San Bruno took against the CPUC and PG&E following the explosion. In early 2014, the City filed a lawsuit to force the CPUC to comply with four unfilled public records requests. The records requests were centered on improper communication and influence between CPUC senior management and the judges tasked with determining PG&E's penalty in the San Bruno case.¹⁸

Months earlier, on June 3rd, 2013, the CPUC general counsel had reassigned five attorneys working on PG&E's San Bruno penalty case. The lawyers had objected on legal and ethical grounds to a change made in the penalty case that would have allowed the \$2.25 billion PG&E was spending on natural gas system improvements to count as its penalty.¹⁹ The objecting lawyers were subsequently moved off the case. An uproar ensued over the attorney reshuffling, leading to a public airing of CPUC staff grievances. By the end of the month, the reassigned attorneys were returned to the penalty case.²⁰

In 2014, after winning in court, the City received a small cache of emails between the CPUC and PG&E. In January 2015 PG&E subsequently released tens of thousands of emails exchanged from 2010-2014.²¹ These emails led to more investigations and increased media scrutiny of both PG&E and the CPUC.

In December 2011, Overland Consulting published a report examining PG&E's gas transmission spending from 1996 to 2010.²² The report noted PG&E had reduced its gas transmission maintenance workforce by ~28% during the time period, implying "resource constraints in pipeline maintenance."²³ However, the report also noted PG&E exceeded its authorized profit in the same time period, suggesting resources were in fact not constrained. The report noted "PG&E chose to use the surplus revenues for general corporate purposes."²⁴ By 2015, the

¹⁷ OII 15-05-015, for instance, was established at the conclusion of OII 11-02-016 when the City of San Bruno discovered PG&E engaged in numerous written communications concerning the assignment of a particular ALJ to PG&E's 2015-2017 Gas transmission rate case. The so-called "judge shopping scandal." The CPUC would ultimately fine PG&E \$1.05 million for the *ex parte* violation.

¹⁸ "San Bruno Demands Release of Public Records Believed to Show Improper Conduct within CPUC, Cozy Relationships with PG&E;" 4 February 2014; <https://www.sanbruno.ca.gov/civicax/filebank/blobdload.aspx?BlobID=24228>

¹⁹ Jaxon Van Derbeken, "Infighting over PG&E penalty goes public;" SFGate; June 14, 2013; <https://www.sfgate.com/bayarea/article/infighting-over-PG-amp-E-penalty-goes-public-4601817.php#photo-2112726>

²⁰ George Avalos, "PUC shuffles its staff amid furor over its handling of PG&E punishment for San Bruno explosion;" *The Mercury News*; June 26, 2013; <https://www.mercurynews.com/2013/06/26/puc-shuffles-its-staff-amid-furor-over-its-handling-of-pge-punishment-for-san-bruno-explosion/>

²¹ CBS SF Bay Area "PG&E Releases Thousands of Emails with CPUC Amid State Investigation; January 30, 2015; <https://sanfrancisco.cbslocal.com/2015/01/30/pge-releasing-thousands-of-emails-with-cpuc-amid-state-investigation-pacific-gas-electric-california-public-utilities-commission-michael-peevey-san-bruno-utility/>

²² Overland Consulting; *Focused Audit of Pacific Gas & Electric Gas Transmission Pipeline Safety-Related Expenditures*; December 30, 2011.

²³ *Ibid*; Overland Report, p. 1-3

²⁴ *Ibid*; Overland Report, p. 1-3

President of the CPUC, Michael Picker, would summarize these findings before the Senate as, “the utility did divert dollars we approved for safety purposes for executive compensation.”²⁵

By March 2015, the CPUC would ultimately close the PG&E penalty case on the San Bruno explosion, leveling a \$1.6 billion fine, which included a \$300 million fine to the General Fund, a \$400 million bill credit spread across PG&E gas customers, and an \$850 million shareholder penalty toward gas transmission safety upgrades.²⁶ In total, the fine amounts from the multiple Investigations arising from the San Bruno explosion would amount to approximately \$2.2 billion. At the time, this was the largest fine in CPUC history.²⁷

In August 2015, the CPUC would open an Investigation into PG&E’s ability to prioritize safety, remarking on the utility’s uneven progress and lack of a consistent, robust, and accountable corporate-wide safety program.²⁸ The CPUC would note: “While the San Bruno Investigations were underway...PG&E publicly committed itself to improving the safety of its operations, invested in safety improvements, and reorganized its enterprise in order to prioritize safety. Nevertheless accidents and events affecting the safety of its customers, the general public, workers and agents, the utility system and the environment have continued to occur.”²⁹ By 2018, the Legislature – through SB 901 (Dodd, Chapter 626, Statutes of 2018) – would require a safety culture assessment of each electrical corporation by an independent evaluator at least every five years.³⁰

In the Courts In October 2012, a San Mateo County Superior Court judge ruled that plaintiffs in civil suits against PG&E were able to seek punitive damages.³¹ By September 2013, PG&E reached settlements with 347 victims of the San Bruno explosion, totaling \$565 million. PG&E had recovered more than half that sum in insurance.³² That same month, state and local prosecutors chose not to seek charges against PG&E, letting the three-year state statute of limitations for criminal prosecution pass. Rather, any criminal prosecution of PG&E was put into the hands of the US Attorney whose statute of limitations is five years.³³

²⁵ Lifsher, Marc. “Funds for safety went to utility execs’ pay instead, PUC president says,” *Los Angeles Times*; March 25, 2015.

²⁶ CPUC press release April 9, 2015; “CPUC Penalizes PG&E \$1.6 Billion for Pipeline Violations” <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M151/K034/151034091.PDF>

²⁷ Unfortunately, that horrific record would be exceeded just five years later when the CPUC fined PG&E \$1.9 billion for the utility’s role in the 2018 Camp Fire in Butte County and multiple wildfires in 2017 in the North Bay. <https://sanfrancisco.cbslocal.com/2020/05/07/california-puc-pge-wildfire-penalty/>

²⁸ OII 15-08-019 <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M154/K363/154363217.PDF>

²⁹ OII 15-08-019 pg. 3

³⁰ PUC §8386.2

³¹ Bulwa, Demian; “San Bruno Blast Ruling goes against PG&E” *SFGate*; October 29, 2012; <https://www.sfgate.com/bayarea/article/San-Bruno-blast-ruling-goes-against-PG-and-E-3991614.php#ixzz2ApbjnHYM>

³² CBS/AP “PG&E to Pay \$565M in Settlements over San Bruno Pipeline Explosion” *CBS SF Bay Area*; September 10, 2013; <https://sanfrancisco.cbslocal.com/2013/09/10/pge-to-pay-565m-in-settlements-over-san-bruno-pipeline-explosion/>

³³ Van Derbeken, Jaxon; “State, county won’t charge PG&E in blast deaths;” *SFGate*; September 9, 2013. <https://www.sfgate.com/crime/article/PG-and-E-won-t-face-state-charges-in-San-Bruno-4800195.php>

In 2014,³⁴ the US Attorney indicted PG&E for multiple willful violations of the Natural Gas Pipeline Safety Act and obstructing the NTSB during its investigation. In August 2016, a federal jury found PG&E guilty of six of the 12 criminal charges – five willful violations of the Pipeline Safety Act and one count of obstruction of justice.³⁵ In January 2017, PG&E was sentenced to five years of probation, ordered to submit to a corporate compliance and ethics monitor-ship, to complete 10,000 hours of community service, and to spend up to \$3 million on an apology campaign to inform the public of the utility’s criminal and neglectful behavior.³⁶ PG&E has a little over two years remaining on its federal probation.

In the Legislature Concurrent with these efforts was Legislative action, both through statutory changes and oversight hearings. Dozens of bills were introduced over the past decade, touching on issues ranging from implementing the NTSB’s gas safety recommendations to tightening ex parte rules at the CPUC to natural gas leak abatement. A selected list of these statutory changes is included in Appendix A. Oversight hearings were also held throughout the decade following the explosion, in both the Assembly Utilities and Commerce Committee and the Senate Energy, Utilities, and Communications Committee.³⁷ In the Senate, this Subcommittee was first formed under the standing Energy Committee during the Chairmanship of Senator Alex Padilla. In the request to then Senate President pro Tempore Darrell Steinberg to consider formation of the Subcommittee, Senator Hill noted:

“Senator Padilla has responded to safety issues, particularly the fatal 2010 explosion in San Bruno, promptly and aggressively, but the nature of a standing committee is that it must address the pressing needs of the day, of which there are many in the Energy Committee’s purview. Safety is different from most issues, however in that it is only at the top of our minds when it is most absent, and it is difficult for a standing committee to address safety until after a tragic accident has occurred.”³⁸

This Subcommittee was subsequently formed in 2013 and has since held 12 hearings on topics related to gas and electric infrastructure safety.³⁹

³⁴ Original filing in April with modification added in July, see: “Attorney General Kamala D. Harris Issues Statement on Federal Indictment of PG&E” April 1, 2014; <https://oag.ca.gov/news/press-releases/attorney-general-kamala-d-harris-issues-statement-federal-indictment-pge>

³⁵ Press Release of the US DoJ “PG&E Found Guilty of Obstruction of an Agency Proceeding and Multiple Violations of the Natural Gas Pipeline Safety Act,” August 9, 2016; <https://www.justice.gov/usao-ndca/pr/pge-found-guilty-obstruction-agency-proceeding-and-multiple-violations-natural-gas>

³⁶ Press release from US DOJ; “PG&E Ordered to Develop Compliance and Ethics Program as Part of its Sentence for Engaging in Criminal Conduct,” January 26, 2017; <https://www.justice.gov/usao-ndca/pr/pge-ordered-develop-compliance-and-ethics-program-part-its-sentence-engaging-criminal>

³⁷ Most of these in 2015. Assembly’s – “Informational Hearing: California Public Utilities Commission Ex Parte Communication and Related Practices,” July 13, 2015; State Capitol Room 437; AU&C. Senate’s – “CPUC and Public Safety: a Focus on Energy Infrastructure,” March 25, 2015; SEUC and “Ex Parte Communications and the CPUC Rule Making Process,” March 11, 2015; SEUC

³⁸ Senator Jerry Hill; “Request for Subcommittee on Gas and Electric Infrastructure Safety,” January 15, 2013.

³⁹ For more information on this Subcommittee, and to review past hearings, please see: <https://seuc.senate.ca.gov/subcommitteehearings>

Streams of Reform

The pipeline explosion in San Bruno marked a watershed moment for California’s regulated utilities, the CPUC, and the public, even if it was not recognizable as such in the immediate aftermath. The origin of an idea, or the formation of a turning point, can be hard to pin down. A tragedy, which produces its own natural momentum for change, can very easily dim if the public’s gaze shifts, a new urgent priority arises, or the regulatory or political hurdles prove formidable. The path of lasting change from formation to execution may often be long, discursive, and absorptive of multiple efforts.

In the face of a tragedy like San Bruno immediate answers and immediate solutions are both appropriate and justified. This is why short-term⁴⁰ solutions – practical, prescriptive approaches – to the known errors or negligence are sought and urgent remediation is demanded. Such was the case with San Bruno.

Many of the recommendations in the NTSB and IRP reports were prescriptive, and quickly demanded. A full-scale recordkeeping overhaul was conducted for all the gas utilities in the State, so that complete records for all major pipelines could be maintained. PG&E installed hundreds of telemetry devices on its pipelines to enable remote shut-offs and pressure checks. As the chart in Appendix B shows, PG&E completed 11 of the 12 recommendations called out by the NTSB’s investigation report.⁴¹ By 2014 PG&E was recognized with international asset management certifications, indicating excellence in its gas system operation.⁴² The CPUC more than tripled their number of gas safety inspectors after 2010.⁴³ The CPUC also empowered staff through a safety citation program to expedite necessary enforcement action against utilities.⁴⁴ But most critically, the CPUC began shifting from an agency focused on infrastructure and compliance to one that discusses organizational safety, culture, and risk metrics. These reforms have reduced risk from natural gas pipelines in the State, and mark clear progress toward safety after the tragedy in San Bruno.

It is worth remembering that these short-term reforms did not come easy. To see them executed required continuous public pressure and regulatory oversight. The IRP report noted PG&E had a culture “whose rhetoric does not match its practices,” worrying that the “company’s image may get in the way of concentrating resources on the most important things.”⁴⁵ A vocal public, exhaustive media, and determined public servants ensured the implementation of many

⁴⁰ **Important distinction - “Short-term” in their implementation, not in their impact.**

⁴¹ Technically, as reported by NorthStar Consulting in 2017, PG&E had “closed out” 11 of the 12 NTSB recommendations. The remaining recommendation was accepted under modified conditions, and thus is still considered “open” even though the agreed work is complete. NorthStar Report, Exhibit III-1, p. I-19, Citation 73

⁴² The International Organization for Standardization (ISO) 55001 and Publicly Available Specification (PAS)55-1

⁴³ CPUC News & Outreach Office; “Working for California: A Monthly Newsletter from the CPUC;” September 2020; pg. 2

https://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/About_Us/Organization/Divisions/News_and_Outreach_Office/WfC%20Sep%202020_092420.pdf

⁴⁴ This staff citation program was most recently updated in Commission Resolution M-4846, to be voted on at the upcoming November 5, 2020 CPUC Voting Meeting. Document received by Subcommittee staff on October 2, 2020, via email, as part of the Commission’s Rules of Practice and Procedure service list.

⁴⁵ Citation 1, *IRP* report; pg. 16-17

of the reforms following the explosion, demanding records and appropriate penalties and real justice. As time passes, these prescriptive reforms must be continually maintained, as safety is not a static resource. Continued energy and public scrutiny are necessary to ensure such maintenance.⁴⁶

Table 1 – Gas Safety Improvements for PG&E⁴⁷

Miles of transmission pipe	6,600	
Miles of distribution pipe	43,000	
	2010	2019
Gas Odor Response Times (min)	33.3	20.8
Remote data points for transmission line pressures and flows	1,300	2,907
Remote data points for distribution line pressures and flows	290	4,314
Third party gas dig-ins/1,000 USA tickets	3.5	1.04
Miles of transmission pipeline replaced	9	>269 (2011-19)
Miles of distribution pipeline replaced	27	>863 (2011-19)
Miles of transmission pipeline strength tested	0	>1,495 (2011-19)
Miles of transmission pipeline made piggable	130	>1,316 (2011-19)
# Automated valves installed (transmission)	0	360

Yet short-term solutions only provide half the answer. They must also be developed alongside long-term solutions which uphold the continuous need for safety when energy or public pressure declines. The IRP report recognized this by mixing both short- and long-term reforms in their list of recommendations. The notion of developing safety management systems at both the utilities and the CPUC was hinted at in the report, on display in such directives to: create performance-based regulations, improve safety culture and safety communication both internally and externally across the industry, and incorporate risk analysis into regulatory considerations. The CPUC has made fitful progress in adopting these long-term reforms, as this Subcommittee has often discussed.

⁴⁶ We are after all, as expressed by Carnot, in a constant state of entropy.

⁴⁷ Table data from PG&E's "2020 Gas Safety Plan" March 16, 2020; https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi2gOvvo5vsAhVFqJ4KHUttDG AQFjABegQIBRAC&url=https%3A%2F%2Fwww.pge.com%2Fpge_global%2Fcommon%2Fpdfs%2Fsafety%2Fgas-safety%2Fsafety-initiatives%2Fpipeline-safety%2F2020GasSafetyReport.pdf&usg=AOvVaw2p4lAnrwMiK7fvzifOTN-n

What follows are evaluations of two long-term reforms at the CPUC: *Risk-based ratemaking* as discussed in the Safety Model Assessment Proceeding (S-MAP),⁴⁸ the individual utilities' Risk Assessment and Mitigation Phase (RAMP) proceedings,⁴⁹ and the forthcoming update to S-MAP;⁵⁰ and the *Safety Culture Assessments* as discussed in PG&E's⁵¹ and SDG&E's⁵² individual proceedings. These case studies show the long and difficult work to enact systemic change in gas safety at the utilities, and highlight how the lessons from the San Bruno explosion must still be discussed and learned.

Risk-Based Ratemaking

After the IRP report recommended the CPUC provide "effective risk-based regulatory oversight of pipeline safety"⁵³ and "consider a more proactive role for the safety staff in utility rate filings,"⁵⁴ the Legislature created a number of gas safety laws requiring the CPUC to thoroughly review the utilities' gas safety plans.⁵⁵ Initially incorporated into R. 11-02-019, three years later the discussion spun into R. 13-11-006, where the CPUC began to develop risk-based decision-making in utility rate cases.

A few months later, in January 2014, Senator Hill filed in R. 13-11-006 – and subsequently codified in legislation⁵⁶ – a formal methodology for considering safety in rate cases through monitoring, metrics, analysis, and audits. These efforts ultimately morphed into the creation of S-MAP – which reviews and approves the utilities' framework for assessing safety risks; RAMP – which are separate filings by each of the utilities describing its risks, mitigation options, and funding; and the General Rate Cases (GRC) – which are separate utility filings that now incorporate recommended risk mitigation and funding prioritization arising from the RAMP.

The work the CPUC has undertaken in these risk assessment proceedings has been herculean, and worthy of recognition. As Professor Richard Callahan remarked at a 2013 hearing of this Subcommittee, "ultimately, culture drives performance, and what drives organizational culture are the conversations you have about performance and about metrics."⁵⁷ Better risk-informed decision-making requires both better data and better data analysis. And better data requires clear direction as to what should be measured, the frequency of the measurement, and the goal

⁴⁸ A. 15-05-002, et al.

⁴⁹ As memorialized in D. 16-08-018; the various utilities had staggered filings with SDG&E/SoCalGas updating their filing in November of 2019 (I. 19-11-010/11), and PG&E having updating its filing in June 2020 (A. 20-06-012).

⁵⁰ OII 20-07-013

⁵¹ OII 15-08-019

⁵² OII 19-06-014

⁵³ Recommendation 6.2.4.4 from *IRP report*, Citation 1.

⁵⁴ Recommendation 6.8.3.1 from *IRP report*, Citation 1.

⁵⁵ Five were signed by Governor Brown in 2011, notable among them SB 705 (Leno, Chapter 522, Statutes of 2011)

⁵⁶ SB 900 (Hill, Chapter 552, Statutes of 2014)

⁵⁷ November 18, 2013 "Improving Safety Oversight at the California Public Utilities Commission;" background here: https://seuc.senate.ca.gov/sites/seuc.senate.ca.gov/files/SlowProgressCPUC_v1pt1_10-28-13.pdf

sought. These are the aims of the S-MAP and RAMP proceedings – an articulation of metrics, benchmarking, controls, and targets.⁵⁸

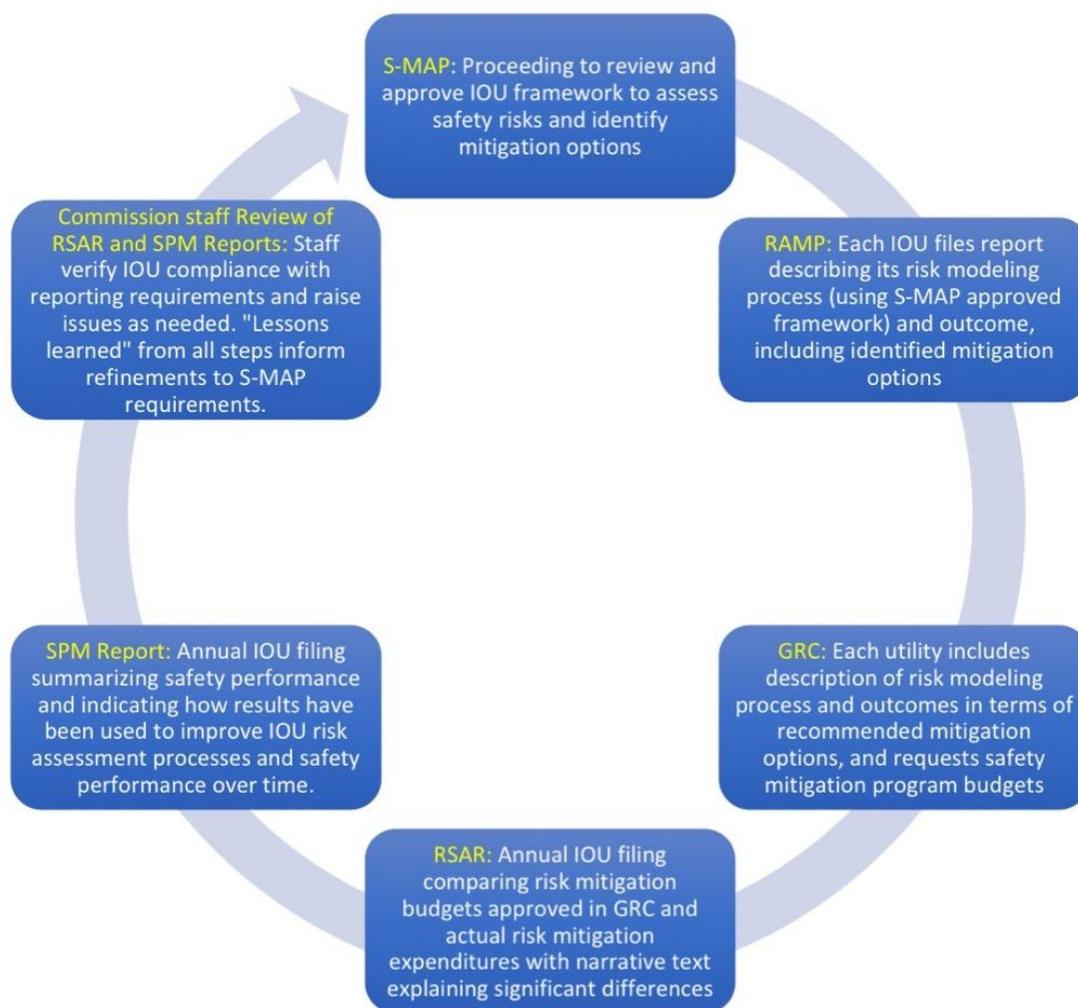


Figure 1: Relationship between S-MAP, RAMP, and GRC Proceedings⁵⁹

Yet such quantification can also quickly turn into risk-analysis paralysis – as the whirlpool of filings, technical jargon, and metrics matrices absorbs all attention and leaves the best way to mitigate a hazard lost in the wash. One of the causes of this, as has been raised by this Subcommittee in the past,⁶⁰ is the inherent problem of focusing safety decisions through the lens of the rate filing. The rate case is about money. As a consequence, its upstream

⁵⁸ Controls are currently established measures that modify and, ideally, reduce risk. Controls may include operations, plans and standards, emergency procedures, and other programs.

⁵⁹ Pg. 10 of "Order Instituting Rulemaking to Further Develop Risk-Based Decision-Making Framework for Electric and Gas Utilities" OIR 20-07-013, filed July 24, 2020.

⁶⁰ Chairman J. Hill's Letter to President Picker and Commissioners regarding CPUC Safety Management, sent November 10, 2016. https://sd13.senate.ca.gov/sites/sd13.senate.ca.gov/files/11-10-16_HilltoPUC_RE_OSA.pdf

proceedings, S-MAP and RAMP, are shadowed by money. Yet safety failures are rarely caused by lack of money. James Reason, one of the early experts on complex accidents, notes that 80% of accidents are caused by organizational or human failures and 20% are caused by technical errors.⁶¹ This is as true for cybersecurity – where human error remains the biggest threat⁶² – as it is for utility infrastructure.

Case in point, the San Bruno explosion could, in very simplistic terms, be said to have been caused by deficient structural welds in 50+ year-old pipe. This causal analysis could lead to risk control measures of aggressive measurement and replacement programs for all vintage pipe in a utility's service territory. However this control ignores other interventions – such as improved protocols in communication and emergency plans when electrical work occurs at critical gas facilities like the Milpitas terminal – that could likewise be based on a causal analysis and prevent any future accident. One of these controls is infrastructure based and expensive, while the other is organizational and less so. Both controls could be prudent utility investments, but the very nature of nesting them in the rate case ensures the most expensive is elevated.

Take, for instance, PG&E's 2020 RAMP filing evaluating the risks of and control for a pipeline rupture.⁶³ Of the 11 controls and 5 mitigations proposed for such an event, only 3 address human factors – including an appropriate Locate and Mark program, pipeline patrols, and public communication. However, none of the 3 human-driven controls actually discuss how PG&E plans to manage the human element; in other words, how PG&E will actually control for the risk. This is particularly troubling given PG&E's history in its Locate and Mark program, where managerial pressure and perverse incentives led to distortions and falsification in reporting metrics.⁶⁴

Other items to address with the current structure of S-MAP/RAMP include:

- Regulators casting a critical eye to the metrics feeding these proceedings – with Locate and Mark once again providing a case study [See Box 3 below], and
- Validation with the risk modeling.

The validation step is an important one, allowing past events to inform the predictive robustness of the risk model. Since risk assessments are largely a set of hypotheses and assumptions, using empirical findings can help close the gap on the uncertainties surrounding the various risks. In PG&E's first attempt at using the RAMP process during its 2020 GRC (its associated RAMP was filed in Nov. 2017), the utility ranked wildfire as 8th in its systemic risk. After the horrific fires of 2017 and 2018, PG&E re-evaluated its risk methodology, and now ranks wildfire

⁶¹ James Reason, *Managing the Risks of Organizational Accidents*, Ashgate, Burlington, 1997, pg. 42

⁶² Carmen Reinicke, "The biggest cybersecurity risk to US businesses is employee negligence, study says," *CNBC*; June 21, 2018. <https://www.cnbc.com/2018/06/21/the-biggest-cybersecurity-risk-to-us-businesses-is-employee-negligence-study-says.html>

⁶³ A. 20-06-012 "Application of Pacific Gas and Electric Company (U39M) to Submit its 2020 Risk Assessment and Mitigation Phase Report" June 30, 2020. Chapter 7.

⁶⁴ OII 18-12-007

Box 3: Caution Needed with Metrics – PG&E compensated for gas safety metrics inflated by wildfire work*

- PG&E replaces an average of 21,000 wood poles per year.¹
- During 2019, PG&E inspected approximately 700,000 distribution poles, an enormous increase due to the enhanced Wildfire Safety Inspection Program.²
- The number of poles replaced in 2019 increased as a result.³
- These new inspections included intrusive testing of the pole and a new loading assessment.⁴
- Intrusive testing identifies “internal or below ground decay that may be present in the pole.”⁵ In other words, **this new testing digs around the pole.**

- The January 2020 agenda for the Board of Directors Meeting of USA North 811 – the one-call center responsible for receiving and dispatching “Call Before You Dig” calls in Northern California – reported “524,721 more tickets in 2019 than ...in 2018, an increase of 41.4%.”⁶ The Board noted this as the largest annual increase in ticket volume they’ve ever seen.
- 27% of the 2019 tickets came directly from PG&E, while 21% came from Osmose, who was consulting with PG&E on their pole work.⁷
- The increases in tickets arose in more remote, wildland, or wildland-urban interface counties. Butte and Lake Counties led these totals with a 600+% increase in ticket volume from 2018.⁸
- **This suggest PG&E and Osmose had increased digging in high fire threat areas of the state.**

- The CPUC in their 2019 Strategic Directive on Safety had established a metric for gas safety as “number of dig ins [or % dig-ins per underground service alert tags]”⁹
- Following the revelations in their Locate & Mark program, PG&E had vowed reform and set as their target for 2019 “1.23 dig-ins per 1,000 tickets.”¹⁰
- In 2020, PG&E reported success in their Dig Safe program due to achieving “1.04 dig-ins per 1,000 underground service alert tickets” in 2019 compared to 1.72 in 2018, far exceeding their stretch goal for the year.¹¹
- PG&E cited the efforts of their Dig-In Reduction Team for this marked decrease.¹²
- Because the gas safety risk metric normalizes over the *actual* number of dig-ins that occurred in 2019, decreases could arise from either a reduction in # of dig-ins [numerator] –and thus improved safety – *or* a large inflation in the # of tickets [denominator].
- **The metric obscures which is accurate, providing little insight into the safety performance of PG&E’s Dig Safe program.**

- On March 4, 2020 PG&E presented its executive compensation plan, which includes both short- and long- term incentives to financially reward PG&E’s senior executives if various safety metrics are met.
- In that plan, 7.5% of the short-term financial incentive would be rewarded if “dig-ins per 1000 tickets” were reduced.¹³
- The CPUC, as part of their decision on PG&E’s reorganization plan, conditionally approved PG&E’s executive compensation plan, subject to further CPUC review.¹⁴
- **This dig-in incentive has the consequence of financially rewarding PG&E to inflate the volume of dig tickets in their service territory, without any measureable improvement in dig safety.**

* References for Box 3 included in Appendix D at end of document

first in its 2020 RAMP.⁶⁵ This failure of the model came at a terrible price – and should be remedied for all future utility filings – but also presents why validation is a critical tool. Undoubtedly, the need for validation will only become more extreme as the climate changes.

These concerns signal a necessary course-correction of risk-assessment that ideally will be addressed in the latest iteration of S-MAP.⁶⁶ But it likewise raises the significant differences between the regulation of risk and the promotion of safety. The CPUC cannot be reliant on the rate case to solve utility safety problems. Rather, the CPUC should address safety management, both internally and at the utilities, as risk assessments alone do not assure safety.

Safety management addresses the underlying organizational structures – not just infrastructure or resources – that can lead to safe conditions, and develops plans to manage hazards. This is a fundamentally different frame of mind than risk assessment. Safety is about confidence (positive framing) while risk is about loss (negative framing).⁶⁷ Safety management and risk assessment are not mutually exclusive; they should be considered together to heighten safety oversight. For their part, the utilities have already developed safety management systems as part of their annual Gas Safety Plans.⁶⁸ The Subcommittee is unaware of the CPUC conducting a formal review of them. Luckily, the CPUC already has the procedural vehicle waiting – the safety culture proceedings.

Safety Culture Assessments

In August 2015, following the closure of the San Bruno penalty case, the CPUC opened an Investigation into PG&E’s ability to prioritize safety and the failings of its organizational culture.⁶⁹ Both the NTSB and the IRP reports had spoken of a deep failure at PG&E, with the NTSB characterizing San Bruno as an

Box 4: Quick Definitions*

Risk – refers to results that deviate from those intended or expected. Risk assessments, therefore, focus on what might be done to reduce the likelihood of an unintended result.

Safety – rather than merely the absence of risk, refers to systemic and constant management in order to cope with both known and unknown or unanticipated risks.*

The *risks* of owning a pool can vary from drowning to electrocution. Whereas operating a pool *safely* can include anything from walking slowly around the perimeter to installing a fence to keeping a life preserver on site. Safety need not always be tied to identified risks.

*pg. 5, Danner & Schulman (2019), Citation 69

⁶⁵ A. 20-06-012 “Application of Pacific Gas and Electric Company (U39M) to Submit its 2020 Risk Assessment and Mitigation Phase Report” June 30, 2020. Chapter 1, Table 1-1, p. 1-5.

⁶⁶ OIR 20-07-013

⁶⁷ Danner, C. and Schulman, P. “Rethinking Risk Assessment for Public Utility Safety Regulation.” *Risk Analysis*, 39, 1044-1059, May 2019

⁶⁸ PG&E “2020 Gas Safety Plan” March 16, 2020; SDG&E “2019 Gas Safety Plan of San Diego Gas and Electric” https://www.sdge.com/sites/default/files/regulatory/2019_SDGE_Gas_Safety_Plan_FINAL.pdf; & SoCalGas “2020 Gas Safety Plan;” March 15, 2020.

⁶⁹ OII 15-08-019.

“organizational accident,” noting failures at numerous levels of the company and a “pervasive lack of proactive measures to ensure compliance.”⁷⁰

The CPUC, in opening the Safety Culture proceeding, recognized the persistence of significant incidents at PG&E even after San Bruno, including:⁷¹

- A June 2012 fatality at the Kern Power Plant demolition;
- Breaches in April 2013 and August 2014 at the Metcalf Transmission Substation, questioning PG&E’s ability to protect the physical security of its critical infrastructure; and
- A March 2014 explosion in a Carmel home resulting from incorrect pipe installation.

The CPUC also observed their own constraints in preventing these persistent accidents, noting, “The Commission’s observation of the ongoing safety incidents on PG&E’s system that threaten human, system, and environmental safety prompts us to ask: Why are the **traditional tools of enforcement not working** to prevent safety incidents and promote a high-functioning safety culture?”⁷² However, the CPUC declined to present this critical question as part of its preliminary scoping memo, focusing the discussion solely on PG&E.

NorthStar Consulting Group (NorthStar) was selected to perform an assessment of PG&E’s organizational culture and governance priorities. The assessment began in April 2016 and was completed in May 2017.⁷³ The NorthStar Report provided five recommendations for the CPUC and over 60 recommendations for PG&E. In July 2018, NorthStar reviewed PG&E’s implementation of six of the recommendations from the original report.⁷⁴ This review, like the original assessment, cited significant improvements in PG&E’s safety culture and process, but noted critical issues remained.

Following the devastating wildfires in 2017 and 2018 and PG&E’s subsequent filing for bankruptcy in early 2019, the Safety Culture proceeding focused on questions of PG&E corporate governance and options the CPUC might employ should PG&E not perform.⁷⁵ These options included: separating PG&E into gas and electric utilities; a periodic review of PG&E’s monopoly license (CPCN); the elimination of PG&E’s holding company; and potentially linking PG&E’s financial returns to safety metrics. These topics would ultimately be absorbed within the CPUC’s review of PG&E’s plan to exit bankruptcy,⁷⁶ leaving the Safety Culture proceeding

⁷⁰ NTSB report, p. 117-118, Citation 2.

⁷¹ “Order Instituting Investigation on the Commission’s Own Motion into whether PG&E’s Organizational Culture and Governance Prioritize Safety;” OII 15-08-019; filed September 2, 2015; p. 10

⁷² *Ibid* p. 12

⁷³ NorthStar Consulting Group; “Assessment of PG&E Corp and PG&E’s Safety Culture;” May 8, 2017; in OII 15-08-019 as an Attachment of the May 8, 2017 Scoping Memo and Ruling.

⁷⁴ And only six, noting “In accordance with SED’s direction, NorthStar did not review the status of all recommendations or perform a detailed follow-up of PG&E’s safety culture.” NorthStar Consulting Group; “Assessment of PG&E Corp. and PG&E’s Safety Culture – First Update;” March 29, 2019; filed as a Ruling by Judge Allen in OII 15-08-019. p. I-1

⁷⁵ D. 19-06-008 regarding reporting of safety experience of the Board of Directors of PG&E, and the June 18th 2019 Ruling on CPUC tools.

⁷⁶ OII 19-09-016

largely idle. Just last month, the CPUC ruled to keep the proceeding open to allow NorthStar to continue monitoring PG&E, without any comment of potential issues to be addressed.⁷⁷

In June 2019, citing increasing concern over a growing tally of safety violations, the CPUC opened an investigation into the safety culture of SoCalGas.⁷⁸ As was the case with PG&E, the CPUC recognized the persistence of significant incidents, including:⁷⁹

- The October 2015 leak at the Aliso Canyon storage facility and the May 2019 independent consultant's root cause analysis which raised concerns over SoCalGas's safety practices;
- A January 2017 gas leak and explosion in Ontario, CA resulting in one injury; and
- An October 2017 explosion of Line 235-2, northeast of Los Angeles, and the systemic history of leakage on both Line 235-2 and its neighbor, Line 4000.

The SoCalGas proceeding is still in its earliest days, but the notion of Safety Culture Assessments – especially with the Legislature mandating them for each electrical corporation at least every five years⁸⁰ – is very much de rigueur. The questions raised by such assessments, as the NTSB and IRP reports highlight, are critical and worthy of continued interrogation. But the CPUC should strive to constrain the scope of these proceedings to focus on deliverable items – namely, bolstering **safety management systems** (SMS). The SMS includes senior management's safety policy vision and comprehensive risk mitigation strategies, but also measures the effectiveness of risk controls, incorporates changes to those controls, and offers strategies to promote safety company-wide through effective communication, training, and empowering safety participation in all personnel levels. Appendix C provides more information on SMS policy.

Popular Culture

In a 2013 literature review of safety culture, authors at Sandia National Laboratories recognized that while *safety culture* is a valuable construct, it has inherent weaknesses; principle among them the lack of a common definition or standard way of measuring it.⁸¹

The CPUC for its part defined *safety culture* in PG&E's proceeding as:

An organization's culture is the collective set of that organization's values, principles, beliefs, and norms, which are manifested in the planning, behaviors, and actions of all individuals leading and associated with the organization, and where the effectiveness of the culture is judged and measured by the organization's performance and results in the world (reality). Various governmental studies and federal agencies rely on this definition of

⁷⁷ "Administrative Law Judge's Ruling Updating Case Status;" OII 15-08-019; September 4, 2020.

⁷⁸ OII 19-06-014

⁷⁹ "Order Instituting Investigation on the Commission's Own Motion into whether PG&E's Organizational Culture and Governance Prioritize Safety;" OII 15-08-019; filed September 2, 2015; p. 10

⁸⁰ SB 901 (Dodd, Chapter 626, Statutes of 2018); PUC §8386.2

⁸¹ Cole, K., Stevens-Adams, S., and Wenner, C. "A Literature Review of Safety Culture" *Sandia Report SAND2013-2754*, March 2013. p. 3.

organizational culture to define “safety culture.” A positive safety culture includes, among other things:

- A clearly articulated set of principles and values with a clear expectation of full compliance.
- Effective communication and continuous education and testing. “Employees will do it right sometimes if they know how. They’re more likely to do it right every time if they fully understand why.”
- Uniform compliance by every individual in the organization, with effective safety metrics, recognition, and compensation, and consequences or accountability for deviating or performing at, above, or below the standard of compliance.
- Continuous reassessment of hazards and reevaluation of norms and practices.

...In a positive ‘safety culture,’ a company’s actions should be **guided by an effective and effectively-implemented risk management plan**. ...⁸²

This definition, while touching on some positive themes, falls short of capturing what is needed to effectively measure safety performance. By squarely focusing the guidance on the *risk management plan*, many aspects of organizational safety articulated in the bullets – company-wide safety policies, corrective actions, and clear channels of communication – are left out. As discussed earlier, the utilities’ current iterations of S-MAP/RAMP have resulted in risk plans that focus on external hazards and the infrastructure investment that may control them. This focus ignores the organizational and human elements inherent to safe organizations.

As a result, the PG&E Safety Culture proceeding evolved into NorthStar consulting recommending specific actions for improving PG&E’s safety culture, PG&E taking corrective action, and NorthStar then following up with further review and recommendations. This may prove a useful strategy for PG&E to implement a safety management system, but leaves out any global consideration for the other utilities the CPUC regulates.

This lack of guidance may lead the evaluation of utilities’ *safety culture* to become, as Guldenmund said, an examination of “everything relating to safety failures that cannot be explained in another way.”⁸³ The gauzy definitions and associated remedies around the concept of *safety culture* will instead draw focus away from the real conditions that affect organizational safety.

Fortunately, this can be easily remedied. The utilities need to demonstrate a strong managerial foundation for safe operations. This managerial foundation is not solely a top-down command-and-control approach. Rather, management should bolster personal responsibility for the safety of the individual, organization, and the public. This can be accomplished through the development and promotion of SMS policies. Most of the utilities – at least in gas operations – have already submitted SMS filings as part of their annual Gas Safety Plans.⁸⁴ NorthStar

⁸² OII 15-08-019, p. 4-5, Citation 69

⁸³ Guldenmund, F.W. “(Mis)understanding Safety Culture and Its Relationship to Safety Management,” *Risk Analysis*, 30, 1466-1480, 2010.

⁸⁴ See Citation 68

provides a template for review in their work with PG&E. The CPUC needs to distill that template into a universal policy for all utilities to follow. Oddly enough, the CPUC already did this work, likely in the last place anyone would look – General Order 164-D,⁸⁵ which established comprehensive system safety program plans for light rail. This GO offers all the core tenets of SMS,⁸⁶ and should be replicated for electric and gas utilities in a unified proceeding to address gaps in oversight of the utilities’ organizational safety.

A New Direction?

But who at the CPUC should be tasked to do this work? SMS policy had been the task of the Office of Safety Advocates, a branch dissolved when their statutory authorization expired in January.⁸⁷ Since OSA’s dissolution, the safety structure at the CPUC has evolved with the creation of a Safety Policy Unit that houses a separate Safety Management Branch, comprised of both a Utility Risk Assessment Section and a Safety Culture and Governance Section.⁸⁸ While the five layers of management between this new section and the Commissioners seems far from ideal, the Safety Culture and Governance section is the likeliest unit to carry the task of implementing SMS at the utilities.

This new Unit should likewise undertake updates to the CPUC’s internal guiding documents on safety, which have been largely ignored or quietly reshuffled over the past few years. The CPUC’s Safety Action Plan was last updated in February 2017.⁸⁹ Throughout 2018-2019 the CPUC seemed to shift focus to its Strategic Directives⁹⁰ and the Safety Enforcement Division’s Annual Work Plans⁹¹ to provide the CPUC’s comprehensive strategy on safety. However, even the SED Work Plans have not been updated since 2018. CPUC staff has informed the Subcommittee that a comprehensive Work Plan will be forthcoming in 2021, and aims to articulate the organizational roles and responsibilities of these new layers of utility safety oversight.

⁸⁵ GO-164D Safety oversight of Rail Transit Agencies and Rail Fixed Guideway Systems

⁸⁶ See Appendix C below and past Subcommittee hearings discussing SMS more in depth – May 3, 2016 “California Public Utilities Commission: Safety Intervenors and Effective Safety Management” Background here: https://seuc.senate.ca.gov/sites/seuc.senate.ca.gov/files/05-03-16_background.pdf and May 14, 2019 “Safeguarding Safety: Participation of Safety Advocates in a Regulatory Landscape,” Background here: https://seuc.senate.ca.gov/sites/seuc.senate.ca.gov/files/05-14-19_background.pdf

⁸⁷ formerly codified in PUC §309.8 under SB 62 (Hill, Chapter 806, Statutes of 2016)

⁸⁸ Safety Policy Division Organizational Chart, as published on October 5, 2020 at https://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/About_Us/Organization/Structure/Org_Charts/Safety%20Policy%20Division.pdf Note: Rachel Peterson is currently acting Executive Director of the CPUC, with Danjel Bout leading the Safety Policy Division.

⁸⁹ http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/Safety/Other/2017_Safety_Action_Plan.pdf

⁹⁰ Pg. 5; the CPUC’s safety directive is largely utility-focused, with a quick sentence included on “developing an effective safety management system” for themselves. http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Transparency/Strategic_Planning_Initiative/Drift%20SD%20Safety.pdf

⁹¹ <http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/Safety/Other/2018%20SED%20Annual%20Plan.pdf>

With the CPUC on this reorganizational precipice, let some of the lessons learned from the San Bruno investigations not be forgotten. No matter how many resources approved or staff assigned to a rate case, organizational safety problems will not be fixed until they are articulated and constantly interrogated in a safety management plan. The focus should be on safety management, as well as culture. Also, safety management is as critical at the CPUC as it is at the utilities. No matter how many new names or restructurings occur – from Risk Assessment and Safety Advisory, to Policy and Planning, to Office of Safety Advocates, to Safety Culture and Governance – the CPUC should keep both risk assessments and safety management as top priorities for regulatory review and guidance.

These lessons go far beyond gas infrastructure safety, touching on every aspect of a utility's enterprise. The CPUC's Wildfire Safety Division (WSD), the newest office created last year under AB 1054 (Holden, Chapter 79, Statutes of 2019), could benefit from such work. The utility's wildfire mitigation plans – which WSD reviews and approves – largely mirror their RAMP filings, focusing more on infrastructure improvements than organizational benchmarks. Again, infrastructure improvements are both necessary and urgent, but are an incomplete path to fully assure safety.

As an example, the Butte County District Attorney's *Summary of the Camp Fire Investigation* released in June highlights this glaring need.⁹² The Summary alleges decades of reduction or elimination in training for PG&E transmission inspectors prior to the 2018 Camp Fire, stating:

“Every QCR [‘qualified company representative,’ i.e. the rebranding of power line inspectors] who has inspected or patrolled the Caribou-Palermo line since...2005 was interviewed. All of the QCRs denied having received any formal training on how to perform an inspection or patrol. According to all the QCRs, any inspection and patrol training was limited to filling out reporting forms and notifications for any issues identified during an inspection or patrol. All of the QCRs asserted that the only training on how to perform an inspection or patrol was via informal mentoring by other, more experienced, Troublemens.”⁹³

PG&E denied these assertions, noting they were “contradicted by PG&E training records.”⁹⁴ Setting aside any litigation of facts, these conflicting statements demonstrate a large gulf between what senior management and what the employees-on-the-ground view as adequate training; in other words, a break in organizational safety. PG&E, for its part, has attempted to address this in its most recent Wildfire Mitigation Plan filing, establishing a program to monitor

⁹² Butte Co. District Attorney Michael L. Ramsey; “The Camp Fire Public Report: A Summary of the Camp Fire Investigation;” June 16, 2020.

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjv82Nr57sAhXUi54KHKOackQFjAAegQIBxAC&url=https%3A%2F%2Fwww.buttecounty.net%2FPortals%2F30%2FCFReport%2FPGE-THE-CAMP-FIRE-PUBLIC-REPORT.pdf%3Fver%3D2020-06-15-190515-977&usg=AOvVaw1KGh-sHZ9XuwstqX84BEAR>

⁹³ *Ibid.* *Camp Fire Summary*, pg. 29-30

⁹⁴ *PG&E's Response to People's Statement of Factual Basis in Support of the Please and Sentencing Statement*; p. 7, filed July 1, 2020 in the United States District Court Northern District of California San Francisco Division case No. 14-CR-00175-WHA (i.e. PG&E's San Bruno probation court)

and audit inspection effectiveness.⁹⁵ This program essentially creates an organizational control to ensure gaps in training are addressed and corrected. This approach will be helpful to ensure consistent inspection protocols across PG&E's electric enterprise, but in being a solely top-down solution, ignores interventions that promote feedback from field staff on how training may be improved or strengthened. The WSD would benefit from similar organizational controls being enacted across all the utilities' wildfire mitigation plans, and by creating protocols for evaluating such controls.

Conclusion

The San Bruno pipeline explosion was a tragedy that should never had happened. In the decade since, California's utilities have implemented real reforms that have reduced risk from natural gas pipelines, marking clear progress toward safety. The CPUC has likewise shifted from an agency focused on infrastructure and compliance to one also interested in management, culture, and process. However, continued attention should be given to these longer-term strategies that assure safety. The CPUC should prioritize not only risk assessments but also safety management systems, and scope safety management for electric and gas utilities in a unified proceeding to address gaps in oversight of the utilities' organizational safety. Such attention toward safety management is not only critical to maintain safety when demand for change declines, but allows for lessons learned in one sector (gas) to be absorbed by other sectors (electric). The CPUC's new Safety Culture and Governance Section should update the CPUC's comprehensive strategies on safety, and update such guiding documents annually. The new Section should also explore hanging questions critical to the CPUC's function as regulators – such as, *why are the traditional tools of enforcement not working?* Finally, public pressure – and its amplifier, Legislative pressure – must continue to be applied. Such has been the mission of this Subcommittee since its creation in 2013. It may be worthwhile for the Legislature to consider the efficacy of continuing such a mission.

⁹⁵ "PG&E 2020 Wildfire Mitigation Plan Report Updated" R. 18-10-007, February 28, 2020, p. 5-30.
https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/2020-Wildfire-Safety-Plan.pdf

Appendix A: Selected Chaptered Legislation Addressing Findings and Solutions from San Bruno and Related Investigations

Session	Measure	Author	Chapter	Year
2009-2010	ABX6-11	Hill	Chapter 2	Statutes of 2010
Provided tax relief to victims of the 2010 San Bruno gas pipeline disaster, the City of San Bruno, local schools, and San Mateo County.				
2011-2012	AB-50	Hill	Chapter 18	Statutes of 2011
Exempted San Bruno residents from paying state taxes on recovery money they received from PG&E, the Red Cross, and the City of San Bruno following the explosion.				
2011-2012	AB-56	Hill	Chapter 519	Statutes of 2011
Required remote-controlled shut off valves in high population areas and the comprehensive testing and record-keeping of transmission lines; prohibited utilities from using ratepayer money to pay penalties for safety violations assessed by the CPUC; and required natural gas corporations to meet annually with local fire departments to review emergency response plans.				
2011-2012	SB-44	Corbett	Chapter 520	Statutes of 2011
Required the CPUC to establish compatible emergency response standards for owners or operators of intrastate transmission and distribution lines.				
2011-2012	SB-216	Yee	Chapter 521	Statutes of 2011
Authorized the CPUC to require automatic shut off or remote-controlled valves on natural gas facilities and intrastate natural gas transmission lines in high consequence areas.				
2011-2012	SB-705	Leno	Chapter 522	Statutes of 2011
Required natural gas utilities regulated by the CPUC to develop service and safety plans.				
2011-2012	SB-879	Padilla	Chapter 523	Statutes of 2011
Directed the CPUC - in any ratemaking proceeding where they authorize a gas corporation to recover expenses for the inspection, maintenance, or repair of natural gas transmission pipelines - to establish and maintain a one-way balancing account for recovery of those expenses.				
2011-2012	AB-578	Hill	Chapter 462	Statutes of 2012
Required the CPUC to act on gas safety recommendations by the NTSB.				
2011-2012	AB-861	Hill	Chapter 464	Statutes of 2012
Required the CPUC to determine the appropriate ratemaking treatment of bonus compensation for utility executives based on the utility's stock price or financial performance.				

2011-2012	AB-1456	Hill	Chapter 469	Statutes of 2012
Required the CPUC to develop measures and standards for gas safety.				
2011-2012	AB-2201	Bradford	Chapter 481	Statutes of 2012
Raised the civil penalties for violations of the Elder California Pipeline Safety Act of 1981 from \$10,000 daily to \$200,000 daily; and raised the civil penalties for any related series of violations of the Act from \$500,000 to \$2 million.				
2013-2014	SB-291	Hill	Chapter 601	Statutes of 2013
Required the CPUC to develop a safety enforcement program for gas and electric violations.				
2013-2014	AB-1937	Gordon	Chapter 287	Statutes of 2014
Required a gas corporation to provide at least three days' notice to a school or hospital prior to performing excavation or construction of gas pipeline within 500 feet of a school or hospital.				
2013-2014	SB-1371	Leno	Chapter 525	Statutes of 2014
Required the CPUC to open a proceeding to adopt rules and procedures that minimize natural gas leaks from CPUC-regulated gas pipeline facilities.				
2013-2014	SB-434	Hill	Chapter 546	Statutes of 2014
Prohibited current and future members of the CPUC from sitting on governing boards of entities they create as commissioners, and tightened conflict-of-interest provisions.				
2013-2014	SB-636	Hill	Chapter 548	Statutes of 2014
Preserved due process in CPUC penalty proceedings by allowing commission staff to serve in an advocacy role or advisory role, but not both concurrently.				
2013-2014	SB-900	Hill	Chapter 552	Statutes of 2014
Required the CPUC to consider the safety performance of natural gas and electricity companies when setting customer rates and developing regulations.				
2013-2014	SB-1409	Hill	Chapter 563	Statutes of 2014
Required the CPUC to list in a report the gas and electric accident investigations the commission finalized in the previous year, as well as those pending completion; and required the CPUC to summarize these investigations in its annual report.				
2015-2016	SB-62	Hill, Pavley	Chapter 806	Statutes of 2016
Established the Office of the Safety Advocate within the CPUC to advocate for continuous, cost-effective improvement of safety management and safety performance of public utilities.				
2015-2016	SB-215	Leno, Hueso	Chapter 807	Statutes of 2016

Reformed the operations and procedures of the CPUC pertaining to laws and rules for ex parte communications, and the criteria and process for disqualification of commissioners to a proceeding.				
2015-2016	SB-512	Hill	Chapter 808	Statutes of 2016
Reformed the governance structure of the CPUC by more clearly outlining the roles and responsibilities of commissioners and staff, and by requiring the CPUC to reach out to communities affected by CPUC decisions, instead of only to regulated utilities.				
2015-2016	SB-661	Hill	Chapter 809	Statutes of 2016
Addressed safety problems involving excavations and gas pipelines by creating the Dig Safe Board and tasking the board with investigating "one-call" violations, developing standards for safe excavation, and coordinating education and outreach efforts.				
2017-2018	SB-19	Hill	Chapter 421	Statutes of 2017
Enacted reforms to bring more oversight to the CPUC and enable the agency to better focus on its mission as the state's utilities regulator.				
2019-2020	SB-550	Hill	Chapter 409	Statutes of 2019
Ensured that safety is integral to any merger, acquisition, or change of control involving major electric or gas companies; and in sales of public utility assets, the impacts to ratepayers and the workforce must be considered as well.				
2019-2020	SB-350	Hill	Chapter 27	Statutes of 2020
Created a framework for Golden State Energy, a nonprofit public benefit corporation, to step in and take over, should PG&E fail to transform as required by AB 1054 (2019 Holden).				

Appendix B: PG&E Completion of the Recommendations from the NTSB’s San Bruno Investigation Report⁹⁶

Recommendation	Recommendation Description	Date Closed by NTSB
Traceable, Verifiable and Complete Records	This item reflects the comprehensive and exhaustive search NTSB undertook for records held throughout the company in a variety of different locations and by numerous sources and departments.	3-13-2012
Emergency Procedure	A comprehensive response procedure to large-scale emergencies on the gas transmission lines was established. The procedure identifies a single person to assume command and specifies duties for all others involved. It includes the development and the use of troubleshooting protocols and checklists and requires periodic tests or drills to show that the procedure works.	8-29-2012
911 Notification	Gas control room operators, who monitor the transmission pipeline network 24/7, are now required to immediately and directly notify the respective 911 call centers when a possible pipeline rupture is detected.	8-29-12
Toxicological Tests	PG&E revised its post-accident toxicological testing to ensure that it’s timely and complete.	8-29-2012
Maximum Allowable Operating Pressure (MAOP) Validation	Use the traceable, verifiable, and complete records located to determine the valid MAOP based on the weakest section of the transmission pipeline or component.	3-14-2013
Hydrostatic Testing	If unable to determine MAOP for class 1, 3, 4 and class 2 HCAs, determine MAOP with a spike test followed by hydrostatic pressure test.	Open-Acceptable Response NTSB Letter 12-1-2015
Work Clearance Procedures	Revise work clearance procedures. Identify the likelihood and consequence of failure associated with the planned work and develop contingency plans.	3-14-2013
SCADA System Tools to Locate Leaks/Breaks	Equip the SCADA system to assist in real-time recognizing and pinpointing leak location, line breaks, and spaced flow and pressure transmitters along covered transmission lines.	5-15-2015
Automatic and Remote Shutoff Valves	Expedite the installation of automatic shutoff valves and remote control valves on transmission lines in high consequence areas.	12-1-2015
Integrity Management Program	IMP assessment including revised risk, defect and leak data, risk methodology and improved self-assessment.	11-14-2013
Integrity Management (Threat Assessment)	Conduct threat assessments using the revised risk analysis methodology incorporated in the integrity management program, as recommended above.	11-14-2013
Public Awareness Program Continuous Improvement	Develop and incorporate written performance measurements, guidelines and continuous improvement in PG&E’s public awareness program.	3-14-2013

⁹⁶ NorthStar Report, Exhibit III-1, p. I-19, Citation 73

Appendix C: Safety Management System⁹⁷

The safety management system (SMS) concept began not as a theory but as a set of best practices meant to address a number of problems that had emerged from the complexity of modern industrial systems. Principal among these problems are that:

1. Humans cause 80% of accidents, but organizations influence human behavior and the organizations themselves needed to be a focus of safety efforts.
2. Industrial systems are too complex for traditional, prescriptive standards and regulation and instead require a performance-based approach.
3. Accident investigations are too late to use as a tool to understand and prevent high-consequence accidents, as the consequences of infrequent accidents have become more and more intolerable.

Four Pillars of the SMS

1. **Safety Policy**

- Provides management and personnel with policy direction, written procedures or rules, management controls, and corrective action processes to maintain safe operations.
- Establishes senior management's commitment to continual improvement through measurable objectives and to provide sufficient resources to implement safety actions.
- Establishes roles, responsibilities, and accountabilities in the organizations safety performance.
- Articulates an enforcement policy.

2. **Safety Risk Management** consists of five process elements:

- *System description*: establish an understanding of the system sufficient to identify hazards.
- *Hazard identification*: through a combination of reactive, proactive, and predictive means, identify safety hazards.
- *Analyze safety risk*: through quantitative and/or qualitative means, determine the severity and likelihood of the manifestation of hazards.
- *Assess safety risk*: compare the safety risk of identified hazards with safety performance targets and determine the acceptability of the risk.
- *Control safety risk*: implement risk controls to eliminate or mitigate safety risks.

3. **Safety Assurance** determines the effectiveness of risk controls and incorporates:

- *Data Collection*: Collect information from reporting mechanisms, incident and accident investigations, audits, etc.
- *Data Analysis*: Identify relevant questions, determine trends, compare data with industry benchmarks, and identify new hazards.
- *Safety Performance Assessment*: Evaluate the safety performance of risk controls to determine their effectiveness.
- *Corrective Action*: Ensure compliance with existing risk controls or, if necessary, conduct safety risk management to develop new risk controls.

4. **Safety Promotion**

- Promote a positive safety culture by opening lines of safety communication.
- Incentivize participation in safety management through all levels of the organization.
- Ensure appropriate safety training and education opportunities.
- Manage safety knowledge so that it may be acquired in a deliberate, organized fashion and accessible to internal and external stakeholders.

⁹⁷ Reprinted from the Subcommittee's reports from May 2016 and again in May 2019.

Appendix D: References for Box 3 (p. 14)

- 1 – pg. 21-15 from Chapter 21 of PG&E's 2020 RAMP, Citation 65
- 2 – From PG&E's "System Inspections Program" homepage under "2019 Wildfire Safety Inspection Program" tab; website accessed on October 5, 2020 at https://www.pge.com/en_US/safety/electrical-safety/safety-initiatives/system-inspections.page
- 3 – pg. 10-32 from Chapter 10 of PG&E's 2020 RAMP, Citation 65
- 4 – *Ibid*
- 5 – *Ibid*, pg. 21-15
- 6 – Agenda of the Board of Directors Meeting; Wednesday, January 29, 2020; USA North 811, pg. 1
- 7- *Ibid*
- 8- *Ibid*, pg. 4
- 9 – Lee Palmer, "California Public Utilities Commission Committee on Finance and Administration; Strategic Directive 02 – Safety"; May 29, 2019; pg. 8
- 10 - PG&E's "2020 Gas Safety Plan" March 16, 2020, pg. 5
- 11- *Ibid*, pg. 40
- 12 – *Ibid*
- 13 – "Motion of Debtors Pursuant to 11 U.S.C. Sec. 105(a), 363(b), and 503(c) for Entry of an Order Approving Debtors' 2020 (I) Short Term Incentive Plan; (II) Long Term Incentive Plan; (III) Performance Metrics for the Chief Executive Officer and President of PG&E Corporation; and (IV) Granting Related Relief" US Bankruptcy Court case No. 19-30088; March 25, 2020; filed March 4, 2020.
- 14 – "Decision Approving Reorganization Plan" D. 20-05-053 from I. 19-09-016; filed May 28, 2020; p. 100