Docket	:	A.17-11-009
Exhibit Number	:	OSA-1
Commissioner	:	C. Rechtschaffen
ALJ	:	S. Roscow
Witnesses	:	Carolina Contreras Jenny Au

OFFICE OF THE SAFETY ADVOCATE
CALIFORNIA PUBLIC UTILITIES COMMISSION

PREPARED TESTIMONY OF CAROLINA CONTRERAS AND JENNY AU ON PACIFIC GAS AND ELECTRIC COMPANY 2019 GAS TRANSMISSION AND STORAGE RATE CASE

(PUBLIC VERSION)

A.17-11-009

San Francisco, California
July 20, 2018

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MEMORANDUM

This report was prepared by the Office of the Safety Advocate (OSA) of the California Public Utilities Commission (Commission) in Pacific Gas and Electric's (PG&E) Application 17-11-009 and Application 17-10-008 for authority to, among other things, update its gas revenue requirement and base rates effective on January 1, 2019.

OSA presents its analysis and recommendations associated with the applicant's request related to the Natural Gas Storage Strategy (NGSS) and Transmission Pipe.

OSA's witnesses' prepared qualifications are contained in Appendix A of this report.

List of OSA Witnesses and Respective Chapters

Chapter Number	Description	Witness
1	Asset Family – Transmission Pipe	Au
2	NGSS - Reliability	Au
3	NGSS – Safety	Contreras and Au

CHAPTER 1 : ASSET FAMILY – TRANSMISSION PIPE

I. INTRODUCTION

This chapter discusses the safety concerns raised by the residents in the Lafayette Community (Lafayette Group) regarding PG&E's gas pipeline operations. A representative from the Lafayette Group identified pipeline safety issues such as testing and replacement of pipelines and safety programs prioritization as well as exposed pipelines.[1] The Commission Safety Enforcement Division (SED) plans to perform an inspection of PG&E's pipelines in the City of Lafayette between August 13 and 17.[2] However, it is unclear what actions SED will require PG&E to take related to certain segments of exposed pipeline. PG&E is requesting authorization of programs to maintain its transmission assets, including shallow and exposed pipes in this proceeding. Therefore, the Commission should consider the Lafayette Groups' concerns as it addresses ways that PG&E may improve safe operations to manage foreseeable risks.

II. SUMMARY OF RECOMMENDATIONS

As an advocate for the continuous and cost-effective improvements of safety management and safety performance of public utilities, OSA is concerned about the risks related to shallow and exposed pipes. The Commission should order PG&E to explain why it currently does not plan to mitigate two specific segments of exposed pipelines in the City of Lafayette as part of its pipeline maintenance program. Additionally, PG&E should provide a timeframe in which it plans to address this issue. PG&E's responses may be helpful for the Commission in determining how to improve safe operations to manage foreseeable risks.

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[1] Email from Gina Dawson of the Community of Lafayette to Chris Parkes of CPUC's OSA, dated October 13, 2017 at 1:25pm.

[2] Email from SED's Joel Tran to OSA's Jenny Au on July 03, 2018 at 9:56am.

III. DISCUSSION

The frameworks for PG&E's pipeline maintenance and replacement programs are approved by SED. Pipeline testing protocol, schedule, and maintenance and replacement programs are specified in state and federal regulations and Commission resolutions. As stated above, SED intends to conduct site inspections in the City of Lafayette in August and to assess PG&E's compliance with pipeline safety operations. The Lafayette Group's concerns include exposed segments of pipeline, as shown below.

Figure 1-1: Picture of Exposed Segment of Pipeline on Beechwood Drive trail in Lafayette[3]

According to PG&E, there are 14 exposed pipeline segments in the City of Lafayette with only four designed and constructed to be above grade (i.e. designed spans).[4] OSA did not find specific projects in PG&E's testimony that ensues PG&E will address these exposed pipeline segments. While most of the 14 exposed segments are

[3] Provided to OSA by Gina Dawson.

[4] PG&E Response to OSA Data Request, GTS-Rate Case2019_DR_OSA_004-Q04.

located in areas that are accessible only by foot or located in restricted traffic area, two specific segments[5] are located in areas that are accessible by foot or vehicle. A vehicle driven into an exposed pipeline segment can result in dire consequences for the community. Also, these two segments are not designed and constructed to be above grade and therefore should be buried below ground.

PG&E asserted that its Transmission Integrity Management Program (TIMP) evaluates "Third Party Damage threat and associated risks for the entire gas transmission" with threat identification and risk scoring.[6] PG&E also stated that its method for deterring and preventing malicious vandalism on its gas transmission facilities with the installation of intrusion detection and monitoring and improving existing barriers.[7]

These two segments are located in plain sight and are accessible by vehicle and therefore, represent a higher safety risk to the community than the other twelve segments.

IV. CONCLUSION

PG&E should explain why it does not appear to have specific plans to mitigate these risks under its TIMP. Additionally, PG&E should provide a timeframe in which it plans to address this issue. PG&E's responses may be helpful for the Commission in determining how to improve safe operations to manage foreseeable risks.

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[5] PG&E Response to OSA Data Request, GTS-Rate Case2019_DR_OSA_004-Q04. Segment #1: Route 191-1, MP1: 25.496 and MP2: 25.504. Segment #2: Route 191-1, MP1: 26.115, MP2: 26.132.

[6] PG&E Response to OSA Data Request, GTS-Rate Case2019_DR_OSA_004-Q03.

[7] PG&E Response to OSA Data Request, GTS-Rate Case2019_DR_OSA_004-Q03.

CHAPTER 2 : NATURAL GAS STORAGE STRATEGY –RELIABILITY

I. INTRODUCTION

This chapter discusses a key of aspect of PG&E's proposed NGSS which is the closing of two underground storage facilities and shifting gas storage used to serve core customers, including residential and commercial gas customers, to independent gas storage providers (ISPs). According to PG&E, hydraulic fracturing (fracking – a less expensive and highly productive exploration method)[8] has reduced gas price volatility. PG&E contends that this has decreased the value of using gas storage to mitigate price volatility. Also, gas storage operators will incur increased costs to comply with new state gas storage safety requirements, which were adopted after a major gas storage leak following a gas storage failure at Aliso Canyon. PG&E proposes to focus its operational strategy on a "reliability philosophy."[9] In other words, PG&E's proposal is to plan its storage capacity for reliability management. In the following sections, OSA will present its recommendations on PG&E's Proposed NGSS.

II. SUMMARY OF RECOMMENDATIONS

OSA does not dispute the fact that fracking has reduced gas price volatility in the gas marketplace and accordingly, the incentive to invest in underground storage facilities has decreased. However, recent events in the gas industry should give the Commission pause and it should consider the important role gas storage plays in California's energy system. The 2015 Aliso Canyon gas leak and pipeline outages raised regulatory concerns about SoCalGas' ability to meet winter gas demands while the 2010 San Bruno pipeline explosion highlights the precarious state of utilities' pipelines along with the need to renew our aging infrastructure. These recent events highlight the importance of gas storage in California's energy system. Acknowledging the vital role of gas storage

[8] A.17-11-019. PG&E Testimony, Chapter 11 at p. 11-2.

[9] A.17-11-019. PG&E Testimony, Chapter 11 at pp. 11-2 to 11-3.

service and the specific reliability and safety issues disused below, the Commission should deny PG&E's proposal to close the two storage facilities at this time.

However, OSA would support a pilot program to simulate the effects of PG&E's proposed NGSS for a period of at least three years.

III. DISCUSSION

PG&E's NGSS proposal is based on the utility's assertion that market forces have made it no longer economical to operate its gas storage facilities and that it can continue to operate its systems reliably by relying on services from ISPs. PG&E owns and operates three underground gas storage (UGS) facilities in Northern California with a total capacity of 100 billion cubic feet (Bcf) and has 25% ownership at a fourth facility (Gill Ranch).[10] PG&E proposes to close two storage facilities (Los Medanos and Pleasant Creek), which have a combined capacity of 18 Bcf (18% capacity of inventory) and 400 million cubic feet per day (MMcf/d).[11] The closure of these two UGS facilities would require core customers to rely on ISPs to obtain their incremental winter peak storage demand and non-core customers to rely on ISPs to meet their demand.

A. The UGS system plays an important role in California's energy system.

In January 2018, the California Council on Science and Technology (CCST) issued a report to evaluate California's gas storage facilities for risks, and current and future viability.[12] According to CCST, "[u]nderground gas storage serves as key

[10] PG&E Workshop on NGSS 2019 GT&S Rate Case Discussion, May 11, 2017. Slide #6 shows Pleasant Creek – 2 Bcf, Los Medanos – 16 Bcf, and McDonald Island – 82 Bcf.

[11] A.1711009, PG&E GTS Rate Case 2019 Workshop, April 12, 2018, Slide #10. It should be noted that PG&E's Response to OSA Data Request OSA_002-Q01Atch01 shows a total capacity of 280 MMcfd for Los Medanos and Pleasant Creek.

[12] Long-Term Viability of Underground Natural Gas Storage in California Summary Report (LTVU Summary) at p. 1.

component of California's gas infrastructure."[13] Underground gas storage is needed to balance supply and demand by providing a gas reserve during low demand months and withdrawal during winter when gas supply is needed for heating.[14] The ability to store gas when demand is low also limits seasonal price fluctuation.[15] Gas storage is also needed to "accommodate electricity ramping" in California due to increased use of renewables.[16] CCST concluded that underground gas storage is currently needed "to provide reliable energy for California" and continues to play a key role in the state's energy system.[17] Therefore, PG&E's proposed NGSS presents reliability and operating risks to the state's energy system.

B. PG&E's Proposed NGSS diminishes the state's insurance policy against uncertainties in the gas market.

PG&E asserted that its NGSS proposal would allow it to meet a one-day-in-10-year system demand reliably by shifting the responsibility of meeting peak core customer storage needs and non-core customer storage to ISPs.[18] Inherent to this proposal is PG&E's reliance, or rather PG&E's core customers reliance/dependence on ISPs to provide incremental storage needs during peak demand. PG&E's customers will be held captive by ISPs whose rates are not regulated by the Commission. Thus, the potential for price volatility is much higher, which OSA will discuss below. PG&E's proposed NGSS

[13] LTVU Summary, p. 45.

[14] LTVU Summary, p. 46.

[15] LTVU Summary, p. 46.

[16] LTVU Summary, p. 51.

[17] Long-Term Viability of Underground Natural Gas Storage in California Summary Report at p. 8 and pp. 74-75.

[18] A.17-11-009 PG&E Testimony, Volume 1 of 2 at p. 11-13, lines 6 to 13.

in this proceeding contradicts the position that it took in Application (A.)13-06-011,[19] as shown in the table below.

Table 2-1: Comparison of PG&E's positions in A.13-06-011 and A.17-11-009

PG&E's assertions in A.13-06-011[20]	**PG&E's proposal in the current proceeding**
Sufficient firm capacity to serve all core customers.	PG&E will not have enough capacity to serve core customers.
PG&E has adequate capacity to ensure continuing gas supplies.	ISPs must provide incremental core customer demand.
Having adequate capacity serves as an insurance policy against possible future market constraints, and bolsters reliability of service and price stability for core customers.	Eliminating storage capacity.

Eliminating the ability to store gas would erode the insurance policy and the ancillary benefits of reliable services and stable pricing that PG&E previously advocated for. The ability to store gas when demand and prices are low and withdraw during peak demand would keep gas prices at a reasonable cost for ratepayers. This approach meets "the goal of the Energy Action Plan of ensuring adequate, reliable, and reasonably priced natural gas supplies, including prudent reserves," which the Commission reiterated in D.15-10-050.[21]

[19] In A.13-06-011, PG&E argued that it should continue to procure interstate pipeline capacity on behalf of core transport aggregators (CTA) customers for natural gas demand (D.15-10-050, at p. 13). In gas operations, gas storage facilities act as a source capacity, providing supply (withdrawal) when needed.

[20] D.15-10-050 at p. 16.

[21] D.15-10-050 at p. 22.

PG&E's proposed NGSS would place the responsibility of meeting core customers peak demand on ISPs that operate in an open market. PG&E further asserted that the "open market **should** rationalize" gas service pricings even though PG&E has not analyzed the impacts of gas costs without its two storage fields.[22] This is not reassuring to PG&E's core customers who will lose the price protection of having storage capacity. The Commission should not subject ratepayers to market forces when there exists a great possibility for market manipulation. Historically, the Commission has reasonably rejected IOUs' proposals to secure core gas services through an open market because it can lead to high prices when supplies are constrained.[23] Similarly, it should reject PG&E's proposal.

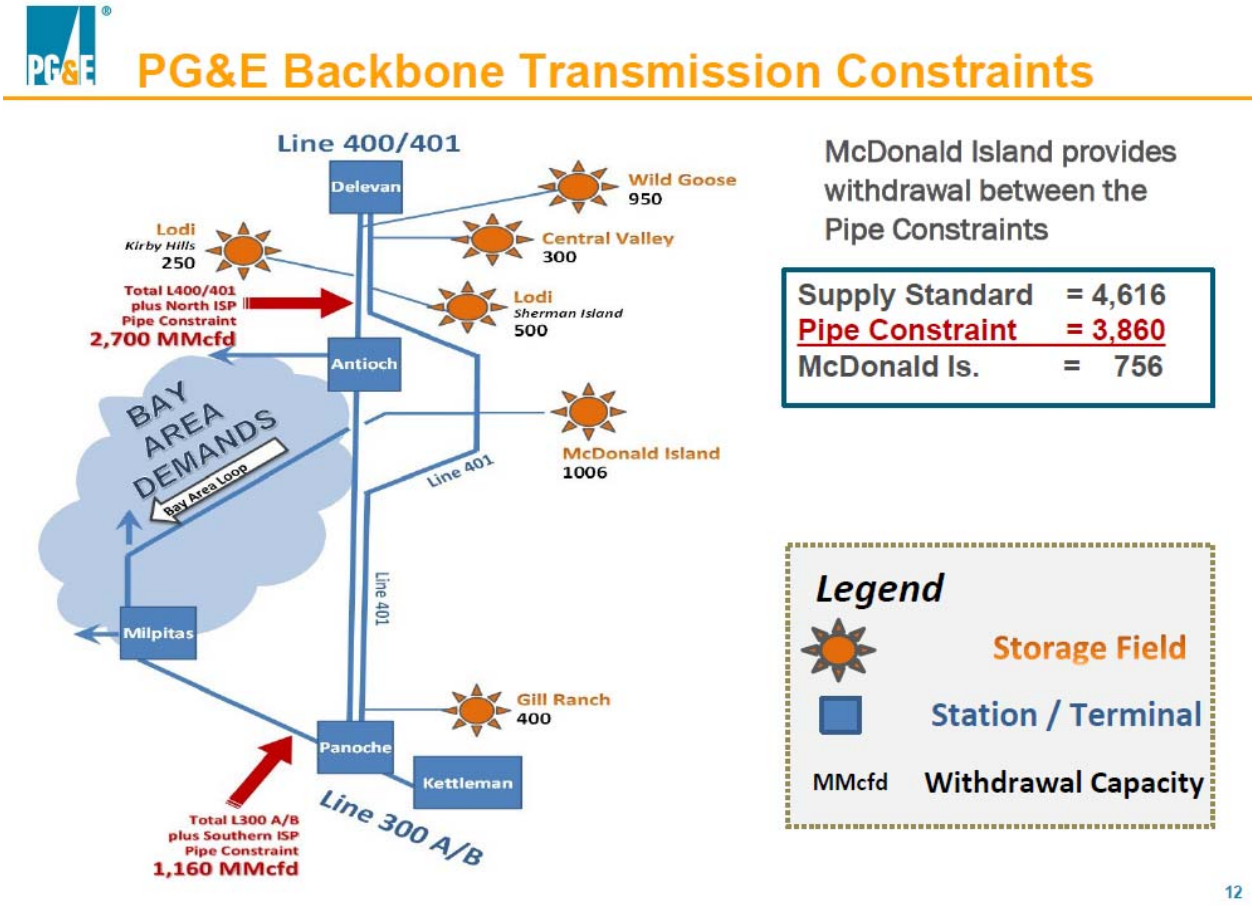
Further, PG&E stated that its Core Gas Supply (CGS) group "expects to procure the majority of its storage services from ISPs at market-based rates" and "intends to issue a competitive solicitation for storage services."[24] The level of competition as described by PG&E is examined below.

[22] A.17-11-009 PG&E Testimony, Volume 1 of 2 at p. 11-31, lines 1 to 5.

[23] D.15-10-050 at p. 20, the Commission rejected the CTA's argument that it should be allow to secure its gas supply through an open market rather than through PG&E's firm pipeline capacity at p. 24, "[a]lthough the Commission could leave this to market forces to sort out, such an approach could become a big problem if the markets for gas pipeline capacity and gas supplies become constrained, and the CTAs have to pay significantly higher prices for pipeline capacity and gas supplies."

[24] A.17-11-009, PG&E Response to ORA Data Request ORA_016_Q01, Answers Q01d and Q01e.

Figure 2-1: Gas Services Facilities[25]



As shown in the figure above, there are four ISPs with a total capacity of 2,000 MMcfd, that can provide storage services to PG&E. Three out of the four ISPs are owned by an entity within Brookfield group of affiliated companies, known as Rockpoint Gas Storage Partners LP (Rockpoint).[26] Rockpoint's facilities (Wild Goose and Lodi) have a combined capacity of 1,700 MMcfd or 85% of the total northern ISPs' capacity.[27]

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[25] PG&E Workshop on NGSS 2019 GT&S Rate Case Discussion, April 12, 2018, Slide #10.

[26] A.1802013, Joint Application of the Wild Goose Storage LLC and Lodi Gas Storage LLC to encumber assets to secure financing, footnote 2.

[27] Total Rockpoint control capacity = Lodi (250+500) + Wild Goose (950) = 1,700. 1,700/2000 = 85%.

Thus, Rockpoint controls a large percentage of the available storage capacity in PG&E's service territory and will be the main provider of storage services for PG&E's customers. It is unclear how PG&E will be able to obtain competitive services in a monopolistic environment.

Also, PG&E's proposed NGSS will increase its dependency on ISPs by almost [redacted].[28] The level of increase and the lack of storage options for PG&E are likely to diminish any negotiation advantages that PG&E currently possesses.

C. PG&E's Proposed NGSS eliminates operating flexibility and has the potential to disrupt energy services to its customers.

Gas storage is used to meet load variations by allowing the utility to store gas during periods of low demand and withdraw it during peak demand. The ability to move excess gas out of a pipeline also facilitates the maintenance of operating pressure at a safe level. Therefore, eliminating storage capacity, as proposed, would eliminate the operating flexibility in the system.[29] For example, PG&E will not have the flexibility to address equipment outages with available storage or park and lend capabilities, necessitating a need for a Reserve Capacity and Emergency Flow Orders and immediate curtailments for outages beyond the Reserve Capacity.[30] Also, without the ability to park and lend, PG&E will have to manage intraday inventory through daily coordination with ISPs.[31] This requires a higher level of cooperation from the ISPs.

PG&E's proposed firm capacity would only meet 20 of the 25 highest system demands since 2016.[32] This means that if the U.S. experiences a weather pattern similar to Winter

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[28] [redacted]

[29] A1711009 PG&E Testimony, Volume 1 of 2 at pp. 11-17 to 11-23.

[30] A1711009 PG&E Testimony, Volume 1 of 2 at pp. 11-18 to 11-19

[31] A1711009 PG&E Testimony, Volume 1 of 2 at pp. 11-20 to 11-23.

[32] A.1711009, PG&E GTS Rate Case 2019 Workshop, April 12, 2018, Slide #13.

2013-2014 (Polar Vortex), PG&E will have to curtail gas usage if it implements the proposed NGSS. Additionally, a recently published study predicted more extreme weather patterns in California.[33] A colder winter will likely cause customers to use more gas for heating, resulting in a higher peak demand. A hotter summer means more air conditioning usage and a higher increase in electricity demand which requires gas for generation. Therefore, the likelihood for curtailment increases along with disruptions in the energy services.

D. PG&E's estimated economic benefits for its proposed NGSS is flawed.

PG&E asserted that its proposed NGSS will result in savings for ratepayers of $1.5 billion to $2.6 billion in present value revenue requirement (PVRR).[34] PG&E offered the following explanation for the estimates:

TABLE 11-5
COMPARISON OF PRESENT VALUE OF THE REVENUE REQUIREMENT
OF PG&E'S PROPOSED NGSS TO THAT OF MAINTAINING CURRENT CAPACITIES

Line No.	PVRR Description	2019 Forecast
1	Maintain Current Capacities	$4,898
2	NGSS Proposal	3,388
3	Net Savings of NGSS	$1,509

To develop the two 20-year forecasts, PG&E first forecast the expenditure that would be required to bring all its storage facilities into compliance with the pending DOGGR regulations in order to maintain current capacities, plus the other work that would be required at Los Medanos and Pleasant Creek independent of those regulations. It then forecast the smaller expenditure required to implement the pending DOGGR regulations only at McDonald Island and Gill Ranch, the two storage facilities PG&E proposes to retain, at the lower capacities required under the reliability-focused model of the NGSS.

[33] April 23, 2018 Article in Nature Climate Change "Increasing precipitation volatility in twenty-first-century California. https://www.nature.com/articles/s41558-018-0140-y

[34] A1711009 PG&E Testimony, Volume 1 of 2 at p. 11-31, line 8.

The table below provides the assumptions used for the estimated amounts.

Table 2-2: Summary of PG&E's Assumptions for Net PVRR[35]

Criteria	Number of Wells Requiring Retrofit	Number of Wells to Install	Number of Wells Requiring Monitoring Annually	Storage Capacity (MMcf/d)	2019 Forecast Budget ($ Million)
Maintain Current Capacities	115	33	74	5,190	$4,898
NGSS Proposal	88	11	49	4,616	$3,388

As demonstrated above, PG&E used an all or nothing approach to estimate the cost savings. PG&E is essentially comparing the cost to provide 4,616 MMcf/d, or the amount storage available under the NGSS proposal, to the cost to provide 5,190 MMcf/d, or the cost to maintain current capacities. A more valid cost comparison would be to estimate the cost to upgrade its own storage facilities to allow it to gain the needed storage capacity that it plans to purchase from the ISPs. In other words, PG&E should estimate the cost to upgrade its own facilities to allow it to provide 4,616 MMcfd to meet the 1day-in-10-year demand.

PG&E's cost estimate for its proposed NGSS failed to include the cost to purchase storage services from ISPs.[36] This operating expense is substantial considering that PG&E plans to increase the amount of purchased storage service from [redacted]

[35] A1711009 PG&E Testimony, Volume 1 of 2 at pp. 11-28 to 11-30, provide information on well inventory. Storage Capacity information from PG&E's Response to OSA Data Request OSA_02-Q02Atch01.

[36] A1711009 PG&E Workpaper Chapter 11 Table 11-2. Under Chapter 11, NGSS, PG&E did not identify any purchase capacity cost.

[redacted][37] The proposed NGSS simply shifts the cost to provide service from a capital investment to an operational expense and therefore, PG&E should have included the expense in its cost estimates to reflect this shift in costs.

PG&E should provide a cost benefit analysis that better informs the Commission of the cost to provide service on a unit cost basis ($ per MMcf/d), including the capital cost, operating and maintenance expense, tax expense, depreciation expense, and other costs associated with the investment.

E. Division of Oil, Gas, and Geothermal Resources' (DOGGR) final regulations exacerbates the impacts of PG&E's Proposed NGSS and vice versa.

On June 29, 2018, DOGGR finalized regulations governing UGS facilities in California.[38] DOGGR's regulations, which will become effective on October 1, 2018, require UGS operators to perform a risk management and emergency response plan, provide integrity testing for wells and reservoirs, implement pressure monitoring and leak detection, and retrofit existing wells to meet new standards.[39] According to PG&E, DOGGR's impending UGS requirements of tubing-and-packer retrofits and down-hole inspection regime will reduce storage capacities at its facilities.[40] Other UGS facilities in California will likely experience a similar reduction in storage capacities for injection, inventory, and withdrawal to comply with DOGGR's requirements.

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[37] [redacted]

[38] Department of Conservation News Release, June 29, 2018. State Finalizes Underground Gas Storage Regulations. http://www.conservation.ca.gov/index/Documents/2018-06%20Underground%20Gas%20Storage%20Regulations%20Approved.pdf

[39] Summary of Final Text of Regulations CCR Title 14, Chapter 4, Subchapter 1. http://www.conservation.ca.gov/index/Documents/Final%20Text%20of%20Regulations.pdf

[40] A1711009 PG&E Testimony, Volume 1 of 2 at p. 11-28, line 17 to p. 11-29, line 2. It should be noted that at the time of PG&E's issuance of its testimony, DOGGR's regulations have not been finalized. Adopted texts are generally in-line with draft regulations.

PG&E's proposed NGSS calls for the closure of two storage facilities and coincides with DOGGR's adopted regulations which will result in capacity reduction. Together, these two events would further constrain the availability of storage services in the state. Under such circumstances, it is reasonable to expect an amplification of operational constraints discussed above and volatility in gas price arbitrage. While it is optional for the Commission to implement PG&E's proposed NGSS, all storage providers must comply with DOGGR's impending regulations. PG&E, however:

1. Failed to assess the ability of ISPs to ensure that they will have the resources necessary to ensure the safety of those facilities given the need to implement increased safety requirements.
2. Failed to assess the increased reliability and safety risks that will result from the significantly increased dependence of core customers on market based independent gas storage providers.

Therefore, the Commission should deny PG&E's proposed NGSS.

F. The Office of Ratepayers Advocates (ORA) similarly opposed PG&E's proposed NGSS.

ORA opposed PG&E's proposal to close the Los Medanos storage field.[41] According to ORA, the lower storage capacity at Pleasant Creek would not present a big impact to PG&E's customers and "could help inform …by measuring market interest in storage facilities."[42] Further, ORA recommended that Los Medanos should remain in operations until the adoption of DOGGR regulations.[43] While OSA's analyses presented above differ from ORA's discussion, OSA's recommendations are generally in-line with ORA's recommendations to deny PG&E's closure of the Los Medanos storage field at this time.

[41] A.17-11-009, ORA-11 at p. 2.

[42] A.17-11-009, ORA-11 at pp. 3 to 4.

[43] A.17-11-009, ORA-11 at p. 2.

IV. CONCLUSION

Based on the information provided above, the Commission should deny PG&E's proposed NGSS. PG&E's proposal would result in risks that are not well defined, and its mitigation methods place too much reliance on the cooperation of ISPs, whose rates are not regulated by the Commission.

In addition to pricing risks for core customers, PG&E admitted that there is an increased risk to noncore customers including service cuts, operational flow order, and curtailments.[44] PG&E's proposal to mitigate price issues is by "believ[ing] that the open market should rationalize … price issues"[45] and through daily coordination, in the case of service risks to its non-core customers.[46] The severity of the impacts to operational and pricing risks resulting from PG&E's proposed NGSS are difficult to predict.

Therefore, the Commission should only authorize PG&E's proposed NGSS as a pilot project. This would allow PG&E to evaluate the operational and market force impacts from the proposed NGSS. During this time, PG&E should operate its system without the use of the Los Medanos and Pleasant Creek facilities, document all operational constraints and mitigation methods, while observing the impacts of market forces on prices.

[44] A1711009 PG&E Testimony, Volume 1 of 2 at p. 11-31, lines 1 to 19.

[45] A1711009 PG&E Testimony, Volume 1 of 2 at p. 11-31, line 4.

[46] A1711009 PG&E Testimony, Volume 1 of 2 at p. 11-31, lines 20 to 27.

CHAPTER 3 : NATURAL GAS STORAGE STRATEGY: SAFETY

I. INTRODUCTION

This chapter of OSA's testimony addresses some safety considerations and presents recommendations related to PG&E's proposed Natural Gas Storage Strategy (NGSS) from its 2019 GT&S rate case application.

PG&E's proposed NGSS, as described in Chapter 11 of its testimony, consists of:

1. ceasing storage operations at Los Medanos and Pleasant Creek storage facilities by October 31, 2019;
2. consolidating operations at McDonald Island storage facility and converting PG&E's 25% share of Gill Ranch Storage (GRS) to a utility asset;
3. transitioning storage to provide reliability-only services;
4. establishing a new system supply reliability standard.[47]

The most salient feature of the NGSS is "[PG&E's] exit from the commercial gas storage business." PG&E would reduce its storage capacity and shift responsibility for the provision of those gas storage services to the ISPs. This would shift the bulk of its – core customer storage service obligations to the ISPs - approximately 84% of core storage capacity[48] - in addition to all non-core customer storage services.

To achieve the NGSS, PG&E requests that the Commission approve a Memorandum of Understanding (MOU)[49] between PG&E and some interested parties (the Joint Parties)[50] including the Independent Storage Providers (ISPs): Gill Ranch Storage (GRS), Wild Goose Gas Storage (WGS), Lodi Gas Storage (LGS), Central

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[47] PG&E 2019 GT&S Testimony, Vol I (M. Christopher) at pp. 11-13 to 11-25.

[48] Based on the storage capacity values presented in Table 11-3 of PG&E 2019 GT&S Testimony, Vol 1 (M. Christopher).

[49] Attachment 1 of PG&E Testimony Vol 1 (M. Christopher) at p. 11-Atch1-1.

[50] Attachment 1 of PG&E Testimony Vol 1 (M. Christopher) at p. 11-Atch1-1indentifies the Joint Parties as: Central Valley Gas Storage, L.L.C.; Gill Ranch Storage, L.L.C.; Lodi Gas Storage, L.L.C.; The Utility Reform Network (TURN); and Wild Goose Storage, LLC; as well as PG&E's Core Gas Supply, Electric Fuels and Gas Operations groups (PG&E)

Valley Gas Storage (CVGS). PG&E describes the MOU as documenting "the basic framework of the proposed changes [under the NGSS]".[51]

II. SUMMARY OF RECOMMENDATIONS

If the Commission adopts all or part of PG&E's proposed NGSS, it must also require additional safety related provisions through its final decision, which may also include modifying the MOU. These provisions are described below.

The Commission should require ISPs and PG&E to do the following:

- Adopt best safety management practices by commencing a program to align their operations with the standards of American Petroleum Industry (API) Recommended Practice (RP) 1173: Pipeline Safety Management Systems (PSMS).
- Complete a third-party gap analysis to determine baseline variance from the standards set forth in API RP 1173. At a minimum, the assessment must evaluate all 10 elements of API RP 1173, and include field, document, and interview components. They must complete the gap analysis within 18 months of a Commission Decision on the NGSS, and upon its completion, they must submit a written report with the gap analysis to OSA and Safety and Enforcement Division (SED).
- Report to the Commission on their plans and progress to implement the PSMS through the Natural Gas Safety Plan submitted yearly to the SED, pursuant to Public Utilities Code (PUC) Section 961, with a copy to OSA.
- Jointly and collaboratively develop a safety management system (SMS) framework that is applicable to their underground storage assets and operations based on the tenets and principles of API RP 1173 and supplemented by other process safety-enhancing practices such as the Occupational Safety and Health Administration's (OSHA) Process Safety Management System. This framework should, at a minimum, address all the elements contained in API RP 1173, as adapted for underground storage, and the ISPs and PG&E should finalize it for implementation within a year of a Commission Decision on the NGSS.

[51] PG&E 2019 GT&S Testimony, Vol I (M. Christopher) in A.17-11-009 at pp. 11-13 to 11-25.

- Report to the Commission annually on the plan and progress of development and implementation of the SMS related to the underground storage assets.
- Identify and explicitly designate, within the SMS (pipeline and UGS), an Accountable Officer who is ultimately responsible for the safety of personnel, business processes and activities of the organization. The Accountable Officer should be an individual with ultimate control and responsibility of the organization, full control of the financial and human resources required to maintain the SMS, and final authority over operations and safety issues.
- In collaboration with OSA and its consultants, participate in the development of safety metrics related to safety management, and human and organizational factors.

The Commission should require the ISPs to do the following:

- Adopt the safety metrics developed in the SMAP proceeding, as are applicable to their operations, and submit them to the Commission at a defined frequency.

The Commission should require SED, in collaboration with OSA, to do the following:

- Verify the ISP's and PG&E's implementation of their Natural Gas Safety Plans before PG&E submits its next rate case.

III. DISCUSSION

The NGSS prioritizes cost savings over operational reliability by reducing the storage capacity operated by PG&E. Stemming from what it perceives as increased costs and diminishing returns for providing gas storage service, PG&E proposes to cease operations at two of its storage facilities and rely on ISPs to provide:

- "core storage for winter reliability and price function;
- non-core storage service;
- greater transparency and reliability."[52]

[52] PG&E data response to ORA-016, Q01, Supp. 01, Attach 01, slide 3.

A. Safety is critical to system operations, but most ISPs have not adopted best safety management practices.

1. Under the NGSS, PG&E's system operations are dependent on ISP performance.

As PG&E explains, the reduced capacity available under the NGSS will result in "reduced operational tolerance and ***increased reliance on ISP performance***".[53] PG&E acknowledges that its system operations' dependence on the ISPs' performance is an increased gas storage risk under the proposed NGSS.[54] In other words, ISPs' performance is critical to maintain energy reliability under the NGSS:

> "with less storage withdrawal capacity available under the NGSS than PG&E currently has, there is potential for more supply cuts, OFOs [operational flow orders], and curtailments of noncore customers than has been historically the case. We have taken great care to right-size our proposed storage capacity and have no way to measure the increased risk of such cuts, OFO's, and curtailments. However, because the reduced storage capacities will result in a narrower margin of operational tolerance and **increased reliance on ISP performance, the increase in this risk must be acknowledged**."[55]

2. ISPs' performance is tied to their management of safety.

A gas operator's ability to manage safety can have a tremendous impact on the performance of the energy system. Safety failures of critical ISP or other gas system components, such as pipelines or wells, can create outages which could affect the entire gas system under the proposed NGSS. This issue is highlighted by the recent energy security challenges experienced in Southern California. The Commission has had serious concerns regarding Southern California Gas Company's (SoCalGas') ability to meet

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[53] PG&E 2019 GT&S Testimony, Vol I (M. Christopher) in A.17-11-009 at p. 11-31.

[54] PG&E data response to ORA-016, Q01, Supp. 01, Attach 01, slide 16.

[55] PG&E 2019 GT&S Testimony, Vol I (M. Christopher) in A.17-11-009 at p. 11-31.

winter gas demand since the well failure at the Aliso Canyon natural gas storage facility (Aliso Canyon). [56] These concerns were compounded by a series of critical pipeline outages in SoCalGas' system leading the Commission to consider extreme emergency orders last winter, such as a moratorium on new connections, [57] and implementing other mitigation measures that impact both core and non-core customers.[58] The Aliso Canyon well failure and at least one of the three pipeline outages mentioned above– a 30-inch high pressure pipeline that exploded near Newberry Springs on October 1, 2017, and from which 16 workers narrowly escaped injury [59] – stemmed from safety gaps that include *deficiencies in the organization's management of safety*.[60] These types of safety management deficiencies cannot be solved by complying with minimum safety

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[56] SoCalGas, a subsidiary of utility company Sempra Energy and regulated by the Commission, is being held responsible for inadequate operations that ultimately led to a four month long natural gas leak at its Aliso Canyon underground storage facility, beginning in October 2015, that has affected the community, the company, the natural gas industry, national and state regulations and the environment in a detrimental way. Aliso Canyon has since been under restricted operations.

[57] Draft Resolution G-3536 issued on December 15, 2017, requiring SoCalGas to implement an emergency moratorium on new commercial and industrial natural gas service connections in both incorporated and unincorporated areas of Los Angeles County from January 11, 2018 until further Commission action, or March 31, 2018.

[58] Aliso Canyon Mitigation Measures Impact Report (May 2018 Update) http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Aliso%20Canyon%20Mitigation%20Measures%20Impact%20Report%20(May%202018%20Update).pdf

[59] "Newberry Springs gas line catches fire, destroys heavy equipment", The Sun, ,published: October 1, 2017, https://www.sbsun.com/2017/10/01/newberry-springs-gas-line-catches-fire-destroys-heavy-equipment/

[60] A University of Southern California study published in the Journal of Sustainable Energy Engineering late last year used a robust risk management framework called AcciMap to systematically analyze how the government, regulators, company, management, staff and work processes contributed to the four-month-long Aliso Canyon gas leak, highlighting the corporate dysfunction at SoCalGas and failures in their management of safety as contributors to the failure. Refer to "A Systematic Framework for Root-Cause Analysis of the Aliso Canyon Gas Leak Using the AcciMap Methodology: Implication for Underground Gas Storage Facilities" M. Tabibzadeh et al, Journal. Sustainable Energy Eng., Vol. 5, No. 3, December 2017. http://www.prnc.org/sites/default/files/articles/2018/Tabibzadeh_et_al.%2C_2017%2C_A_Systematic_Framework_for_Root-Cause_Analysis_of_the_Aliso_Canyon_Gask_Leak%2C_JSEE.pdf

OSA review of Technical Root Cause Analysis of L-235-2.

regulations. At least a portion, if not all, of the deficiencies identified above could have been addressed through an effective SMS.

3. ISPs have not adopted best safety management practices.

The National Transportation Safety Board's (NTSB) accident investigations have revealed that, in numerous cases, SMS or system safety programs could have prevented loss of life and injuries.[61] SMS help organizations continuously and comprehensively track and improve their safety performance. Organizations from many industries (e.g., chemical manufacturing, maritime, aviation, nuclear) use SMS to evolve, improve, and support their safety cultures. For example, the aviation industry saw an 83% decrease in fatal accidents through applying the "systems think" principle of SMS[62] while the chemical industry reports significant reduction in accidents with the implementation of SMS[63].

NTSB found that adoption of SMS would help operators improve safety performance and recommended development of a standard specific to pipelines following catastrophic incidents in 2010, including the San Bruno pipeline rupture. ISPs operate both pipelines and UGS. Both the federal safety regulator, the Pipeline and Hazardous Materials Safety Agency (PHMSA), and the oil and gas industry have now adopted the American Petroleum Industry (API) Recommended Practice (RP) 1173 PSMS as a best

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[61] NTSB - Safety Management Systems, retrieved from https://www.ntsb.gov/safety/mwl/Pages/mwl-3.aspx

[62] "Sample Implementation of An Industry-Wide Safety Management System" presentation by Christopher A.Hart, Former Chairman and Member of the National Transportation Safety Board, CPUC En Banc on SMS, March 2018 at slide 12. http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/Safety_Advocates/S1P2%20Hart.pdf

[63] "Accidental Release Prevention Process Safety Management Systems - Incident Reductions after Implementation of Contra Costa County Industrial Safety Ordinance, including Safety Culture Requirements" presentation by Randall L. Sawyer, Chief Environmental Health and Hazardous Materials Officer, CPUC En Banc on SMS, March 2018. http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/Safety_Advocates/S2P4%20Sawyer.pdf

practice.[64] Appendix B contains an overview of the PSMS framework contained in API RP 1173 by PHMSA.

> "PHMSA fully supports the implementation of [API] RP 1173 and plans to promote vigorous conformance to this voluntary standard. The recommended practice is a proactive, system-wide approach to reducing risks and provides operators with a comprehensive framework to address risk across the entire life cycle of a pipeline. The standard promotes pipeline safety, while implementing guidelines for continuous improvement."[65]

Despite widespread industry recognition that the PSMS is a key tool to proactively prevent high consequence incidents and effectively manage safety, the ISPs have not adopted this best safety management practice. Although one ISP, GRS, plans to incorporate API RP 1173[66], others do not plan to do so because "API RP 1173's requirements are not mandatory."[67] For example, LGS and WGS do not intend to adopt this best practice, but they control 90% of the ISP market's working capacity, as shown in the table below. Unlike the ISPs, other Commission-regulated transmission pipeline operators do report adopting API RP 1173.[68] In fact, about 87% of almost 100 companies surveyed by industry associations have performed a gap analysis comparing their existing programs to API RP 1173.[69] None of the ISPs have performed such an analysis and do not currently intend to perform one.

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[64] ISPs (GRS/CVGS/WGS/LGS) response to OSA- 01, question 7.

[65] Written Testimony of Marie Therese Dominguez Administrator of PHMSA, February 25, 2016 at p.16.

[66] D.18-05-010 has adopted a settlement agreement in which GRS agrees to incorporate API RP 1173 for a comprehensive safety management system, along with other safety management provisions. See Attachment 1of Motion of The Joint Applicants and the Office of the Safety Advocate for Approval of Settlement Agreement in A.17-02-003.

[67] LGS/WGS response to OSA-01 question 7.

[68] PG&E, SoCalGas, San Diego Gas & Electric, Southwest Gas Company.

[69] Pipeline Safety Management System 2017 Annual Report. https://pipelinesms.org/wp-content/uploads/2018/05/2017-Pipeline-SMS-Annual-Report.pdf

Table 3-1

ISO API RP 1173 Implementation and Storage Capacities

ISO	Adopted API RP 1173?[a)]	Intends to implement API RP 1173? [a)]	Active Well Count [b)]	% of ISO Working Capacity [b)]	% of Max ISO Daily Deliveries [b)]
GRS	No	Yes	12	2%	25%
LGS	No	No	35	27%	28%
WGS	No	No	18	63%	36%
CVGS	No	Maybe	8	9%	11%

Source: a) ISO's response to OSA-GRS/LGS/WGS/CVGS-01 question 7.
b) 2016 Underground Natural Gas Storage Capacity published by Energy Information Administration

Even though this best practice is not yet mandatory, PHMSA has indicated that the industry is "one bad accident away from Congress making [SMS] mandatory", and recommends that companies adopt it.[70] With "very few tools to work with" in enforcing safety rules and because generating a new pipeline rule can take three or more years, Jeff Wiese – the-then head of PHMSA's Office of Pipeline Safety – told the nation's top oil and gas pipeline safety officials that PHMSA would be trying to persuade the pipeline industry to voluntarily improve its safety operations.[71] Recognizing the benefits of API RP 1173, some state agencies have proactively required operators to implement this best practice,[72] PHMSA is training its staff to audit for this standard, and may require it on a

[70] PHMSA Update Western Regional Gas Conference San Diego, California, August 29, 2017. http://www.westernregionalgas.org/2017/presentations/WRGC%2008292017%20Alan%20K%20%20Mayberry%20.pdf

[71] As reported by InsideClimate News, from conference held in New Orleans on July 24, 2013. https://insideclimatenews.org/news/20130911/exclusive-pipeline-safety-chief-says-his-regulatory-process-kind-dying .

[72] For example: Washington Utilities and Transportation Commission. Docket PG-150120 approving Section V(B)(7) and (8) of the Settlement Agreement with Cascade Natural Gas Corporation; Indiana Utility Regulatory Commission, Cause No. 44970, adopted section C.7. of Settlement Agreement with Northern Indiana Public Service Company.

case-by-case basis. Likewise, the Commission should proactively address safety management.

B. The Commission should require the ISPs and PG&E to adopt best safety management practices.

1. MOU contains no safety-related provisions

As the Aliso Canyon well failure demonstrates, the failure of UGS facilities can pose a major threat to public health and safety, the environment, and even energy security. In the recent study prepared in response to Governor Brown's direction to assess the long-term viability of underground gas storage in California (LTVUGS Report), the California Council of Science and Technology (CCST) found that the failure rate of UGS in California is higher than the worldwide failure frequency.[73]

According to PG&E:

> "in developing the MOU, the Joint Parties have kept reliability, *safety*, and customer financial well-being at the forefront".[74]

Parties should be aware that UGS presents greater risks than were known pre-Aliso Canyon. For example, WGS is noted as the only ISP with a recorded loss-of-containment (LOC) incident as of 2016, which after controlling for other factors, ranks this facility as the second highest in likelihood for a loss of containment (LOC) event in the whole state, after Aliso Canyon.[75] However, the MOU does not contain any safety-related provisions, nor does it demonstrate that the Joint Parties sufficiently considered safety or its management.

2. Effective safety management is critical to managing UGS risks

The LTVUGS Report found that:

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[73] LTVUGS Summary Report at p. 17.

[74] PG&E 2019 GT&S Testimony, Vol I (M. Christopher) in A.17-11-009 at p. 11-44.

[75] Table 1.2-12 of LTVUGS Report at p. 124.

> "The risks associated with underground gas storage can be managed and, with appropriate regulation and *safety management*, may become comparable to risks found acceptable in other parts of the California energy system" (conclusion SR-1)[76];

and recommends that, amongst other recommendations, "regulations consider human and organizational factors as well as traits of healthy safety culture" because these drive safety outcomes. [77]

Although the final DOGGR rules address important aspects of UGS safety, they do not provide for the systematic framework and feedback loops that characterize SMS. However, the final rules provide a good foundation for the UGS operators to build upon and apply the approach developed in API 1173. For example, the final rules do not address safety culture as was recommended in the LTVUGS Report, but the API RP 1173's framework does[78]. API states that "implementing PSMS elements strengthens an organization's safety culture."[79]

Although API RP 1173 was created for pipelines, it embodies the best of a dozen other approaches from other high hazard industries[80] and is sufficiently broad that UGS operators could adapt it for UGS operations.

3. ISPs should implement a Safety Management System in accordance with API RP 1173.

While ISPs assert that they have pipeline safety programs that contain some components of a PSMS, those programs generally only achieve minimum compliance with pipeline safety regulations and do not, by themselves, make a *system*.[81] While an SMS does build on those programs, the PSMS framework in API RP 1173 encourages

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[76] LTVUGS Summary Report at p. 9.

[77] LTVUGS Summary Report at p. 33.

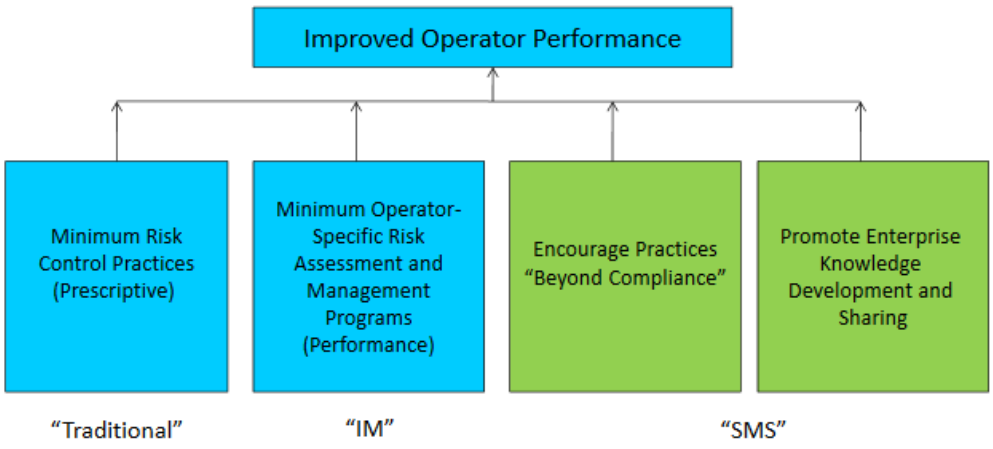
[78] Multiple instances, API Recommended Practice 1173 first edition, June 2014, Draft Version 11.2.

[79] *Id.* at p. 21

[80] Appendix B at p. 15.

going *beyond* traditional standards and regulations with a strong emphasis on safety culture, management review, and continuous improvement. As an example, the figure below shows how traditional (i.e. "prescriptive" pipeline safety programs) and integrity management (IM) programs required by federal pipeline safety regulations compare to the API RP 1173 PSMS in contributing to improved performance. SMS encourage practices beyond compliance and promote knowledge development and sharing.

Figure 3-1
SMS Impact on Operator Performance



Source: PHMSA update, Virginia State Corporation Commission Pipeline Safety Conference Virginia Beach, Virginia, https://www.scc.virginia.gov/urs/pipe/pres/17psc1.pdf

The Commission has stated that it must evaluate the safety of public utilities more holistically considering "implementation of best practices, industry standards, and the associated metrics of the security and safety of its electric grid, gas pipelines, and facilities."[82] OSA not only supports this holistic approach, but urges the Commission to proactively ensure these best practices are adopted because complying with minimum

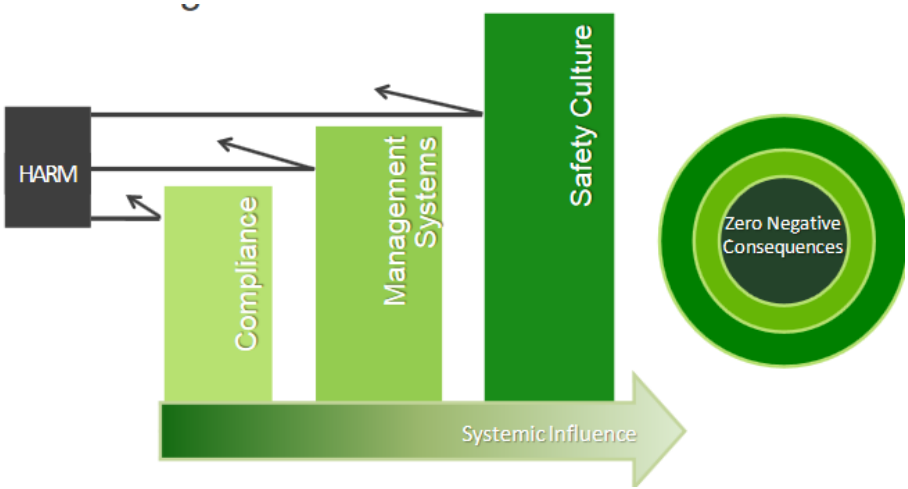
(continued from previous page)

[81] For an example, see Schedule A of LGS/WGS data response to OSA -01.

[82] R.13-11-002 at p. 7; D.14-12-025 at p. 6; D.16-08-018 at p. 156.

requirements does not assure safety.[83] Management systems or SMS, are a step to move beyond the "compliance" mentality and increase the defense barriers that prevent harm as shown in the Figure below. For all the reasons stated in earlier sections, doing so is especially critical for the ISPs under the NGSS. PG&E asserts it has already implemented a PSMS compliant with API RP 1173 and conducted a gap analysis. Nonetheless, the Commission should set the same expectations for ISPs and PG&E.

Figure 3-2
Preventing Harm



Source: Presentation by Dr Claudine Bradley, NEB, CPUC En Banc on SMS, March 7, 2017. http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/About_Us/Organization/Divisions/Safety_Advocates/S2P3%20Bradley.pdf

If the Commission adopts all or part of PG&E's proposed NGSS, it must also require additional safety related provisions through its final decision, which may also include modifying the MOU. The Commission should require ISPs and PG&E to do the following:

[83] Dr Claudine Bradley, Canadian National Energy Board, at the CPUC's En Banc on Safety Management Systems on March 7, 2018. Webcast available at http://www.adminmonitor.com/ca/cpuc/en_banc/20180208/ at 3:01:40.

- Adopt best safety management practices by commencing a program to align their operations with the standards of API RP 1173: PSMS.
- Complete a third-party a gap analysis to determine baseline variance from the standards set forth in API RP 1173. At a minimum, the assessment must evaluate all 10 elements of API RP 1173, and include field, document, and interview components. The gap analysis must be completed within 18 months of a Commission Decision on the NGSS, and upon its completion, the written report with the gap analysis must be submitted to OSA and SED.
- Report to the Commission on its plans and progress for implementing the PSMS through the Natural Gas Safety Plan submitted annually to SED, pursuant to PUC Section 961, with a copy to OSA.

4. UGS Operations should also adopt a SMS approach.

The Aliso Canyon well failure highlighted the need for operators and regulators to explicitly address gas storage safety considerations in gas storage proceedings. PG&E's and the ISP's UGS operations would greatly benefit from the application of the API RP 1173 elements for similar reasons that it benefits its pipeline operations. In light of the risks associated with UGS operations, the dependence on ISPs performance for PG&E's system operations, in addition to the unprecedented level of work that DOGGR's final rules will require the UGS operators to implement, an SMS approach is essential to manage risks, improve safety performance, and ensure that the new safety work is effectively completed and managed in the long-term. For the ISPs, this will also ensure some transparency, as discussed in later sections.

For the reasons stated above, if the Commission adopts all or part of the NGSS, it must proactively address safety and require that PG&E and the ISPs do the following:

- Jointly and collaboratively develop an SMS framework that is applicable to their underground storage assets and operations based on the tenets and principles of API RP 1173 and supplemented by other process safety-enhancing practices, such as OSHA's Process Safety Management. This framework should, at a minimum, address all the elements contained in API RP

1173, as adapted for underground gas storage, and they should finalize it for implementation within a year of a Commission Decision on the NGSS.

- Report to the Commission annually on the plan and progress of development and implementation of the SMS related to the underground storage assets

Since PG&E has experience with the development of API 1173 and is also the proponent of the NGSS, it should lead and support the group in developing the SMS framework.

5. Designate an Accountable Officer/Executive

Leadership's level of accountability for their organization's safety performance reflects that leadership's actual commitment to safety. Executive management is ultimately accountable for the management of safety because it controls the allocation of resources to address business functions, including the management of safety risk. For this reason, SMS requires explicit lines of decision-making accountability at the senior management levels. Within SMS, the individual with ultimate accountability for its performance is known as the Accountable Executive.[84] Other industries and regulatory agencies, such as the Federal Aviation Administration (FAA) and Canada's National Energy Board (NEB),[85] require designation of the "Accountable Officer/Executive" as part of the safety management approach. This person is usually the highest level of management – typically the Chief Executive Officer - who has ultimate control over the financial and human resources necessary to maintain the organization's operations and

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[84] For additional information on the need of an Accountable Executive refer to: SMS Framework, Federal Transit Administration, August 2015 at p 3; https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_SMS_Framework.pdf; and

"Why SMS?: An introduction and overview of safety management systems", discussion paper for the International Transportation Forum of the Organization for Economic Cooperation and Development, 2017, at p.27-28. https://www.itf-oecd.org/sites/default/files/why-sms.pdf

[85] The NEB regulates gas operators in Canada and requires operators adopt a SMS. They have been a rich resource informing API 1173, particularly on matters related to safety culture. See bibliography on safety culture of API Recommended Practice 1173 first edition, June 2014, Draft Version 11.2.

establish, develop, and maintain the safety management system.[86] The NEB explained the requirement for an AO at the Commission's En Banc on Safety Management Systems (SMS En Banc) earlier this year as an effort to *influence* the advancement of safety culture and not an effort to regulate safety culture.[87]

This approach is also encouraged by the North American Regulators Working Group on Safety Culture (NARWGSC)[88] who indicate that,

> "there [should be] an accountable officer (AO) designated. This delegation is appropriate based upon the organizational structure (i.e. the correct person is delegated with the authority and control for human and financial resources). The AO demonstrates understanding of and commitment to the role and responsibilities. There [should be] evidence of the AO taking action to resolve issues."[89]

Per the NAWGSC safety culture indicators, the absence of such an AO can indicate a weakness in an organization's safety culture.

Likewise, to ensure the success of the SMS/PSMS efforts, the Commission should require ISPs and PG&E to do the following:

- Identify and explicitly designate, within the SMS (pipeline and UGS), an AO who is ultimately responsible for the safety of personnel, business processes and activities of the organization. The AO should be an individual with ultimate control of and responsibility for the organization, full control of the financial and human resources required to maintain the SMS, and final authority over operations and safety issues.

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[86] US 14 CFR 5.25; Canada's NEB Onshore Pipeline Regulations (OPR) Section 6.2.

[87] Dr Claudine Bradley, Canadian National Energy Board, at the CPUC's En Banc on SMS on March 7, 2018. Webcast available at http://www.adminmonitor.com/ca/cpuc/en_banc/20180208/

[88] NARWGSC consists of oil and gas regulators with representatives from National Energy Board (NEB), Canada Newfoundland Labrador Offshore Petroleum Board (C-NLOPB), Canada Nova Scotia Offshore Petroleum Board (CNSOPB), United States' Bureau of Safety and Environmental Enforcement (BSEE), and the United States' Pipeline and Hazardous Materials Safety Administration (PHMSA).

[89] NARWGSC, "Safety Culture Indicators Research Project: A regulatory Perspective," 2016, Appendix B at p.1.

6. Adopt similar provisions to the Partial Settlement Agreement of Appendix A of D. 06-07-010

Since the NGSS results in reduced operational flexibility, the margin to absorb unexpected events by the system is smaller. To help mitigate operational risk associated with reduced tolerances, the Commission should require PG&E and the ISPs to adopt similar conditions as in the settlement agreement authorized in D.06-07-010.[90] Specifically:

- Standby power generation capacity that assures full contracted volumes can be withdrawn during electric power supply outages
- Sufficient available compressor horsepower to assure the contracted volumes can be injected or withdrawn at the prevailing pressures of the interconnecting PG&E pipeline, as set forth in the Operating and Balancing Agreement with the ISP;
- Operator availability assuring that corrective action is initiated quickly in the event of equipment or power failure;
- Maintenance practices that provide reasonable assurance that all necessary facilities are available and operable when storage service are needed;
- The facilities, equipment, operating procedures, and maintenance practices are consistent with expected gas storage industry practices.[91]

[90] D. 06-07-010, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/58338.PDF.

[91] D. 06-07-010, http://docs.cpuc.ca.gov/PublishedDocs/PUBLISHED/GRAPHICS/58340.PDF.

C. Greater transparency and regulatory oversight of ISPs requested by PG&E should extend to their safety performance.

PG&E is relying on "greater transparency and regulatory oversight of the ISPs" to mitigate the operational risks associated with increased dependency on the ISP's for its system operations. PG&E also identifies that, because of this increased dependency risk, "it may need to buy an ISP(s) if they become financially stressed or insolvent." [92]

1. ISPs are exempt from important safety oversight initiatives such as safety performance metrics.

The provisions in the MOU reflect PG&E's requests related to greater transparency and regulatory oversight of the ISPs. However, those provisions fail to recognize the important relationship between safety and performance. This failure is significant because the market-based structure that the ISPs operate in has exempted them from many of the Commission's initiatives to increase the transparency and oversight related to the safety of the entities it regulates. For example, the Commission is developing a set of metrics to evaluate the safety performance of energy utilities through its Safety Model Assessment (SMAP) Proceeding.[93] That effort is tied to the general rate case plan, and because the ISPs set market-based rates, they are exempt from the requirements from that initiative.[94] This exemption has created a gap in the level of safety oversight and monitoring of the ISPs' safety performance.

The fact that ISPs set market-based rates should not exempt them from developing and reporting on similar safety performance metrics, especially if system operations will increasingly depend on their performance. Therefore, if the Commission adopts all or part of PG&E's proposed NGSS, it should require the ISPs to do the following:

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[92] PG&E data response to ORA -016, Q01, Supp. 01, Attach 01, at slide 17.

[93] A.15-02-002, et al, Safety Model Assessment Proceeding (SMAP): D.14-12-025, D.16-08-018_Phase 2 Interim Decision.

[94] ISPs are authorized to set market-based rates and do not submit general rate case applications.

- Adopt the safety metrics developed in the SMAP proceeding, as are applicable to their specific operations, for reporting to the Commission at a defined frequency.

The safety metrics developed in the SMAP proceeding are focused on standardized safety risk metrics applicable across all utilities, and while valuable, these have largely ignored metrics related to human and organizational factors.[95] However, the LTVUGS Report highlights that these factors play a critical role in safety. OSA has consulted with safety experts who specialize in that area and recognizes the importance of human and organizational factors in safety. The Commission should also consider and monitor these factors in the form of metrics.

To appropriately supplement the SMAP metrics, the Commission should require PG&E and the ISPs to do the following:

- In collaboration with OSA and its consultants, participate in the development of safety metrics related to safety management, and human and organizational factors.

2. Implementation of Natural Gas Safety Plans should be verified.

The ISPs and PG&E are required to submit annually a Natural Gas Safety Plan (Safety Plans) to the Commission's SED.[96] These plans provide an overarching articulation of how the gas operators intend to deliver safe and reliable operation of its Commission-regulated gas pipelines.[97] SED reviews and approves the plan and the utilities are required to implement the plan. The Safety Plans set forth the intent to deliver safe and reliable operations, not necessarily the implementation.

All too often, organizations are eager to be seen as valuing safety, outwardly espousing safety as one of the organization's core values, while meeting only the

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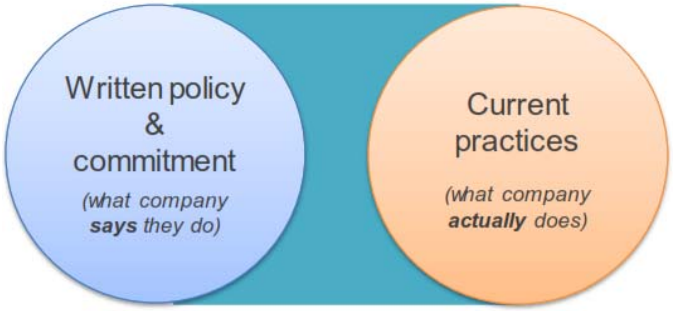
[95] Safety and Enforcement Technical Working Group SMAP Metrics Master List http://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Safety/Risk_Assessment/SMAP/Staff%20Proposal%20SMAP%20Metrics.xlsx

[96] Plans can be viewed at http://www.cpuc.ca.gov/General.aspx?id=2507.

[97] PU Code Section 961.

minimum requirements for safety. In a study commissioned by the NEB comparing major industrial accidents, it found that when these accidents occur "there is often an observable disconnect in the company's vision (what they say) and their planning, implementation, monitoring, and review (what they actually do)."[98] The Independent Review Panel (IRP) highlighted this issue in its Report of the San Bruno incident. The IRP concluded that "[s]imply put, 'the rubber did not meet the road' when it came to PG&E's implementation of the recommendations of its enterprise risk management process."[99] This gap is depicted in the figure below.

Figure 3-3
Gap between what is said and what is done



Source: Presentation by Dr. Claudine Bradley, CPUC En Banc on SMS, March 7, 2018.

It is important for the Commission and is in the public's best interest to not only check that PG&E and the ISPs are committed to safety on paper through approval of the Safety Plans, but to actually verify the effectiveness of that commitment through increase on oversight activities that go beyond the minimum regulatory requirements.

To do so, the Commission should require SED to, in collaboration with OSA, do the following:

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[98] NEB Statement on Safety Culture. https://www.neb-one.gc.ca/sftnvrnmnt/sft/sftycltr/sftycltrsttmnt-eng.html

[99] "Assessment of PG&E Corporation and PG&E Company's Safety Culture" by Northstar Consulting Group for the California Public Utilities Commission at p. II-11.

- Verify the ISP's and PG&E's implementation of select critical aspects of their Natural Gas Safety Plans before submittal of PG&E's next GT&S rate case application.

IV. CONCLUSION

Under the NGSS, system operations will depend on the performance of the ISPS. Recent experience in Southern California has highlighted the impact of safety-related issues on an operator's performance. However, the NGSS ignores the critical role that safety plays in the ISPs' performance. If the Commission adopts all or part of PG&E's proposed NGSS, it must also require additional safety related provisions through its final decision, which may also include modifying the MOU. These provisions are necessary to mitigate the operational risks associated with reducing operational flexibility under the NGSS and increasing dependency on ISPs. These provisions promote the adoption of best safety management practices by both ISPs and PG&E for their pipelines and underground storage operations, promote strengthening of safety culture at their organizations, and increase transparency and Commission oversight.

APPENDIX A

Qualifications of Witnesses

QUALIFICATIONS AND PREPARED TESTIMONY
OF
JENNY AU

Q1. Please state your name, business address, and position with the California Public Utilities Commission (Commission).

A1. My name is Jenny Au and my business address is 320 West 4th Street, Suite 500, Los Angeles, California. I am a Senior Utilities Engineer in the Office of the Safety Advocate.

Q2. Please summarize your educational background.

A2. I graduated from the Cal Poly Pomona, with a Bachelor of Science Degree in Civil Engineering. I am a registered civil engineer in the State of California.

Q3. Briefly describe your professional experience.

A3. I have been employed at the Commission since 2007. I participated in many Class A Water Utility proceedings as an engineer in the Office of Ratepayer Advocates. My previous professional experience includes engineering positions at the Los Angeles Regional Water Quality Control Board and the Department of Toxic Substances Control.

Q4. What is your responsibility in this proceeding?

A4. I am responsible for Chapter 1 on Asset Family- Transmission Pipe, Chapter 2 on PG&E's Proposed NGSS - Reliability, and co-sponsoring Chapter 3 on PG&E's Proposed NGSS - Safety.

Q5. Does this conclude your prepared direct testimony?

A5. Yes, it does.

QUALIFICATIONS AND PREPARED TESTIMONY
OF
CAROLINA CONTRERAS

Q1. Please state your name and business address.

A1. My name is Carolina Contreras. My business address is 505 Van Ness, San Francisco.

Q2. By whom are you employed and in what capacity?

A2. I am employed by the California Public Utilities Commission as a Senior Utilities Engineer in the Office of the Safety Advocate (OSA).

Q3. Please describe your educational and professional experience

A3. I hold a Bachelor of Science degree in Civil Engineering from the University of New Orleans, a Master degree in Economics and Management of Network Industries from Université Paris-Sud XI, in Paris, France, and a Master of Science degree in Electric Power Industry from Comillas Pontifical University in Madrid, Spain. I have nine years of experience in the utility and related industries, six of those with the California Public Utilities Commission (CPUC). At the CPUC I worked on a broad spectrum of water and natural gas safety issues, ranging from general rate cases and utility funding requests to implementing post-San Bruno natural gas safety legislation. While working for the Safety and Enforcement Division I reviewed utility safety spending, budgeting, and resource-allocation practices, worked on PG&E's Pipeline Safety Enhancement Plan (PSEP) and Gas Transmission and Storage rate case, and audited new gas safety initiatives. I joined OSA in 2017. Prior engagements include engineering and utility design work at Kimley-Horn and Associates, and energy management work for AXPO Iberia, a European energy company.

Q4. What is the scope of your responsibility in this proceeding?

A4. I am the co-sponsor of Chapters 2 of prepared testimony regarding PG&E's 2019 GT&S Rate Case Application (A. 17-11-009)

Q5. Does this complete your testimony?

A5. Yes

APPENDIX B

Safety Management Systems - API 1173, PHMSA presentation at LGA Pipeline Safety Seminar New Orleans, July 2015

Safety Management Systems
API RP 1173

LGA Pipeline Safety Seminar
New Orleans, LA

Wednesday July 22, 2015
10:15 – 11:00 AM

Chris McLaren
USDOT PHMSA

Today's Agenda

- PHMSA Update
- PHMSA Safety Posture Initiative
- Importance of Management Systems
- Safety Culture
- Safety management Systems (API RP 1173)

PHMSA Leadership Update

Tim Butters – has left PHMSA and will be a Senior Advisor at the Federal Aviation Administration (FAA) as of June 8

Marie Therese Dominguez – nominated to be PHMSA Administrator.

previously served as Principal Deputy Assistant Secretary of the Army (Civil Works) at the Department of Defense, a position she has held since 2013.

Stacy Cummings - PHMSA's Interim Executive Director and senior career executive, is delegated the duties of the Administrator by Secretary Foxx, effective June 5, 2015.

served as Executive Director at the Federal Railroad Administration.

2015: What is happening

Rulemaking action continues

- Covering all Congressional mandates / NTSB recommendations

Significant policy development underway:

- Integrity Verification Process for HL pipelines
- LNG; small scale applications to fuel transportation

Reauthorization begins

Recruiting, developing and retaining people

Rulemaking

- Excavation Damage Prevention (Final Rule)
- Miscellaneous Rulemaking (Final Rule)
- EFV Expansion beyond Single Family Residences (NPRM)
- Operator Qualification, Cost Recovery and Other Pipeline Safety Proposed Changes (NPRM)
- Plastic Pipe (NPRM)
- Standards Update (Final Rule)
- Safety of Gas Transmission and Gathering Lines (NPRM)
- Safety of On-Shore Hazardous Liquid Pipelines (NPRM)
- Rupture Detection and Valve Rule-NPRM being developed

Other Regulatory Developments

- NPMS Information Collection
- Integrity Verification Process for Hazardous Liquids Pipelines
- Advisory Bulletins:
  - Reversals, Product Changes, Conversions
  - Use of metrics in measuring IMP effectiveness
  - Construction Notification
  - Hurricane Preparation and Damage
  - More to come from NTSB Gas IM Safety Study

PHMSA Safety Posture Initiative

- PHMSA's mission is to protect people and the environment from the risks of hazardous materials transportation. Safety is PHMSA's number one priority.
- The Office of the Chief Safety Officer (CSO) has initiated the PHMSA Safety Posture Initiative that supports DOT's strategic priorities, and builds upon DOT's legacy of safety.
- The CSO serves as the primary advocate for safety within PHMSA and is the safety conscience of the agency.
  - Establishes and reviews PHMSA-wide safety and security policies,
  - Evaluates risk and agency performance,
  - Coordinates and harmonizes PHMSA's emergency planning and incident response, and
  - Fosters continuous improvement in PHMSA's safety programs and the safety of PHMSA's employees

PHMSA Chief Safety Officer

- As part of a healthy safety and reporting culture to maintain and foster continuous improvement in employee safety within PHMSA, PHMSA Employees are encouraged to report accidents or near-misses in the workplace.
  - OSHA defines NEAR MISS as an incident where no property was damaged and no personal injury was sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.
- Identifying initiatives, both short- and long-term to bring our safety regime in line with confronting the biggest safety risks and concerns across our transportation network; and
- Identifying perceived vulnerabilities in the Department's safety priorities and activities that represent unacceptable risk to the traveling public and address them.

Safety Initiative Goals

- Advance priority rulemakings, including:
  - Pipeline Safety: Safety of Gas Transmission and Gathering Pipelines (NPRM)
  - Pipeline Safety: Excess Flow Valves in Applications Other than Single-Family Residences in Gas Distribution Systems (NPRM)
  - Pipeline Safety: Enforcement of State Damage Prevention Laws (Final Rule)

Safety Initiative Goals

- Continue to pursue and foster non-regulatory approaches to effect continuous improvement in safety, such as Safety Management Systems, Safety Culture, and incentivizing regulated entities to move beyond mere compliance with regulations by adopting and institutionalizing voluntary, meaningful, comprehensive programs that will advance safety.
- Advance PHMSA's pipeline damage prevention program.
- Plan for wider adoption and shifting uses and transportation of natural gas: liquefaction, transport, distribution, export, intermodal connections

Safety Initiative Goals

- Address aging pipeline infrastructure and rapid modernization and expansion (e.g., to include new construction; replacement).
- Continue to address pipeline operations and management (e.g., continuous improvement of integrity management; information collection on existing pipeline systems; and other operational changes such as flow reversals and conversions).

Underlying Principles

- The Pipeline Operator Alone is Responsible for Safe Operations:
  - It is the responsibility of pipeline operators to understand and manage the risks associated with their pipelines.
- The Regulator Can Influence Operator Performance:
  - PHMSA's primary role is to establish minimum safety standards
- PHMSA also strives to impact operator performance beyond mere compliance with the regulations
- API RP 1173 - Pipeline Safety Management Systems (PSMS) national consensus standard has been published
  - Support maturation of safety culture within organizations
  - Support development of safety management systems

Moving from Compliance to Choice

- Energy pipelines have graduated to the national stage, many times for the wrong reasons
- Our world must move from a “checkbox” mentality to understanding the health of our pipeline systems by analyzing and understanding data and information and promptly acting to reduce risks
- Prescription may need to be added to performance based IM regulations to address inadequacies identified in inspections and accidents

Safety Management Systems

What we discussed last year here at LGA

- Gas Transmission & Gas Gathering ANPRM from 2011
  - Topic M - Quality Management Systems (QMS)
- SMS in other Industries and their success
- NTSB Recommendations from Enbridge Marshall, MI (2012) accident to API to develop an industry standard for SMS
- First Public Meeting was held July 2, 2014 to preview the content of the draft of API RP 1173

Safety Management Systems

- A 3rd Public Meeting was held April 22, 2012 to discuss the publication of API RP 1173 http://primis.phmsa.dot.gov/meetings
- API RP 1173 embodies the Best of a Dozen Other Approaches from Other High Hazard Industries
- The goal of this document is to provide pipeline operators with a framework to review an existing PSMS or develop and implement a new PSMS.
- The document is designed to provide a framework that is allows for flexibility to meet an operators unique operating environment and scalable from small to large systems

Safety Management Systems

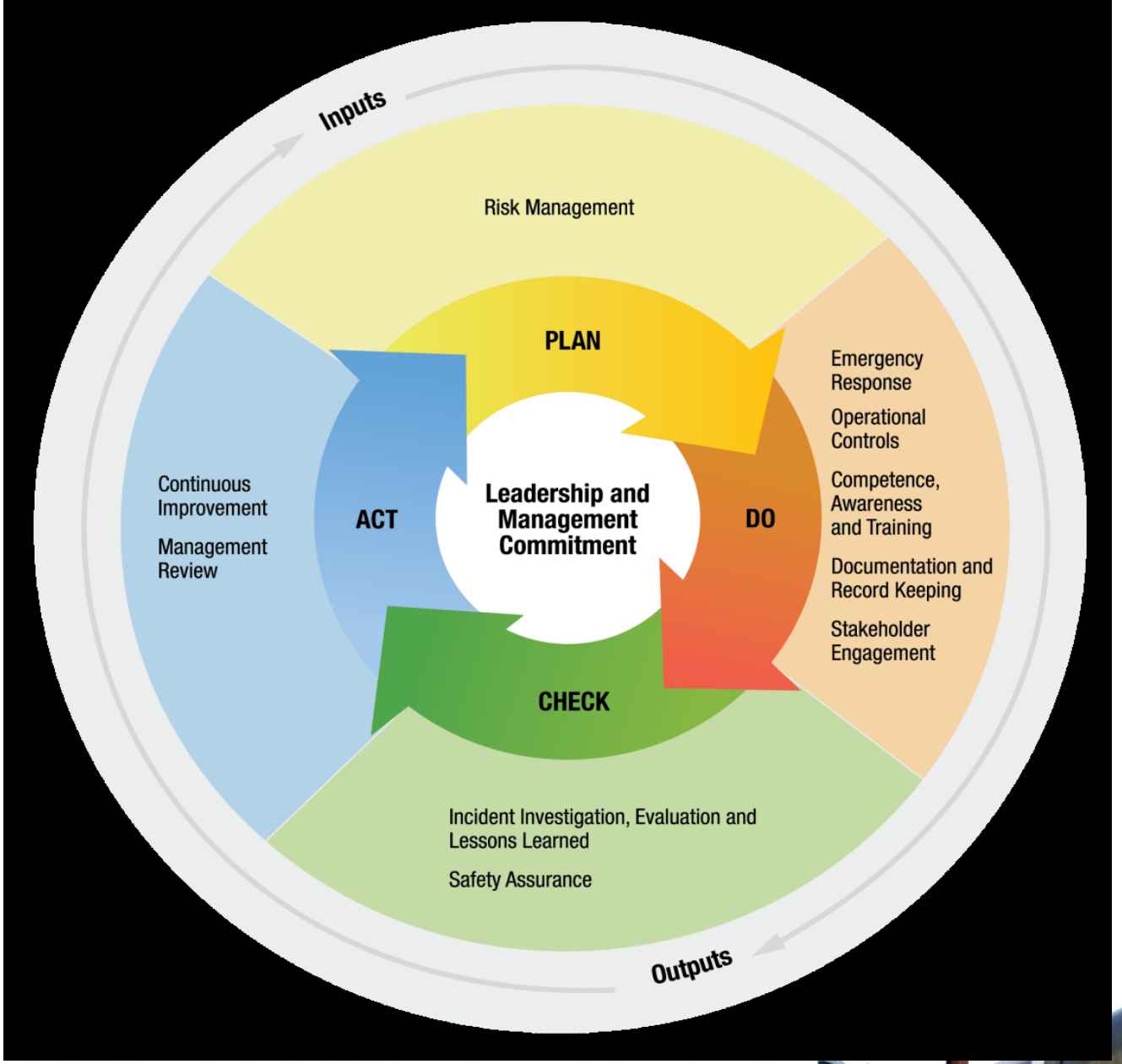
- Based on “Plan – Do - Check – Act” Continuous Improvement Model
- SMS adds Dimensions to Integrity Management
  - Safety Culture Elements
  - Emphasis on the Vital Check-Act Elements
- Safety Culture is defined by DOT as the shared values, actions, and behaviors that demonstrate a commitment to safety over competing goals and demands.

Safety Culture

Critical elements of a strong safety culture:

1. Leadership is Clearly Committed to Safety
2. There is Open and Effective Communication Across the Organization
3. Employees Feel Personally Responsible for Safety
4. The Organization Practices Continuous Learning
5. There is a Safety Conscious Work Environment
6. Reporting Systems are Clearly Defined and Non-Punitive
7. Decisions Demonstrate that Safety is Prioritized Over Competing Demands
8. Mutual Trust is Fostered between Employees and the Organization
9. The Organization is Fair and Consistent in Responding to Safety Concerns
10. Training and Resources are Available to Support Safety

Plan, Do, Check, Act The core of the standard



Continuous Improvement is the Goal of the standard

Safety Initiative Goals

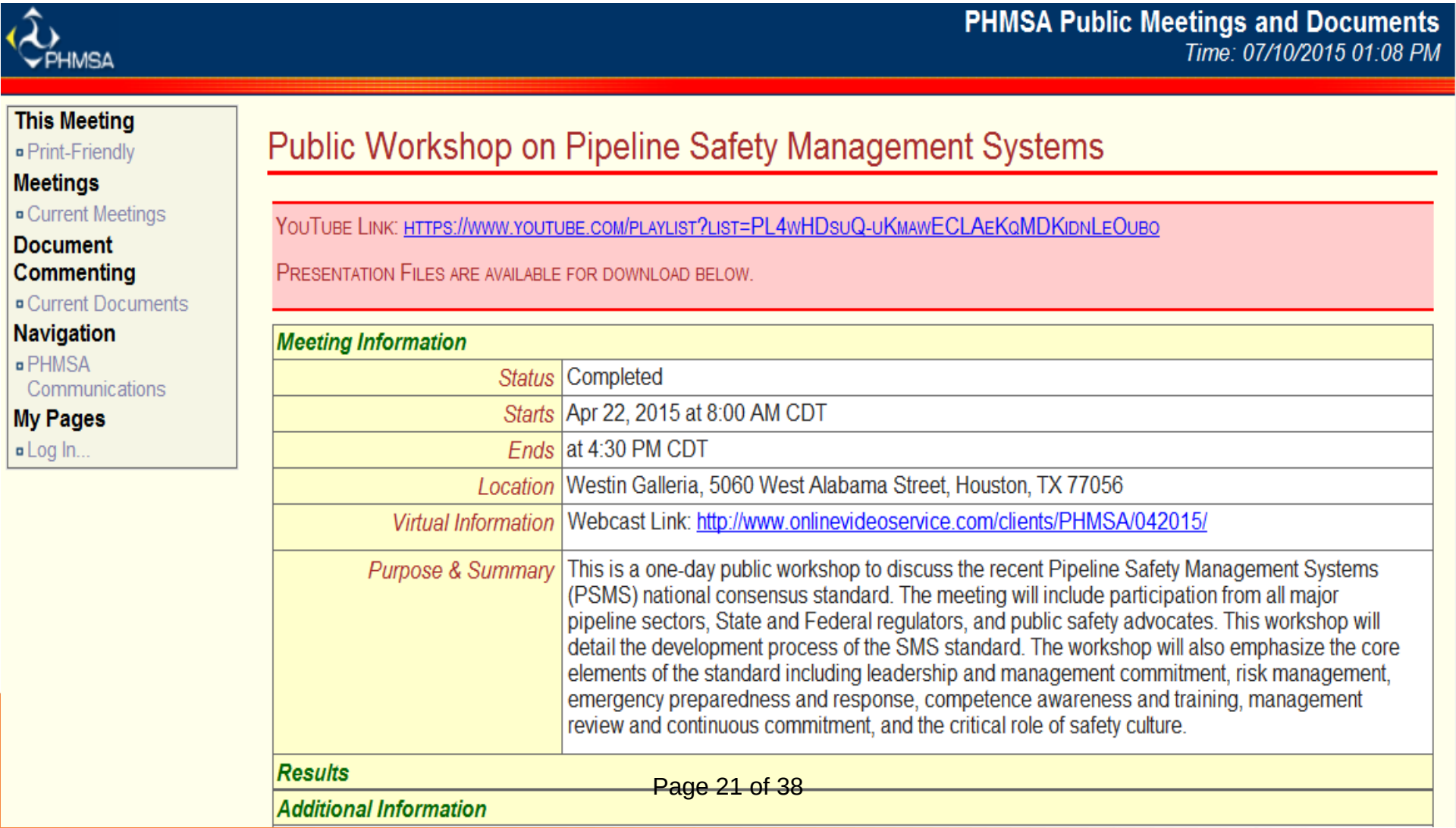
- Continue to pursue and foster non-regulatory approaches to effect continuous improvement in safety, such as Safety Management Systems, Safety Culture, and incentivizing regulated entities to move beyond mere compliance with regulations by adopting and institutionalizing voluntary, meaningful, comprehensive programs that will advance safety.
  - API RP 1173
  - Safety Culture implementation is first step

PSMS Processes

Essential Pipeline Safety Management System Elements

- Leadership and Management Commitment
- Stakeholder Engagement
- Risk Management
- Operational Controls
- Incident Investigation, Evaluation and Lessons Learned
- Safety Assurance
- Management Review and Continuous Improvement
- Emergency Preparedness and Response
- Competence, Awareness and Training
- Documentation and Record Keeping

PSMS Meeting website
http://primis.phmsa.dot.gov/meetings/



PSMS Processes

- **Leadership and Management Commitment (Section 5)**
  - Goals and Objectives
  - Responsibilities of Leadership
  - Top Management
  - Management
  - Employees
  - Responsibility, Accountability and Authority
  - Making Communication, Risk Reduction and Continuous Improvement Routine
- When Leadership Has a More Visible Role in Demonstrating the Safety Culture it Brings Rigor to Asset Protection / Safety

PSMS Processes

- **Stakeholder Engagement (Section 6)**
  - Internal
  - External
- Internal Focus on Employee Engagement, Involvement and Learning.
- External Focus on Moving from Awareness to Dialogue to Help Identify and Control Risk and Share Performance.
- Supports Processes to Identify and Resolve Concerns about Transparency on Safety Matters

PSMS Processes

- **Risk Management (Section 7)**
  - Data Gathering and Evaluation of Quality
  - Risk Identification and Assessment
  - Risk Prevention and Mitigation
  - Periodic Analysis
  - Analysis Report
- Responsiveness to Employee-identified Risk Builds and Improves the Safety Culture
- Identification of Operational Risks for Mitigation. (Beyond Regulatory Requirements)

PSMS Processes

- **Operational Controls (Section 8)**
  - Operating Procedures
  - Safe Work Practices
  - Quality and System Integrity
  - Management of Change
  - Outsourcing and Contractors
- Greater Certainty That Activities Are Performed as Expected and there is a Commitment to Safety.
- Employee Understanding That Following Procedures Is Important and can Confidently Stop Work and Identify Unsafe Activities.

PSMS Processes

- **Incident Investigation, Evaluation and Lessons Learned (Section 9)**
  - Investigation of Incidents
  - Follow-up and Communication of Lessons Learned
  - Learning From External Events
- Ensures the Right Information Is Gathered from Events.
- Sharing of Lessons Learned Within the Organization Builds the Safety Culture.
- Uses the Incidents of Others to Prevent Their Occurrence Within the Organization.

PSMS Processes

- **Safety Assurance (Section 10)**
  - Audit and Assessment
  - Employee Reporting and Feedback
  - Analysis of Data
  - Performance Evaluation
  - Evaluation of Safety Culture
  - Evaluation of Maturity
- Validation that Risk Management Is Systematic and Disciplined.
- Evaluates the Openness of the Organization and Trust of the Employees in the Organization.

PSMS Processes

- **Management Review and Continuous Improvement (Section 11)**
  - Management Review
  - Input Requirements
  - Output Requirements
  - Continuous Improvement
  - Evaluation of Technology
- Defines Opportunities and Obtains Authorization for Continuous Improvement Activities.
- Sets Safety as a Priority.

PSMS Processes

- **Emergency Preparedness and Response (Section 12)**

Procedures include the following elements:

- Potential types of emergencies
- Internal and external notification requirements
- Identification of response resources and interfaces
- Recognition and use of Unified Command/ICS
- Safety, health, and environmental protection processes
- Communication plan
- Training and drills
- Lessons learned and improvement process
- Periodic review and updating of the plan

- Being Prepared Leads to Good Safety Culture Characteristics.
- Identifies the Resiliency of the Organization and Gives a Realistic Sense of Vulnerability and Therefore Watchfulness.

PSMS Processes

- **Competence, Awareness and Training (Section 13)**

Training to ensure that personnel and contractors are updated and aware of:

- applicable elements of the PSMS that affect their job requirements
- accountabilities, responsibilities, and authorities in executing the PSMS
- newly emerging or changing risks, problems in execution of the pipeline safety management system, and opportunities to improve processes and procedures
- potential consequences of failure to follow processes or procedures

PSMS Processes

- **Documentation and Record Keeping (Section 14)**
  - Control of Documents
  - Control of Records
  - Procedures
- Ensures procedures and programs are up to date
- Enables accurate reporting and tracking of data, which is the basis of learning and improvement

Executing a Pipeline Safety Management System Strengthens Safety Culture (Section 15)

Contribution of Each element:

- Leadership and Management Commitment
- Stakeholder Engagement
- Risk Management
- Operational Controls
- Incident Investigation, Evaluations and Lessons Learned
- Safety Assurance
- Management Review
- Emergency Preparedness and Response
- Competency, Awareness and Training
- Document Control

Why is Leadership the Heart of PDCA? Leadership is everywhere

Top Management- accountable for continuous improvement, routine review of safety performance and communications about safety

Management- ensures process, procedures and training to meet objectives; assess, evaluate and adjust as needed to meet objectives; foster continuous improvement

Employees– identify improvements, reveal risks

- Consider employee, public and pipeline safety when stopping work for safety concern
- Bring rigor of employee safety to asset protection

SMS Conclusions

SMS require More

- Intentional and systematic actions
- Diligence and oversight
- Involvement at all levels - communications
- “Go and Check” attitude

The rewards of SMS are

- Increased pipeline safety – risk reduction
- Creation/Enhanced safety oriented culture
- Broader organizational involvement

Seven Rules of Admiral Rickover

1. *You must have a rising standard of quality over time, and well beyond what is required by any minimum standard.*
2. *People running complex systems should be highly capable.*
3. *Supervisors have to face bad news when it comes, and take problems to a level high enough to fix those problems.*
4. *You must have a healthy respect for the dangers and risks of your particular job.*
5. *Training must be constant and rigorous.*
6. *All the functions of repair, quality control, and technical support must fit together.*
7. *The organization and members thereof must have the ability and willingness to learn from mistakes of the past.*

High Reliability Organizations

Preoccupation with failure - seeking out small faults in the system and using those to improve performance,

Reluctance to simplify – valuing diversity of views and resisting the temptation to jump to quick conclusions,

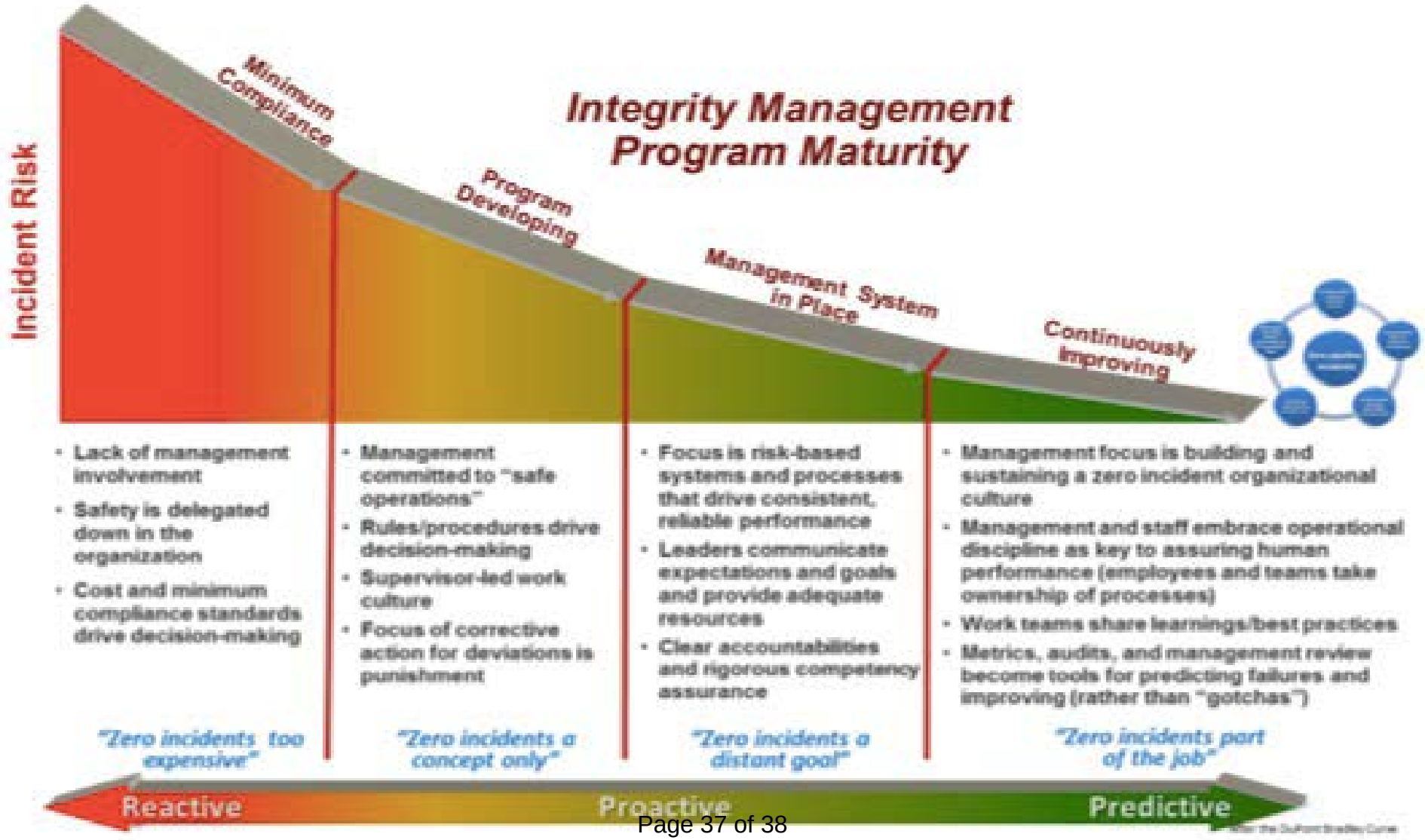
Sensitivity to operations – valuing experienced operating people who have a nuanced system understanding,

Commitment to resilience – using layers of protection, valuing redundancy in equipment and people, and

Deference to expertise – placing appropriate value on the advice of technical experts in decision making.

ORGANISATIONAL SAFETY – A NEW RESEARCH VENTURE FOR THE AUSTRALIAN PIPELINE INDUSTRY:
Dr Jan Hayes, Peter Tuft, and Professor Andrew Hopkins, Australian National University, Canberra, Australia

Assessing Maturity



Thank you for your Participation

Websites are our primary form of communication

- http://phmsa.dot.gov/pipeline
- http://primis.phmsa.dot.gov/dimp/
- http://primis.phmsa.dot.gov/meetings/
- http://www.phmsa.dot.gov/foia/e-reading-room

APPENDIX C

List of Attachments

Index of Data Responses

Index Page	Citation		Response Party	Request Number	Question Number	Attachment
	Page	Footnote(s)				
OSA-1	3-3, 3-4, 3-16	52, 54, 92	PG&E	ORA-016		Q1Supp01Atch01
OSA-48	3-6	63	GRS	OSA-01	Q7	
OSA-58	3-6	63, 21	LGS/WGS	OSA-01	Q7	
OSA-63	3-6	63	LGS/WGS	OSA-01		Schedule A
OSA-77	3-6	63	CVGS	OSA-01	Q7	
OSA-650	2-5	24	PG&E	ORA-016	01d & 01e	
OSA-654	2-7, 2-10	28, 37	PG&E	OSA-002	09	Atach01CONF
OSA-655	2-9	35	PG&E	OSA-002	02	Q02atch01
OSA-704	1-2, 1-3	4, 5	PG&E	OSA-004	04	
OSA-706	1-3, 1-3	6, 7	PG&E	OSA-004	03	

Index of Additional Documents

Index Page	Citation		Document
	Page	Footnote (s)	
OSA-84	3-5	57	DRAFT Resolution G-3536
OSA-90	3-5	58	Aliso Canyon Mitigation Measures Impact Report (May 2018 Update)

Index Page	Citation		Document
	Page	Footnote (s)	
OSA-124	3-5	59	"Newberry Springs gas line catches fire, destroys heavy equipment", (The Sun)
OSA-128	3-5	60	"A Systematic Framework for Root-Cause Analysis of the Aliso Canyon Gas Leak Using the AcciMap Methodology: Implication for Underground Gas Storage Facilities"
OSA-159	3-6	61	NTSB – Safety Management Systems
OSA-160	3-6	62	"Sample Implementation of An Industry-Wide Safety Management System"
OSA-178	3-6	63	"Accidental Release Prevention Process Safety Management Systems - Incident Reductions after Implementation of Contra Costa County Industrial Safety Ordinance, including Safety Culture Requirements"
OSA-216	3-7	65	Written Testimony of Marie Therese Dominguez Administrator of PHMSA (excerpt)
OSA-221	66	3-7	Motion of The Joint Applicants and the Office of the Safety Advocate for Approval of Settlement Agreement in A.17-02-003, Attachment 1: Settlement Agreement
OSA-236	3-7	69	Pipeline Safety Management System 2017 Annual Report
OSA-248	3-8	71	"Exclusive: Pipeline Safety Chief Says His Regulatory Process Is 'Kind of Dying" (Inside Climate News)
OSA-253	3-8	72	Washington Utilities and Transportation Commission Docket PG-150120 Settlement Agreement with Cascade Natural Gas Corporation,
OSA-258	3-8	72	Indiana Utility Regulatory Commission, Cause No. 44970, Settlement Agreement with Northern Indiana Public Service Company
OSA-273	3-9, 3-10, 3-10	73, 76, 77	"Long Term Viability of Underground Gas Storage in California", Summary Report, CCST
OSA-425	3-9	75	"Long Term Viability of Underground Gas Storage in California", Chapter 1, Section 1.2: Failure Modes, Likelihoods, Consequences
OSA-513	3-10, 3-10, 3-14	78, 79, 85	API Recommended Practice 1173 first edition, June 2014, Draft Version 11.2

Index Page	Citation		Document
	Page	Footnote (s)	
OSA-552	3-14	84	SMS Framework, Federal Transit Administration
OSA-599	3-14	84	"Why SMS?: An introduction and overview of safety management systems", OECD
OSA-607	3-15	86	US 14 CFR 5.25
OSA-609	3-15	86	Canada's NEB Onshore Pipeline Regulations (OPR) Section 6.2
OSA-610	3-15, 3-15	88, 89	"Safety Culture Indicators Research Project: A regulatory Perspective", North American Regulators Working Group on Safety Culture
OSA-630	3-19	98	NEB Statement on Safety Culture
OSA-649	3-19	99	"Assessment of PG&E Corporation and PG&E Company's Safety Culture", Northstar Consulting Group
OSA-656	2-2	10	PG&E Workshop on NGSS 2019 GT&S Rate Case Discussion, May 11, 2017. Slide #6
OSA-658	2-2, 2-6, 2-7	11, 25, 32	A.1711009, PG&E GTS Rate Case 2019 Workshop, April 12, 2018, Slides #10, #13
OSA-661	2-2, 2-3, 2-3, 2-3, 2-3, 2-3	12, 13, 14, 15, 16, 17	Long-Term Viability of Underground Natural Gas Storage in California Summary Report (LTVU Summary), pp.1, 45, 46, 51, 8, 74-75
OSA-669	2-4, 2-4, 2-4, 2-5	19, 20, 21, 23	D.15-10-050, at pp. 13, 16, 22, 20, 24
OSA-676	2-6	26	A.1802013, Joint Application of the Wild Goose Storage LLC and Lodi Gas Storage LLC to encumber assets to secure financing. Footnote 2.
OSA-677	2-8	33	April 23, 2018 Article in Nature Climate Change "Increasing precipitation volatility in twenty-first-century California. https://www.nature.com/articles/s41558-018-0140-y
OSA-678	2-10	38	Department of Conservation News Release, June 29, 2018. State Finalizes Underground Gas Storage Regulations. http://www.conservation.ca.gov/index/Documents/2018-

Index Page	Citation		Document
	Page	Footnote (s)	
			06%20Underground%20Gas%20Storage%20Regulations%20Approved.pdf
OSA-680	2-10	39	Summary of Final Text of Regulations CCR Title 14, Chapter 4, Subchapter 1. http://www.conservation.ca.gov/index/Documents/Final%20Text%20of%20Regulations.pdf
OSA-708	1-1	1	Email from Gina Dawson of the Community of Lafayette to Chris Parkes of CPUC's OSA, dated October 13, 2017 at 1:25pm
OSA-711	1-1	2	Email from SED's Joel Tran to OSA's Jenny Au on July 03, 2018 at 9:56am

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company Proposing Cost of Service and Rates for Gas Transmission and Storage Services for the Period 2019-2021. (U39G)	A.17-11-009

CERTIFICATE OF SERVICE

I hereby certify that I have on this date served a copy of **PREPARED TESTIMONY OF CAROLINA CONTRERAS AND JENNY AU ON PACIFIC GAS AND ELECTRIC COMPANY 2019 GAS TRANSMISSION AND STORAGE RATE CASE (PUBLIC VERSION)** to all known parties by either United States mail or electronic mail, to each party named on the official service list attached in **A.17-11-009.**

I also hand-delivered a hard copy to the assigned Administrative Law Judge's mail slot.

Executed on **July 20, 2018** at San Francisco, California.

/s/ ROSCELLA V. GONZALEZ
Roscella V. Gonzalez

CALIFORNIA PUBLIC UTILITIES COMMISSION
Service Lists

PROCEEDING: A1711009 - PG&E - APPLICATION P
FILER: PACIFIC GAS AND ELECTRIC COMPANY
LIST NAME: LIST
LAST CHANGED: JULY 16, 2018

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