



Annual Report Number 3
Recommendations for Improvements Related to
Safety and Leak Prevention
July 2021 – June 2022

Report Date: July 31, 2022

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Overview

SoCalGas (Defendant) and the State Attorney General, City Attorney for the City of Los Angeles, County Counsel for the County of Los Angeles, and the County of Los Angeles (collectively referred to as Government Plaintiffs) entered a Consent Decree to resolve claims raised by the Government Plaintiffs associated with the natural gas leak that occurred at the Aliso Canyon natural gas storage Facility (Facility) in October 2015. The terms and conditions of the Consent Decree required SoCalGas to, among other things, form an internal safety committee, and select and retain a third-party subsurface gas storage industry expert (Safety Ombudsman) who shall act as a safety advocate for the Facility. A copy of the Consent Decree may be accessed via this link: [Click Here](#)

Section 4.2 of the Consent Decree outlines the requirements for SoCalGas to establish a Well and Storage Operations Safety Committee (WSOC). The duties of the WSOC include but are not limited to the following:

- Meet quarterly to review safety issues at the Facility;
- Review operational safety issues and promote safe operations at the Facility consistent with applicable laws, rules, regulations, and orders;
- Review Facility-related information, materials, or work product to assess safety at the Facility;
- Make recommendations to SoCalGas for repairs, improvements, policies, and/or upgrades to the Facility or infrastructure therein;
- Facilitate the role of, and work in cooperation with, the Safety Ombudsman;
- In coordination with the Safety Ombudsman, conduct periodic safety audits or safety-related Strengths, Weaknesses, Opportunities, Threats (“SWOT”) analyses of the Facility; and
- Review California Public Utility Commission (CPUC), California Department of Conservation Geologic Energy Management Division (CalGEM), audit reports of the Facility.

Section 4.3 of the Consent Decree outlines the requirements for SoCalGas to select and retain a Safety Ombudsman and the duties associated with that role. The duties of the Safety Ombudsman include the following:

- Participate in all Well and Storage Operations Safety Committee (WSOC) meetings;
- Have access to all non-privileged materials, information, records, and work product in SoCalGas’ possession, custody, and control necessary to accomplish the tasks required of the Safety Ombudsman;
- Review CPUC and CalGEM audit reports of the Facility;
- Review and evaluate all incidents reported to the public and State and local agencies pursuant to Section 4.1 of the Consent Decree;
- Review and advise on the WSOC’s efforts, findings, and recommendations for improvements;
- Serve as a non-exclusive repository for safety-related concerns reported by the public with respect to the Facility;
- Serve as a point of contact to receive safety complaints or concerns relating to the Facility from anyone who wishes to remain anonymous, and provide any anonymous reports of safety concerns to SoCalGas;

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- Maintain the privacy of the person or member of the public confidentially making safety complaints or concerns relating to the Facility;
- Generate annual reports (Annual Reports) that detail the following:
 - The work of the Safety Ombudsman;
 - The work of the WSOC; and
 - Recommendations, if any, for improvements related to safety and prevention of leaks at the Facility.
- Provide the Annual Reports to the Attorney General, the City Attorney, County Counsel, the CPUC and CalGEM. The Annual Reports shall also be made public via the Aliso Canyon Website and the local community shall be provided with an opportunity to comment on the Annual Reports. The Safety Ombudsman shall schedule at least one public meeting each year to explain and respond to questions regarding the Annual Reports.

A new person filling the role of the Safety Ombudsman began with the September 2021 meeting, where the past Ombudsman introduced the new Ombudsman. The former Ombudsman completed his duties with respect to the role with the annual public meeting held virtually on October 6, 2021.

This report has been prepared in accordance with the requirements outlined in Section 4.3, (b), (ix), (2) of the Consent Decree, and summarizes the recommendations for improvement made by the WSOC and/or the Safety Ombudsman during the period of July 2021 – June 2022. It is the third such annual report. [Section I](#) of this report summarizes recommendations developed by the WSOC. [Section II](#) includes recommendations of the Safety Ombudsman.



I. Recommendations of the WSOC for Safety Improvements at the Facility

No additional recommendations for safety improvements were made by the WSOC during the period covered by this report. However, at the June 15, 2022 WSOC meeting, a new subcommittee was formed to identify and prioritize several storage integrity management-related procedures for audit of operational discipline, discussion of procedure robustness and adequacy, and recommendation to the WSOC for its decision and initiation of the next audit. Prior recommendations and outcomes were covered in previous annual reports.

II. Recommendations of the Safety Ombudsman for Safety Improvements at the Facility

Part A: Recommendations Made During the July 2021 – June 2022 Period

The Safety Ombudsman developed the recommendations listed below during the July 2021 – June 2022 period for consideration of the WSOC/SoCalGas.

1. Upon review of the RMP SIMP chapters, the new Ombudsman added thirty-two (32) specific suggestions for improvements. Many of the comments were directed toward clarifying statements in the document; however, there are several instances where SoCalGas referenced pending development of new Gas Standards to address a void, and the Safety Ombudsman strongly recommended such gaps be addressed as soon as possible. There also were several instances where discretionary language (“should”) was used in place of prescriptive language (“shall”) concerning various integrity-related activities; it was recommended that discretionary terms be replaced with prescriptive terms where appropriate.

Among the RMP-SIMP improvements, the Ombudsman formally recommended at the June 15, 2022 meeting that SoCalGas develop a plan for baseline reservoir integrity risk assessment, which is required by PHMSA prior to March 13, 2024.

- **SoCalGas Response:** SoCalGas addressed each RMP recommendation and for those recommendations not already addressed in the April 1, 2022 RMP update, SoCalGas will evaluate the additional changes during subsequent annual reviews and ongoing changes to RMP-SIMP chapters.

Efforts are ongoing to develop a framework for managing reservoir integrity and risk, including development of new, or implementing enhancements to existing, processes and procedures. SoCalGas engages in several activities to monitor reservoir integrity, such as semi-annual inventory shut-ins and pressure-volume analysis. SoCalGas has developed GS 224.132 – Reservoir Integrity Assessment and continues to work on integration of data from various monitoring activities. In addition, SoCalGas has conducted a Reservoir and Caprock Threat Workshop and continues to build on that effort.

2. As an outcome of the October 2021 public inquiry and the investigation pursued by the Safety Ombudsman, including data requests to SoCalGas, the Safety Ombudsman reviewed several procedures (Gas Standards). In the response to the public inquiry, posted on March 2, 2022, the



Safety Ombudsman recommended that SoCalGas revise the applicable pressure monitoring procedural standard to include:

- a. Trend monitoring for parameters such as well casing pressure, well tubing pressure, annulus pressure from all applicable annular spaces, and methane readings, for conditions under which adverse trends might occur within specified “normal operating levels;”
 - b. Detail on how to identify deviations from normally expected pressures and methane levels and how to analyze trends of pressure, volume, rate, or methane concentration;
 - c. Detail on how to analyze trends of each type of pressure or volume information, with the thresholds of normal operation only serving to define required actions under the abnormal operating condition procedural standard but that unexpected trends occurring at levels below thresholds also should be analyzed;
 - d. Integration of pressure and methane monitoring data to identify occurrences when multiple types of information might point to an issue requiring further investigation;
 - e. Requirements for frequency of monitoring and reviews of the monitoring practices;
 - f. Requirements for more frequent monitoring in areas where anomalous behaviors occur and evaluation of the benefits of additional sample collection and analysis to identify soil and annular space gases; and
 - g. Clarity of role responsibility for trend monitoring, internal reporting, and investigation.
- SoCalGas Response: In a June 2022 conference call with the Safety Ombudsman, additional clarification was given regarding the recommendations pertaining to annulus pressure trend analysis, roles and responsibilities of personnel managing and executing the pressure monitoring program, and integration of pressure monitoring data with other monitoring or well integrity information. The Pressure Monitoring gas standard is scheduled for a detailed review this year, and SoCalGas plans to include these areas in the review. Specifically, SoCalGas plans to take the following actions:
 - Recommended revisions *a, b, c*: Review additional steps on pressure readings that are within 10% of an AOC (abnormal operating condition).
 - Recommended revisions *d, f*: Review written guidance on actions to take in the event of a relevant situation and the appropriate contact.
 - Recommended revisions *e, g*: Additional written updates of tasks being performed by specific roles as well as listing specific roles and responsibilities by position instead of by group.
3. As an outcome of the October 2021 public inquiry, the investigation pursued by the Ombudsman, and the response posted on March 2, 2022, the Safety Ombudsman recommended that SoCalGas promote trust by increasing transparency of and performance metrics related to:
 - a. Procedural robustness, adequacy, and continual improvement;
 - b. Risk management effectiveness through:
 - i. Metrics regarding risk management activities (prevention, mitigation, planning, analysis, plan implementation);
 - ii. Metrics regarding risk reduction and whether it occurs with respect to some or all of prevention, mitigation, knowledge gap closure, or other aspects of risk; and



- iii. Metrics regarding risk decisions executed and effects monitored.
- c. Safety culture improvements, including those with respect to human and organizational risk management.

Explanation: Each year, SoCalGas sets goals and metrics to measure progress in storage integrity management. Performance measures include number of wells assessed and assessment type, number of actionable condition findings resulting from the assessments, number of internal audits and regulatory audits, and the resulting number of corrective actions identified and corrective actions completed. Many of the metrics tracked by SoCalGas could be characterized as “lagging” indicators – counts of events that have occurred. The Ombudsman suggests that leading indicators be established in the areas of the three items in the summary recommendation. For example, SoCalGas conducts an annual review of the SIMP to confirm adequate controls are in place to demonstrate compliance with regulatory requirements and identify areas of improvement with respect to risk assessment process, awareness of abnormalities and communicating and managing change, actions taken to verify reservoir and well integrity and to control threats to integrity, regulatory audit findings and corrective actions, and other recommendations made during the year – and within those activities a number of leading indicators could be tracked.

With respect to safety culture, the framework for the SoCalGas SIMP performance monitoring and continual improvement is in place and being lived; as culture can be defined, in part, by the attitudes, beliefs, and practices of a group of people, the maturity of the RMP-SIMP could be monitored as a leading indicator of safety culture. PHMSA published a 2014 guidance document for pipeline integrity programs that could be adapted to storage integrity management programs: *Guidance for Strengthening Pipeline Safety Through Rigorous Program Evaluation and Meaningful Metrics*, July 10, 2014, provides guidance describing methods to evaluate and measure integrity management (IM) program effectiveness.

- SoCalGas Response: SoCalGas appreciates the example metrics provided by the Safety Ombudsman. As aspects of the SIMP program develop, SoCalGas will look for opportunities to update the metrics to enhance the ability to evaluate program performance.
- 4. Implement within the SIMP applicable recommendations from the CPUC-sponsored report by 2EC “Independent Safety Culture Assessment of SoCalGas and Sempra Energy.”

Explanation: SoCalGas is in the process of, but has not completed, the assessment of human factors in operating and maintenance procedures. The SoCalGas SIMP exists within the context of the organizational culture of the company. Organizational culture affects performance and effectiveness of integrity management programs. The Ombudsman participated in the January 26, 2022 public workshop presented by the authors of the California Public Utilities Commission (CPUC)-sponsored report by 2EC, “Independent Safety Culture Assessment of SoCalGas and Sempra Energy” (December 10, 2021). The Ombudsman read the entire report, which is available on the [CPUC website](#). CPUC states that the report is “part of the CPUC’s investigation to determine whether SoCalGas and Sempra have an organizational culture and governance that prioritizes safety, adequately directs resources to promote accountability and achieve safety goals and standards, and how SoCalGas reacts as an organization when a significant safety event occurs.”



The improvements identified in the 2EC “Safety Culture Assessment...” report for the CPUC should be brought into the SIMP, as strong processes within an integrity management program such as the SIMP can be living examples within a company of a particular center of excellence in safety culture. The role of the Safety Ombudsman is in part designed to assist in the safety culture transformation discussed in the 2EC report, through the Safety Ombudsman’s functioning within the role as prescribed, which allows insight into the way the SoCalGas storage integrity management processes and procedures are worked, the robustness of those processes and procedures, the information obtained, the way information is used in risk-informed decisions, and the way performance is managed and improved.

- **SoCalGas Response:** The 2EC Report did not analyze system integrity practices and, therefore, no recommendations were made related to SoCalGas’ SIMP. The 2EC Report presents opportunities to improve safety culture through efforts such as engagement, training, and dialogues. Accordingly, SoCalGas is preparing a Safety Culture Improvement Plan to realize improvement opportunities. For SoCalGas’ Response to the 2EC Report, please [Click Here](#).

Part B: Report on SoCalGas Progress in Responding to Recommendations Made in Prior Periods

Part B-1

The following recommendations made by the WSOC in 2020 are closed, having been addressed and implemented in Q4 of 2020:

1. Develop a Company Gas Standard outlining the process for taking wells out of service/returning wells to service.
2. Review and address the PHMSA audit letter dated May 28, 2020 prior to the next scheduled PHMSA audit of Aliso Canyon.

Part B-2

The following recommendations made by the Safety Ombudsman are closed, with SoCalGas responses briefly summarized below:

1. The Ombudsman made thirty-two (32) recommendations for improving the SIMP in 2020. SoCalGas reviewed each recommendation and provided the Ombudsman with a response and most recommendations were included in the revised RMP-SIMP submitted to CalGEM on April 1, 2022.
2. In October 2020, the Ombudsman recommended that SoCalGas develop and implement procedures for analysis of apparent corrosion rate and corrosion defect characterization to facilitate identification of wells requiring immediate action to address potential integrity issues which could pose a threat to the safety of the Facility. SoCalGas retained a third-party expert to complete a corrosion study of SoCalGas’ storage wells, including developing a methodology for calculating corrosion rates of well casings, consideration of inspection tool defect sizing accuracy and reporting thresholds for both MFL and UT casing inspection platforms, and direct examination of portions of



casing which have been removed from wells to aid in validation of the inspection tool results/accuracy.

SoCalGas has implemented procedures for analysis of apparent corrosion rate and corrosion defect characterization to identify and address well integrity issues.

SoCalGas is progressing on 2nd- and 3rd-round assessments of well integrity; they have reduced the overall footprint of wells by plugging and abandoning low-use wells and have increased the design robustness of many existing wells by installing new inner strings of casing and cement. The overall reduction in risk through monitoring, maintenance, and rehabilitation and repurposing of wells, along with the increase in knowledge of site-specific, time-dependent mechanisms of degradation such as internal and external corrosion, has provided justification for extending the reassessment interval.

CalGEM's Underground Gas Storage Regulations state, under Section 1726.6(a)(2), "The Division may approve a less frequent casing wall thickness inspection schedule for a well if the operator demonstrates that the well's corrosion rate is low enough that biennial inspection is not necessary."

In March 2022, CalGEM approved extensions of downhole casing inspection intervals from 24 months to 50 to 60 months for seven (7) wells at Aliso Canyon; all seven wells have had new inner strings of casing installed. SoCalGas has submitted similar requests to CalGEM for nearly three dozen wells.

The reduced frequency of well workovers coupled with the knowledge gained with respect to degradation rates can lower the overall risk profile of the Facility without compromising public and employee safety.

3. The Ombudsman recommended in Q4 2020 that SoCalGas initiate an investigation of possible subsurface accumulation(s) of gas behind well casing in the area surrounding the SS-25 well, including baseline and subsequent gas detection logs. This investigation could be accomplished as part of California's Requirements for Underground Gas Storage Projects – specifically Section 1726.7.e, which mandates that operators develop a program to conduct baseline and subsequent gas detection logs on each gas storage well to detect gas behind casing. investigation may reveal whether residual gas associated with the SS-25 leak exists at depth, and if so, enable accurate mapping of the gas. This, in turn, may aid SoCalGas, CalGEM and the CPUC in assessment of the risk associated with remnant gas accumulations, and whether a recovery plan is feasible and advisable.

SoCalGas has collected field screening data at various monitoring locations on and around the SS-25 well pad since the well was plugged in February 2016. A leak survey report that analyzed data from nested soil vapor probes from April to December 2016 found that significant reductions in methane concentrations had been observed in the subsurface. Data also indicated that natural degradation processes had assisted in bulk methane reduction, and at some locations had allowed complete attenuation prior to reaching the surface. Additional monitoring performed through August 2018 using nested soil vapor probes found no detectable methane.

Separately, per the requirements of CalGEM regulation 14 CCR §1726.7(e), SoCalGas is developing a program to "conduct baseline and subsequent gas detection logs on each storage



well to detect gas indications behind casing.” Gas detection logs have been run on all gas storage wells. Further program definition will be added around types of tools to utilize, frequency of logging, and comparison of subsequent logs to each other and to the baseline.

4. In mid and late 2020, the Safety Ombudsman recommended that SoCalGas initiate an internal audit of compliance with its Gas Standards associated with well intervention activities, specifically Well Workover, Casing Inspection, and Management of Change, and periodically assess other well intervention standards over the next 2-3 years.

In March 2021, a subcommittee of the WSOC initiated an audit of Gas Standard 224.106, Casing and Tubing Inspection Field Procedure. By December 2021, the subcommittee completed the audit and submitted a report to the company.

The Audit Final Summary dated March 23, 2022 was provided to the Safety Ombudsman on July 8, 2022. There were eight (8) findings and recommendations submitted to SoCalGas. SoCalGas responded with actions already having been implemented or in the process of being implemented regarding all eight findings.

5. SoCalGas conducts a community meeting annually with residents and other parties to address questions related to the Aliso Canyon Facility – the Aliso Canyon Community Meeting. The Safety Ombudsman should be included in the notice of this meeting and be afforded the opportunity to join the meeting. Participation by the Safety Ombudsman will facilitate transparency and may serve to aid in addressing questions of a broader nature concerning how safety and well integrity are addressed by the storage industry at large.

SoCalGas will notify the Safety Ombudsman of the annual Aliso Canyon Community Meeting so that the Safety Ombudsman has the opportunity to attend.

6. The WSOC issues minutes from each quarterly meeting with the Safety Ombudsman. Typically, the minutes have not been distributed until the next scheduled quarterly meeting. The Safety Ombudsman previously requested that the minutes be issued within a reasonable time after each quarterly meeting as opposed to waiting until the next meeting. Also, the Safety Ombudsman should have an opportunity to review and comment on the draft meeting minutes prior to formal approval by the voting members of the WSOC.

The WSOC meeting minutes have been distributed within a reasonable time after each quarterly meeting during the July 2021 – June 2022 period.

Part B-3

The following recommendations made by the Safety Ombudsman are open, with SoCalGas responses briefly summarized below:

1. The Safety Ombudsman made the following recommendations in July 2021 to increase the adequacy and effectiveness of Gas Inventory Analysis and resolve year-to-year discrepancies and/or inconsistencies:
 - a. Apply consistent methodology for calculating average reservoir pressure in the inventory verification process and consistent with Gas Standard GS 224.070 Reservoir Integrity and Inventory Assessment;



- b. The report format should be consistent from year to year, and the report should discuss elements influencing average reservoir pressure calculations, such as any operational changes, changes to the estimate of gas dissolved in the oil phase, influence from the aquifer, and any other aspects that affect the analysis;
 - c. Changes to the average reservoir pressure evaluation method should be updated in the relevant Gas Standard, GS 224.070 Reservoir Integrity and Inventory Assessment, assuming that has not been completed;
 - d. The change in the July 5, 2018, weighted average reservoir pressure, P/Z, and Z factor reported in the 2018 report versus what is reported in the 2020 version needs to be explained, including all assumptions made in arriving at the revised figure in the 2020 report;
 - e. SoCalGas should retain a third-party independent reservoir engineering expert with expertise in gas storage operations to perform an annual independent review of the results of its inventory verification analysis of Aliso Canyon; and
 - f. Include in the inventory assessment an address of fuel, use, and fugitive loss and how these are accounted for in the inventory verification process.
- SoCalGas Response: SoCalGas reviewed recommendations a. through f. above and responded as follows, in order:
 - The methodology for calculating reservoir pressure is consistent across the storage fields, and, where differences exist, they are pointed at in GS 224.070 (Section 4.3.4.1.1). SoCalGas plans to develop field-specific appendices, providing greater granularity on the changes in the well population used for the calculation over time.
 - SoCalGas plans to develop a more comprehensive annual report on inventory verification addressing the items identified in the recommendations.
 - See SoCalGas' response to a. above.
 - This recommendation refers to an inadvertent typo in the 2020 report, which has been fixed.
 - This recommendation is already implemented and detailed in GS 224.070, Section as the "Validation" step of the Inventory Assessment Process Workflow. As discussed with the Safety Ombudsman, a 3-to-5-year independent review may be more appropriate.
 - SoCalGas plans to include a section in the proposed comprehensive annual report which reviews the data obtained from the Measurement Group regarding fuel usage and fugitive losses.

Status: Certain items remain Open, as noted in the SoCalGas response, and the progress to completion will be monitored through quarterly WSOC meetings in the July 2022 – June 2023 period.



2. In mid-late 2019 and through 2020, the Safety Ombudsman recommended that SoCalGas review and evaluate adaptation of relevant practices contained in ISO Standard 16530 (Petroleum and Natural Gas Industries – Well Integrity) such as Well Barriers, Well Monitoring and Surveillance, Annulus Pressure Management, and Well Intervention. SoCalGas reported on June 10, 2021 that it had initiated its review of ISO 16530.
 - SoCalGas Response: SoCalGas has conducted a preliminary review of the ISO 16530 document. Initial findings were that many of the recommendations in the ISO document, such as identification of threats, definition and documentation of well barriers, management of annulus pressure, and execution of various monitoring activities for wells are duplicative of existing state and federal regulations. In a June 2022 conference call with the Safety Ombudsman, additional suggestions and clarifications were made regarding areas of the ISO 16530 document that SoCalGas could evaluate and consider for incorporation into the SIMP, including leakage rate acceptance criteria, performance standards, and determination of annulus pressure thresholds. SoCalGas will continue its review of ISO 16530 to evaluate which recommendations would be appropriate to incorporate into the SIMP.

Status: Open, with SoCalGas progress to be monitored through quarterly WSOC meetings in the July 2022 – June 2023 period.

3. Through mid-late 2019 and 2020, the Ombudsman made an ongoing recommendation that SoCalGas periodically review its human and organizational capacity and effectiveness with respect to the SIMP, identify potential gaps in technical expertise, include supervisory protocols to ensure adequate oversight for both company and contractor personnel, assess the adequacy and competence of resources to meet the needs of the organization, and verify that those engaged in SIMP activities are trained in and aware of the associated regulatory compliance requirements.
 - SoCalGas Response: Thus far SoCalGas has added detail to Section 7.2.1 of SIMP.8 Quality Assurance Plan to describe the status of the Human Factors Assessment. The description in SIMP.8 is supplemented in the updated April 1, 2022 RMP with Appendix D: Human Factors Assessment Overview.

Status: While in part this original 2019-2020 recommendation is closed, it is an ongoing recommendation to which the new Ombudsman added similar specific recommendations as noted in [Part A](#) of this Section, and thus the study of human and organizational factors and reliability remains an open recommendation, subject to periodic evaluation of the Company's continual improvement.