



**Annual Report Number 6**  
**Recommendations for Improvements Related to**  
**Safety and Leak Prevention**  
**July 2024 – June 2025**

**Report Date: August 31, 2025**

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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.
- Review California Public Utilities Commission (CPUC) and 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:
  - o The work of the Safety Ombudsman.
  - o The work of the WSOC.
  - o 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 (1) public meeting each year to explain and respond to questions regarding the Annual Reports.

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 2024 – June 2025. It is the sixth such annual report. [Section I](#) of this report summarizes recommendations developed by the WSOC. [Section II](#) includes recommendations from the Safety Ombudsman.

The Safety Ombudsman maintains a compendium of all recommendation topics by the WSOC and/or the Ombudsman over the past five (5) years during which the Consent Decree has been active. This report provides a summary of the new recommendations as well as the status of prior recommendations. The summary of past and current recommendations and the progress of SoCalGas in response to the recommendations is contained in a Microsoft Excel file which can be found at the following link: [Click Here](#)



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

A SWOT analysis of SoCalGas' SIMP Chapter 6 Management of Change was conducted by the WSOC starting in mid-late 2024 and concluding in early 2025. The subcommittee conducted two (2) workshops with stakeholders and subject matter experts to gather feedback. The Strengths, Weaknesses, Opportunities and Threats were summarized and presented to the WSOC for both the SIMP.6 standard process and the eMOC tool currently in use.

The subcommittee developed an Action Plan to address improvement opportunities identified through the MOC SWOT analysis, including reinforcement and learning by sharing examples of operational MOCs, development of an MOC Dashboard and shared initial examples charts. Additionally, SoCalGas created an enterprise-wide gas standard on Management of Change with publication in the first half of 2025.

WSOC recommendations for improvements to the MOC process include:

1. Continue annual awareness training, upgrade the training module, and establish a feedback loop survey after the training.
2. Continue technical review meetings; leverage the new cross-functional Technical Committee to support MOC technical reviews.
3. Create a specific MOC email address for support and communication; promote eMOC usage; generate metrics for eMOC usage and present to Management annually to emphasize importance.
4. Address the eMOC Stakeholder role, as defined in SIMP.6, Section 1.3.1, in training updates.
5. Include a process for Stakeholders to provide feedback in eMOC form.
6. Address the groups recommended to participate in technical review, as noted in SIMP.6, Section 3.2.1, in training updates.
7. Review the enterprise MOC procedure and incorporate best practices into the SIMP MOC process where applicable.

*SoCalGas progress:* Enterprise MOC has been published in 2025, and enterprise-wide training has been completed. Additionally, a video to promote awareness is planned for 2025. The published enterprise MOC will be reviewed, and best practices will be incorporated into SIMP 6 as applicable, by 2026.

8. Create and deploy an MOC Dashboard for accessibility/visualization of program metrics and real-time data; add a metric for the time difference between initiation date and approval date; include language addressing changes impacting safety, reliability, or environment in SIMP.6, Section 3.1.2, and update training.

*SoCalGas progress:* Online MOC Dashboards have been created.

9. Add an example list of scenarios requiring MOC to the SIMP.6 appendix and to the MOC section of gas standards; annually review documented MOCs with underground and above-ground storage departments to promote understanding of scenarios requiring MOC; circulate a quarterly bulletin of



completed MOCs, and solicit feedback on changes that may have missed documentation or are pending documentation.

*SoCalGas progress:* Examples of MOC will be included in SIMP 6 during the annual review planned for 2025. Example MOCs are being added to applicable gas standards as annual reviews are completed, and this task will be fully completed in 2026. The MOC bulletin was created and circulated periodically.

Prior WSOC recommendations remaining open are described in [Section II, Part B-1](#) of this Report.

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

### **Part A: Recommendations Made During the July 2024 – June 2025 Period**

There were no new recommendations from the Safety Ombudsman during the July 2024 – June 2025 period.

### **Part B: SoCalGas Progress Responding to Prior Recommendations**

#### **Part B-1**

Please refer to Annual Report Number Five – Recommendations for Improvements Related to Safety and Leak Prevention at this link: [Click Here](#), for a listing and discussion as applicable for prior recommendations considered to be addressed and closed.

[Section I](#) above discusses the MOC-related improvements recommended by the WSOC and the SoCalGas progress on those recommendations.

#### **Part B-2**

Please refer to Report Number Five – Recommendations for Improvement at the link in Part B-1 above for a listing and discussion, as applicable, for prior recommendations considered to be addressed and closed.

The following recommendations made by the Safety Ombudsman were closed during the July 2024 – June 2025 period, 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 the Aliso Canyon Facility.
- 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 is in the process of retaining the services of a third party to review the gas inventory analysis and provide further recommendations. SoCalGas reviewed recommendations a. through f. above and responded as follows, in order:
  - o 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.
  - o SoCalGas plans to develop a more comprehensive annual report on inventory verification addressing the items identified in the recommendations.
  - o See SoCalGas' response to a. above.
  - o This recommendation refers to an inadvertent typo in the 2020 report, which has been fixed.
  - o This recommendation is already implemented and detailed in GS 224.070 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.
  - o SoCalGas plans to include a section in the proposed comprehensive annual report that reviews the data obtained from the Measurement Group regarding fuel usage and fugitive losses.
- SoCalGas 2024 Update: The third-party consultant is anticipated to begin towards the end of Q4 2024. This effort will include:
  - o Review the methodology for calculating average reservoir pressure in the inventory verification process.
  - o Evaluate changes to the average reservoir pressure evaluation method and provide feedback.
  - o Perform a review of the results of the inventory verification analysis of the Aliso Canyon Facility.
- SoCalGas 2025 Update: SoCalGas retained Ryder Scott as a third-party expert consultant and started work on the inventory validation process. Ryder Scott will evaluate our current methodology and make recommendations for improvement if necessary.
- *Ombudsman Note:* This recommendation is provisionally closed; the Ombudsman will want to see the results of the third-party consultant when the work is completed.
- 2. The Ombudsman recommended in March 2022 that SoCalGas develop risk metrics that can be tracked and trended. Metrics could be developed with respect 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.
- SoCalGas 2025 Response: SoCalGas has drafted proposed performance metrics and continues to refine them relative to updated information and changes within Underground Storage such as the implementation of a company-wide SMS Program.
  - *Ombudsman Note:* This recommendation is closed. Performance metrics can be subject to change as the storage integrity management program continues to learn and mature.
3. In December 2022, the Ombudsman recommended that SoCalGas improve Well Handover procedures and review STOR-002 vs. ISO 16530 for potential changes and additions.

SoCalGas identified a need to formalize the “pre-spud” meeting and checklist that is used for the well handover process. SoCalGas updated its written process (STOR-002) to remind the engineer of sources of information for the well handover. The “pre-spud” meeting and checklist update was completed, formalizing these items and adding them to GS 224.103. The records generated are retained in the well workover file in WellView. By Q4 2025, SoCalGas plans to update STOR-002 to add a checklist for returning the well to service after workover operations are completed.
  - *Ombudsman Note:* This recommendation is closed as the actions are planned to be complete by year end 2025.
  4. In June 2022, the Ombudsman recommended that SoCalGas develop a plan for reservoir integrity risk assessment.

SoCalGas completion actions: SoCalGas completed a baseline risk assessment of the Aliso Canyon Facility reservoir in March of 2024 per the qualitative reservoir risk framework described during the Q2 2024 WSOC meeting. The reservoir risk framework assesses threats within the Incorrect Operations & Maintenance, Geological Uncertainty, Third Party Damage, and Weather & Outside Forces threat categories, and achieves differentiation of these threats through an understanding of the established prevention and mitigation measures in place. Efforts to continue managing reservoir risk have included completion of Reservoir Monitoring and Reservoir Integrity Assessment Plans and monitoring for Notices of Intent or other signs that third parties may be performing work in the vicinity of the storage field or reservoir.
  - *Ombudsman Note:* This recommendation is closed as the baseline reservoir integrity risk assessment was completed.
  5. Taking into evaluation the well deliverability, well siting, proximity to greatest perceived threat of fault displacement, and SoCalGas’ progress on “evaluating the wells at Aliso Canyon for the installation of subsurface safety valves as measures to mitigate landslide and/or seismic threats”, as well as SoCalGas’ past experience with reliability of deep-set subsurface safety valve systems, and after review and consultation with subsurface safety valve system manufacturers, select one





well for demonstration installation of a current-technology deep subsurface safety valve system. Develop maintenance, inspection, and testing practices for the system, then monitor the performance reliability of the installation over a period sufficient to demonstrate the potential range of reliability and the net risk change. Note\*: SoCalGas stated in response to DR#20, Q4 and Q5 that “SoCal is in the process of evaluating the wells at Aliso Canyon for the installation of subsurface safety valves, as measures to mitigate landslide and/or seismic threats.”

SoCalGas actions: As a result of well-specific risk assessments, recent installations have been made at intermediate depths approximately 200’ below the Younger Santa Susana Fault to mitigate fault displacement risk in wells Fernando Fee 35C (1707’), Porter 50C (3175’), and Fernando Fee 32F (3517’).

Installations are planned at Fernando Fee 32G, Porter 68A, Porter 69D, Porter 69K, and Porter 72B.

Refer to Annual Report Number Six – Work of the Safety Ombudsman - [Click Here](#), for SoCalGas response to the Ombudsman’s Data Request #22 and links to information related to the installation selection basis and the testing-inspection-maintenance program that SoCalGas has implemented to support reliability.

- *Ombudsman Note:* This recommendation is closed as several wells have had or will have had SSSV installed to intermediate depths below fault intersections by the end of 2025.
- 6. Continue Activities of the WSOC: Conduct Audits and Strengths-Weaknesses-Opportunities-Threats (SWOT) Exercises; conduct a SWOT exercise over the course of the 2023-2024 WSOC meetings.

The WSOC selected SIMP.6 Management of Change in 2024 for SWOT and conducted the exercise through early 2025, resulting in recommendations as addressed in [Section I](#) of this Report.

- *Ombudsman Note:* This recommendation is closed as the SWOT exercise was completed in March 2025 and SoCalGas response to recommendations are in progress as detailed in [Section I](#) of this Report.
- 7. The Ombudsman recommended in March 2023 that SoCalGas’ risk reduction at the Aliso Canyon Facility since 2016 be documented, including the knowledge gained through ongoing monitoring, the preventive and mitigation (P&M) efforts employed or planned, and the perceived efficacy and effectiveness of those P&M measures. Risk reduction could be itemized for each of the following categories and subcategories:
  - a. Reduction in footprint (number of active wells and well sites)
  - b. General reduction in environmental and safety impact potential
  - c. Reduced reservoir pressure and volume (reduces consequence potential)
  - d. Increased mechanical integrity and resilience of wells
  - e. Design/materials improvements (liners, other tubulars, cement, wellhead)
  - f. Two passive physical/technical barriers (tubulars)
  - g. Additional wellhead barriers
  - h. Treatment for prevention/mitigation of other hazards
  - i. Plugged well integrity



- j. Increased human and organizational awareness and discipline
- k. High-quality procedural and engineering/material standards
- l. Remote/electronic/continuous monitoring, with alarm/warning management
- m. Additional downhole and wellhead testing, inspection, analysis
- n. WSOC and other aspects related to safety management
- o. SIMP organizational acumen
- SoCalGas 2024 Response: SoCalGas developed a framework and approach to managing the integrity of underground storage assets in its SIMP plan, including processes for data collection and integration, threat evaluation and risk assessment, integrity assessment, and implementation of prevention and mitigation protocols. The processes described and referenced in the SIMP plan detail the mitigations implemented to reduce the risk of a well or reservoir failure. SoCalGas developed and is executing a quantitative risk assessment for storage wells. The risk assessment framework will allow for various mitigation scenarios to be evaluated, demonstrating the risk benefit of certain implemented or proposed P&M measures.
- SoCalGas implemented various measures at the Aliso Canyon Facility that support management and mitigation of risk, including:
  - o Dual barrier well construction and operation (tubing-only flow)
  - o Metal loss and mechanical integrity testing of well tubulars (e.g., MFL, UT, noise/temp, pressure testing)
  - o Well abandonments or remediations (e.g., inner string installations)
  - o Annulus pressure monitoring
  - o Surface and subsurface safety valves
  - o Emergency response drills
  - o Governance plans and procedures
  - o Risk assessments
- SoCalGas 2025 Update: Baseline risk assessments using the quantitative framework developed by SoCalGas have been completed on all Aliso Canyon Facility gas storage wells. The Quantitative Risk Assessment (QRA) assesses the threats of Corrosion, Erosion, Manufacturing Defects, Installation Defects, Mechanical Damage, Equipment Failure, Third-Party Damage, Well Intervention, Incorrect Operations & Maintenance, and Weather & Outside Forces. Risk metrics calculated include probability of a gas release, societal and individual life safety risk (fatalities per year), environmental risk (methane of CO<sub>2</sub> equivalent per year), and aggregate risk (\$USD per year). Sensitivity analysis has been conducted on all gas storage wells to understand the risk benefit of downhole safety valves and future analyses will explore the risk benefits of previously implemented mitigations, such as pressure monitoring, packer fluid, and surface safety valves. SoCalGas will continue to analyze and understand the risk results now that assessments have been completed and as new results are generated.
- *Ombudsman Note:* The Ombudsman considers this recommendation closed. Due to the state of maturity of the SoCalGas risk model, the types of risk reduction metrics recommended can be performed.



The Ombudsman delivered new recommendations at the end of the July 2023-June 2024 cycle:

1. Update the "...finite element analysis previously performed at Aliso Canyon" (Note – SoCalGas, in its response to DR#20 Q1, stated that "Evaluation of the fault displacement threat leverages public models for earthquake frequency, surface expression likelihood, and fault displacement amplitude. The probability that a given fault displacement amplitude will result in a well failure is estimated leveraging finite element analysis previously performed at Aliso Canyon.")

*Discussion:* Pursuant to SoCalGas responses to DR#19 and DR#20, this recommendation seeks clarification on the ability of SoCalGas to update the analysis with additional information.

2. Part 1: Model the change in resistance and resilience of the dual-casing-string wells to show the difference between before- and after-state of risk at the facility wells in regard to failure due to mass earth movement.

Part 2: Define how the tubular failure frequencies for current wellbore completions with tubing/packer and/or new and additional cemented casing strings compare in an updated finite element analysis with the failure frequency over a 10-year period for each well in the previous analysis, stated to be in the range  $2.9\text{e-}3$  to  $3.9\text{e-}3$  per year. Is that likelihood different if the period is different than 10 years – for example, what would be the failure probability over 50-year and 100-year periods?

*Discussion:* Part 1: A similar recommendation was made in Annual Report Number Four – Work of the Safety Ombudsman, and Annual Report Number Four – Recommendations for Improvements Related to Safety and Leak Prevention, pursuant to DR#17, #18, and #18A, where the Ombudsman noted that each well with a new inner string is, potentially, more resistant to, and resilient against, the potential impact of earth mass movements due to seismic activity and/or landslides. The new well tubulars have greater mechanical strength than the original production casing, including greater collapse resistance, greater internal yield, and increased joint strength at the threaded connections. This recommendation builds on the September 2023 recommendation, in that SoCalGas reported differences in failure rates for such wells in response to DR#20, Q2, but it is not clear how these differences are more fully represented in the individual well risk assessments.

Part 2 seeks clarification on how the relative risk information is presented by SoCalGas.

- SoCalGas Actions: For Part 1 of this recommendation, refer to the Annual Report Number Five, Work of the Ombudsman and see response 2 from DR #20 for risk benefit of dual barrier construction and inner string additions.
3. Part 1: Show the difference in risk profile or risk envelope, as defined in Part 2 of Recommendation #2 above, for wells re-completed since 2016 where additional tubular strings were added to the wellbore profile.

Part 2: Show how additional tubular strings are handled in the probabilistic evaluation/equation, as independent barriers vulnerable to their individual failure likelihood in relation to a single fault displacement source event, or as redundant or partially redundant barriers.

Part 3: Show how secondary effects and co-dependent barrier elements (such as wellbore cement) are addressed in the probability chain.



Part 4: Use a P90/P90+ potential leak scenario stemming from tubular failure at deep seated fault displacement with gas flow to the surface, when coupled with a longer-than-10-year review period for fault displacement tubular failure. (\*Is SoCalGas addressing scenarios higher than P50, such as P90/P90+ consequence scenarios in their well integrity risk assessments? – Recommendation made here is to develop and show the full risk potential envelope (or profile) for the range of failure likelihood and consequence scenarios).

*Discussion:* Parts 1, 2, 3: Analysis and graphical visualization of risk envelope and/or risk profile helps to see the difference with and without various mitigations, as well as the full probability severity spectrum of likelihood and consequence. Full view of a risk envelope or risk profile might have impact on risk-informed decision-making depending on the context of the organization's and stakeholders' risk perception and risk tolerance.

Part 4 seeks clarification on characterization of the modeling of the high-end range of potential consequences.

- *Ombudsman Note:* The Ombudsman considers this recommendation closed. Due to the state of maturity of the SoCalGas risk model, the types of risk comparisons recommended can be performed. In addition, SoCalGas responses to DR #20 (refer to Annual Report Number Five – Work of the Safety Ombudsman [Click Here](#)) provide information related to this recommendation.

### **Part B-3**

Five (5) recommendations made by the Safety Ombudsman remain open, although SoCalGas has made progress in each of the subject matter areas.

Several recommendations are provisionally complete as presented in [Section II, Part A](#) of this Report and are not repeated here. The group of recommendations made by the WSOC pursuant to the SWOT exercise on the SIMP.6 MOC remain open, but the progress was detailed in [Section I](#) of this Report and is therefore not presented here. SoCalGas progress on the remaining open recommendations is summarized below.

1. 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. The study of human and organizational factors and reliability remains an open recommendation, subject to periodic evaluation of the Company's continual improvement.
- 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, 2023 RMP with Appendix D: Human Factors Assessment Overview. During the Q1 WSOC meeting, held on March 23, 2023, SoCalGas provided an overview of the Safety Forward program to WSOC. Safety Forward is a company-wide commitment to enhance SoCalGas' safety culture while living its safety values. Under the SIMP, the Internal Audit and Human Factors Assessment programs provide structures for detailed procedural reviews, including observations of field execution, to understand the appropriateness and effectiveness of SIMP processes. They also allow for an understanding of how the systems in place support personnel in their comprehension of procedural requirements and execution of tasks.



The employee training program in place includes awareness training of procedures pertinent to an individual's job responsibilities. The contractor onboarding process supports the effort to bring trained and qualified individuals to job sites.

- SoCalGas 2024 Update: SoCalGas' Human Factors Assessment program, as part of SIMP, is executed on individual operations and maintenance processes to evaluate the interactions between humans and the systems in place to support their execution of tasks and procedures. Three (3) human factors assessments have been completed. SoCalGas plans to complete at least two (2) additional human factors assessments in 2024.
  - SoCalGas 2025 Update: SoCalGas has completed eleven (11) Human Factors Assessments (HFAs) as of July 2025. SoCalGas plans to complete seven (7) additional HFAs by the end of 2025, for a total of eighteen (18) HFAs by the end of 2025. In 2026, SoCalGas plans to complete nine (9) HFAs.
  - *Ombudsman Note:* Open while SoCalGas continues work in this area. SoCalGas has completed eleven (11) human factors reviews, plans seven (7) more by end of 2025 and nine (9) in 2026.
2. In 2019-2020, the 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 initiated a review of IOS 16530 in 2021 and since that time has implemented some changes, but one (1) open item remains, related to documentation and display of well barriers in WellView. SoCalGas reported in July 2024 that it was engaged in an evaluation of third parties for a Well Integrity Management System (WIMS) solution to provide integration of well operations data, well barrier schematics, monitoring and status of well barriers, and other potential functions to support management of well integrity. SoCalGas anticipated implementation of a solution in the 2025-2026 timeframe, but in the 2025 update stated that resource limitations will delay implementation until 2028. However, SoCalGas continues to implement data and process improvements associated with well integrity.

- *Ombudsman Note:* Open while SoCalGas continues process improvements to well safety information communication.
3. The Ombudsman recommended in 2020 that SoCalGas investigate possible subsurface accumulation(s) of gas behind well casing in the area surrounding the SS-25 well, including baseline and subsequent gas detection logs.

By mid-2022, SoCalGas had collected field screening data at various monitoring locations on and around the SS-25 well pad. 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 developed 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. Given





that there are no open hole neutron logs to provide a true baseline, SoCalGas identified logging program elements that include:

- Compensated neutron logs (CNL) with combination of ultrasonic imaging tool/cement bond log (USIT/CBL) run on wells post inner-string installations.
- Comparison of original cased hole logs with subsequent logs to provide qualitative indications of gas (void) behind casing, depending on specific well configurations.
- Logging frequency dependent on CalGEM-approved assessment interval.

SoCalGas reviewed the annular pressures of surrounding wells within a 1/4-mile radius of SS-25 for the last four (4) years and did not identify any anomalously high pressures.

- *Ombudsman Note:* SoCalGas has completed past observations, but the Ombudsman considers this to be a standing open recommendation, as annulus pressure and fluid monitoring and identification of hydrocarbon sources are critical features of well and reservoir integrity assessment. Additionally, the original release from SS-25 in 2015-2106 could have longer-term residual effects in the subsurface, though diminishing through time. So far, SoCalGas reports that nothing of concern has been identified in the monitoring, but the Ombudsman will continue to request an emphasis on this subject and review of information related to it.
4. With respect to reservoir risk assessment and its qualitative treatment of threats affecting the reservoir – geologic uncertainty, third-party activity, incorrect operations, and outside forces – the Ombudsman recommends: a) clarify the definition of a reservoir risk event; b) add pressure-volume-inventory as a threat and, specific to the Aliso Canyon Facility, identify the sensitivity of gas volume per psi as a tool to monitor for reservoir events; and c) evaluate interaction of the pressure-volume-inventory threat with the geologic uncertainty threat.

The SoCalGas reservoir risk assessment model is recent and likely will undergo further development and improvement. The Ombudsman offered these recommendations for SoCalGas' consideration in the ongoing development and improvement of its reservoir risk assessment model.

- *SoCalGas 2025 Update:* In the context of the reservoir risk assessment, a reservoir failure is defined as the loss of containment of gas from the part of the reservoir intended for gas storage. Over- or under-pressuring of the reservoir is included as a threat within the Incorrect Operations and Maintenance threat category, with monitoring of the P/Z vs V hysteresis curve identified as an established measure to monitor for evidence of a loss of containment event. Geological Uncertainty, including uncertainties of reservoir extent, caprock capacity, and reservoir expansion/contraction, is covered in the risk assessment. As the assessment framework matures, SoCalGas will further explore potential threat interactions and methodology improvements.
  - *Ombudsman Note:* Recommendation remains open. SoCalGas is still exploring threat interactions and should look at the inventory in a volume per pressure unit trend analysis as well as the stated P/Z vs. Volume "hysteresis curve." This recommendation is linked to the gas inventory assessment needs recommendation discussed in [Section II, Part B-2](#) (Recommendation #1) of this report, which is provisionally closed. However, the Ombudsman will want to review the results of the Ryder Scott gas inventory assessment for the Aliso Canyon Facility.
5. From the 2023 Annual Report Number 4, released to the public in September 2023, the Ombudsman recommended that SoCalGas could improve its storage well emergency action plans to identify flow capability of each well and implement improvements in emergency action plans for





gas storage well incidents using heat flow, noise, pollutant flow, and precautionary distancing measures.

Based on the Ombudsman's review of SoCalGas' responses to DR#16 and DR#16A recommendations for improvement in the well emergency action plans could include:

- Identification of max flow capability (absolute open flow, tubing flow constrained, at maximum operating pressure) at surface for each well.
- Identification of downhole rupture flow potential through casing (tubing-casing annulus constrained; variable with depth?).
- Determination of the relationship of max flow at surface to heat flux and to noise flux.
- Determination of the relationship of heat and noise flux to emergency planning initial isolation zones, emergency action zones, and emergency planning zones.
- Characterization of the nature of well flow and other fluid/pollutant/toxin transport (fluids other than natural gas) – is there information to differentiate the potential fluid composition from wells?
- Identification of potential collector and transport zones above (shallower than) the storage intervals – identification of rock properties, native pressures, native fluid contents – prioritize by shallowest/best/etc. Are any of these zones observed directly or by comparison of neutron or other logs over time?
- Characterization of how downhole leaks might spread in the subsurface and/or modeling of potential pathways, including identification and characterization of how downhole uncontrolled hydrocarbon and other fluid releases could be detected and controlled, how such releases might spread, and what receptors could be affected.
- SoCalGas 2024 Response: SoCalGas is performing a study of precautionary distances in the event of a potential well failure based on storage inventory and inflow performance relationship (IPR). SoCalGas anticipates updating the Blowout Contingency Plan, as appropriate, in Q1 2025, after the completion of the study.
- SoCalGas 2025 Update: SoCalGas is developing the IPR curve information for all wells and anticipates completion by Q3 2026. Based on information generated, SoCalGas will adjust, as needed, emergency action plans for gas storage well incidents. SoCalGas anticipates updating the Blowout Contingency Plan, with initial well safe zones by Q2 2026.
- *Ombudsman Note:* The recommendation remains open until SoCalGas completes the actions in 2026. The Ombudsman will provide an update in the 2026 report to indicate progress or satisfactory closure.