



ENCLOSURE 1

Department of Conservation Division of Oil, Gas, and Geothermal Resources

July 19, 2017

Updated Comprehensive Safety Review Findings

This Enclosure 1 sets forth findings that support the State Oil and Gas Supervisor's determination that the safety requirements of Senate Bill 380 have been fulfilled and that injection may resume at the Aliso Canyon gas storage facility (Facility). *The issuance of these findings does not lift the prohibition on injection at the Facility. The Supervisor will issue an Order wherein he lifts the injection prohibition subject to additional temporary requirements. These temporary requirements are meant to further demonstrate the integrity and safety of the Facility as the injection operations resume.*

This statement of findings incorporates the findings in the January 17, 2017 letter (Enclosure 2). Some findings below are updates to the findings in the January letter. To the extent that the findings below and in the January letter may overlap, the more current findings below replace the previous findings. The updates and additional findings made, based on the comprehensive safety review and a joint inspection of the Facility by the Division of Oil, Gas, and Geothermal Resources (DOGGR), California Public Utilities Commission (CPUC), and the California Air Resources Board (CARB), are as follows:

- Forty-nine (49) of the 114 injection wells at the Facility passed the two batteries of tests. Public Resources Code section 3217 requires to ensure external and internal well mechanical integrity. DOGGR has reviewed and verified the results of the tests and has made the test results publicly available on its website. DOGGR has issued well-specific findings letters for each of these wells.
- Sixty-five (65) of the 114 injection wells at the Facility have passed at least the first battery of tests. Southern California Gas Company (SoCalGas) took these wells out of service and safely isolated them from the gas storage field consistent with Public Resources Code section 3217. DOGGR has reviewed and verified the results of the tests, and has made the test results and documentation of the isolation of the wells publicly available on its website. DOGGR has issued well-specific findings letters for each of these wells. As Public Resources Code section 3217 requires, the 65 wells have one year to pass all tests (i.e. the second battery of tests) or be permanently plugged and abandoned consistent with regulations and any additional conditions DOGGR may impose on a case-by-case basis.
- Each of the 49 wells eligible to be used for injection have been equipped with tubing-and-packer completions that isolate the tubing-casing annulus. For each of the 49 wells, the production tubing was pressure tested to verify the integrity of the primary mechanical barrier. Public Resources Code section 3217 and the Supervisor's Order No. 1109 require that injection and production of gas occurs through the interior tubing, and shall not occur through the annulus between the tubing and casing.

- Every well is equipped with real-time pressure monitoring of the tubing and casing. The pressure is continuously reported and monitored in SoCalGas's operations center with alarms for any significant pressure changes. This technology facilitates the operator's compliance with Public Resources Code section 3217's requirement to conduct ongoing pressure monitoring of wells.
- DOGGR has determined that, to comply with Public Resources Code section 3217, the appropriate maximum bottom-hole reservoir pressure at the top of the reservoir structure, as represented by the productive interval in the Porter 69G well, is not more than 2,926 pounds per square inch absolute (psia); and the appropriate minimum reservoir pressure is 1,080 psia. DOGGR's approval of these limits is based upon review of the proposed pressure limit submitted by SoCalGas; consultation with geotechnical experts at Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory (collectively, "National Labs"), and the University of Texas; and consideration of public comments on the proposed pressure limits. As many of the wells at the Facility are currently isolated from the reservoir with a mechanical plug and fluid filled tubing and casing, maintaining a reservoir pressure below hydrostatic pressure provides an additional safety factor. Once the isolated wells have been permanently plugged and abandoned or completed all testing and remediation in accordance with Order No. 1109, DOGGR would consider a renewed proposal by SoCalGas to inject at a higher operating pressure. A maximum surface operations pressure of 2,476 pounds per square inch gauge will ensure that the reservoir pressure remains below 2,926 psia.
- SoCalGas satisfied the requirement of Order No. 1109 to include an effective geologic and geotechnical hazard mitigation protocols in the Risk Management Plan (RMP) filed under California Code of Regulations, title 14, section 1724.9, subdivision (g). DOGGR carefully considered all data submitted by SoCalGas and followed up with SoCalGas as necessary to collect additional data to ensure that the RMP would be complete according to the mandates of Order No. 1109 and the regulation. DOGGR also consulted with the National Labs regarding potential geologic and geotechnical hazards that may affect the Facility. The National Labs recommended that two studies be conducted to provide a more detailed understanding of the seismic hazards at the facility. The National Labs concluded that they "do not believe that the recommended detailed seismic studies require immediate action, but they should be planned and executed in a deliberate manner." As a result, DOGGR conditioned approval of the RMP on additional study in conjunction with the National Labs to evaluate seismic risk mitigation measures beginning in 2017.
- SoCalGas satisfied the requirement of Order No. 1109 to include an effective facility-wide emergency response plan in the RMP filed under California Code of Regulations, title 14, section 1724.9, subdivision (g). Updates and improvements to the emergency response plan, including possible enhancements based on input from local first responders, are anticipated prior to, and even after, DOGGR approves the RMP. Completion of the iterative process to enhance the emergency response plan is not required for resumption of injection at the Facility and is infeasible, as DOGGR anticipates that emergency response plans in general will be revised if and when new information warranting an update becomes available.
- SoCalGas has completed a leak survey for the entire facility and reported all results to the CPUC.

- SoCalGas has provided DOGGR with a written procedure for dealing with any production tubing leaks and production casing/tubing annulus pressure increases, which includes response procedures and follow up actions; up-to-date protocols for sustained surface casing pressure; and uniform definitions for labeling annuli.
- SoCalGas is implementing an inspection and leak detection protocol that is consistent with DOGGR's emergency regulations, the requirements of Senate Bill 887 (Pavley, Chapter 673, Statutes of 2016), and best practices identified in consultation with CARB.
- SoCalGas has an effective work plan in place for compliance with the requirements in DOGGR's emergency regulations for function testing downhole devices.

To further confirm the integrity of the Facility after resuming injection, simultaneous with lifting the prohibition on injection, the Supervisor will order SoCalGas to take additional temporary measures, and conduct certain tests, immediately before and soon after resuming injection. DOGGR and the CPUC initially identified these temporary post-emergency requirements in their October 21, 2016 joint letter to SoCalGas:

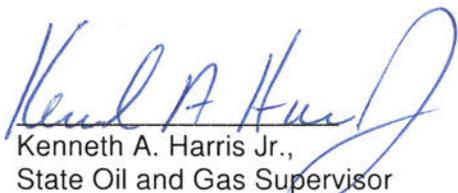
- At least once during the two-week period prior to resuming injection, SoCalGas will be required to complete a leak survey for the entire facility with all results reported to the CPUC and the Division within three days of completion, and conduct a downwind flight to measure total site methane emissions.
- SoCalGas will be required to complete a leak survey for the entire Facility within 72 hours after resuming injection operations, with results reported to the CPUC and CARB within three days of completion of the survey. Reportable leaks must be immediately reported to the appropriate agencies as required by law.
- In addition to the daily monitoring for leaks required under DOGGR's regulations, SoCalGas will be required to complete leak surveys for the entire Facility immediately after one month of injection operations and quarterly thereafter for one year (five surveys total), with results reported to the CPUC and CARB within seven days of completion.
- SoCalGas will be required to report daily reservoir pressure estimates to the CPUC and DOGGR during the first 30 days of resuming injection.
- SoCalGas will be required to report daily reservoir injection and withdrawal volume measurements to the CPUC and DOGGR during the first 30 days of resuming injection.
- SoCalGas will be required to continue to work diligently to complete testing or fully plug and abandon each well that was isolated within one year of isolation.
- SoCalGas will be required to address any outstanding data gaps in the project file for the Facility.
- After injection has resumed, SoCalGas will be required to conduct at least two downwind flights to measure total site methane emissions to demonstrate the absence of significant leaks at the Facility.

- SoCalGas will be required to continue to conduct research on seismic risk to the satisfaction of DOGGR using a third party consultant approved by DOGGR and the National Labs.

The following examples of the CPUC and DOGGR closely coordinating contributed to the Supervisor's findings stated above:

- The CPUC and DOGGR conducted joint Technical Safety Compliance field inspections that included field verifications to function test critical safety control devices associated with the gas injection and withdrawal system.
- The CPUC and DOGGR developed a Master List for pre-injection safety assurances and will ensure SoCalGas complies with the measures in the Master List so that wells and pipelines on the site are brought back to pressure in a safe manner.
- The CPUC and DOGGR required SoCalGas to equip all wells returned to operations with continuous annulus pressure monitoring devices with alarms.

Based on the foregoing, including the findings in Enclosure 2 and all site inspections and public comments, the Supervisor finds the comprehensive safety review is complete. That review demonstrates the integrity of the wells at the Facility, that the risks of failures identified during the review have been addressed, and that the Supervisor has satisfied all other statutory and regulatory requirements consistent with Public Resources Code section 3217. Further, the Supervisor finds that DOGGR will continue to collaborate with the CPUC to ensure that SoCalGas complies with all regulations and other measures designed to ensure the safety of the Facility.



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