1	Department of Conservation, Division of Oil, Gas, and Geothermal Resources
2	Legal Office for the STATE OIL AND GAS SUPERVISOR
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4	Telephone (916) 323-6733
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6	STATE OF CALIFORNIA
7	NATURAL RESOURCES AGENCY
8	DEPARTMENT OF CONSERVATION
9	DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES
10	
11	ORDER TO
12	TAKE SPECIFIED ACTIONS RE:
13	ALISO CANYON GAS STORAGE FACILITY
14	[Pub. Resources Code, §§ 3013, 3106, 3219, 3224, 3226, 3300, and 3403.5.]
15	[Cal. Code Regs., tit. 14, §§ 1724, 1724.6, 1724.7, subd. (e), and 1724.10]
16	
17	Order No. 1109
18	March 4, 2016
19	Operator: Southern California Gas Company (S4700)
20	Aliso Canyon Field
21	Los Angeles County
22	Los Angeles County
23	BY
24	·
25	Kenneth A. Harris, Jr.
26	STATE OIL AND GAS SUPERVISOR
27	

I. Introduction

Under the authority of the Public Resources Code (PRC), the State Oil and Gas Supervisor (Supervisor) may order tests and remedial work concerning oil field operations which, in his judgment, are necessary to prevent damage to life, health, property, and natural resources. (See Pub. Resources Code, §§ 3106 and 3224.) Further, the Supervisor is to ensure that "no damage occurs to the environment by reason of injection and withdrawal of gas" in underground gas storage facilities. (Pub. Resources Code, § 3403.5.) To that end, the Supervisor may request from the operator any data that are pertinent and necessary for the Division of Oil, Gas, and Geothermal Resources (Division), and its District Deputy, to properly evaluate underground injection projects. (See, e.g., Cal. Code Regs., tit. 14, §§ 1724.6 and 1724.7, subd. (e).) The operator must maintain those data and make them available to Division personnel to show, among other things, that no damage to life, health, property, or natural resources is occurring by reason of the project. (Cal. Code Regs., tit. 14, § 1724.10, subd. (h).)

At all times relevant to this Order, **Southern California Gas Company¹** (SoCal Gas or Operator) is the "operator," as defined in PRC section 3009, of certain "wells," as defined in PRC section 3008, subdivision (a), and is conducting "operations" as defined in California Code of Regulations, title 14, (Regulations) section 1720, subdivision (f), at a gas storage project (see Regulations section 1724.9) in the Aliso Canyon Field in Los Angeles County (Field).

Based on data in Division files, discussions with Operator, and Division site visits, the Supervisor determined that there was an uncontrolled flow of fluids (see Regulations section 1722.5) from well "Standard Sesnon" 25 (API no. 037-00776) and a waste of gas in the Field, which Operator has addressed. On February 18, 2016, the Division confirmed that the lead was under control. Operator's response to the uncontrolled flow of fluids from well "Standard Sesnon" 25 included halting all injection into the gas storage injection project in the Field. On December 10, 2015, the Supervisor issued Order 1106, ordering Operator to continue to not inject gas into the gas storage project until injection is authorized by the Division.

¹ The Operator Code for Southern California Gas Company is S4700.

 (Supervisor's Emergency Order 1106, p. 9.) Order 1106 is a final order of the Supervisor and currently remains in effect.

The uncontrolled flow of fluids from well "Standard Sesnon" 25 has brought into question the integrity and safety of all of the wells in the gas storage injection project in the Field. The Storage Integrity Management Plan submitted to the Public Utilities Commission in connection with 2016 General Rate Case Proceeding A.14-11-XXX also raises concerns about the integrity and safety of the wells in the gas storage injection project. In order to protect life, health, property, and natural resources, it is necessary to demonstrate the integrity and safety of each of the wells in the gas storage project in the Field. Therefore, in accordance with PRC sections 3013, 3106, 3219, 3224, 3300, and 3403.5, and Regulations sections 1724, 1724.6, 1724.7, subdivision (e), and 1724.10, subdivisions (a), (h), and (k), the Supervisor hereby orders Operator to take the actions identified below. This order does not supplant previous orders of the Supervisor, and the actions ordered herein shall be in addition to the actions that the Supervisor has previously ordered Operator to take.

II. <u>Definitions</u>

The following definitions apply to the terms used in this Order:

PRC section 3008, subdivision (a), defines "Well" to include "any well drilled for the purpose of injecting fluids or gas for stimulating oil or gas recovery, repressuring or pressure maintenance of oil or gas reservoirs, or disposing of waste fluids from an oil or gas filed; [and] any well used to inject or withdraw gas from an underground storage facility[.]"

PRC section 3009 defines "Operator" to mean "a person who, by virtue of ownership, or under the authority of a lease or any other agreement, has the right to drill, operate, maintain, or control a well or production facility."

Regulations section 1720, subdivision (f), defines "Operations" to mean "any one or all of the activities of an operator covered by Division 3 of the Public Resources Code [i.e., the oil and gas law, commencing with PRC section 3000]."

III. Statutory and Related Authority

PRC section 3013 states that the oil and gas law (Division 3 of the PRC, commencing with section 3000) "shall be liberally construed to meet its purposes" and grants the Supervisor "all powers" that may be necessary to carry out those purposes.

PRC section 3106, subdivision (a), authorizes the Supervisor to "supervise the drilling, operation, maintenance, and abandonment of wells and the operation, maintenance, and removal or abandonment of tanks and facilities attendant to oil and gas production ... so as to prevent, as far as possible, damage to life, health, property, and natural resources ... [and] loss of oil, gas, or reservoir energy[.]"

PRC section 3219 requires the operator of a well wherein high pressure gas is known to exist to equip the well with casings of sufficient strength, and with such other safety devices as may be necessary, in accordance with methods approved by the Supervisor, and to use every effort and endeavor effectually to prevent blowouts, explosions, and fires.

PRC section 3224 requires the Supervisor to "order such tests or remedial work as in his judgment are necessary to prevent damage to life, health, property, and natural resources[.]"

PRC section 3300 states that "[t]he blowing, release, or escape of gas into the air shall be prima facie evidence of unreasonable waste."

PRC section 3403.5 states that "[t]he supervisor is required to maintain surveillance over [underground gas storage] facilities to insure that the original reserves are not lost, that drilling of new wells is conducted properly, and that no damage occurs to the environment by reason of injection and withdrawal of gas."

Regulations section 1724 specifies the types of well records that an operator must maintain and includes "[s]uch other information as the Supervisor may require for the performance of his or her statutory duties."

Regulations section 1724.6 allows the Supervisor to require from an operator "any data that, in the judgment of the Supervisor, are pertinent and necessary for the proper evaluation of the proposed project."

Regulations section 1724.7, subdivision (e), requires the following, where applicable: "Other data as required for large, unusual, or hazardous projects, for unusual or complex structures, or for critical wells. Examples of such data are: isogor maps, water-oil ratio maps, isobar maps, equipment diagrams, and safety programs."

Regulations section 1724.10, subdivision (a), requires that any changes to an injection project "shall not be carried out without Division approval."

Regulations section 1724.10, subdivision (h), states: "Data shall be maintained to show performance of the [injection] project and to establish that no damage to life, health, property or natural resources is occurring by reason of the project. Injection shall be stopped if there is evidence of such damage ... or upon written notice from the Division. Project data shall be available for periodic inspection by Division personnel."

Regulations section 1724.10, subdivision (k), authorizes the Supervisor to request "[a]dditional data requirements or modifications [as] necessary to fit specific circumstances and types of projects."

SoCal Gas's Aliso Canyon gas storage project approval letter (dated April 18, 1989, revised July 26, 1989) conditions 6, 10, 11, and 12, among others, require SoCal Gas to provide data, conduct testing, and perform remediation that the Division deems necessary to ensure and demonstrate that no damage is resulting from operations of the gas storage project.

IV. <u>Actions Required of Operator</u>

Based on the facts, and in accordance with the legal authorities described in this Order, the Supervisor has determined that Operator must take the following actions to demonstrate the integrity and safety of each of the wells in the gas storage injection project in the Field.

Therefore, IT IS HEREBY ORDERED, pursuant to PRC sections 3013, 3106, 3219, 3224,

3300, and 3403.5, and Regulations sections 1724, 1724.6, 1724.7, subdivision (e), and 1724.10 that Operator take all of the following actions:

- (1) For each of the wells in the gas storage injection project in the Field that have not been properly plugged and abandoned in accordance with Public Resources Code section 3208, follow the comprehensive safety review detailed in Attachment 1 of this order (Safety Review). Division staff shall be provided an opportunity to witness testing as specified in the Safety Review. Documentation of testing under the Safety Review shall be provided to the Supervisor in an electronic format within the timeframe specified in the Safety Review Testing Regime. The Safety Review shall be undertaken with all reasonable haste and with the understanding that until all of the actions required under the Safety Review are complete, the Supervisor will not lift the prohibition against injection imposed under Order 1106.
- (2) Provide the Division with regular reports on progress towards completion of the Safety Review. Progress reports shall be provided to the Division every first and third Friday of the month until the Supervisor has confirmed in writing that the Safety Review is complete.
- (3) Properly plug and abandon in accordance with Public Resources Code section 3208 all wells in the gas storage injection project in the Field that have not been tested and remediated to the Division's satisfaction within one year after completion Step 6b of the Safety Review.
- (4) In order to facilitate Division staff witnessing to ensure the effectiveness of testing under the Safety Review, provide an on-site trailer for use as a base of operation for Division staff while the Safety Review is being carried out.
- (5) Equip all wells to be employed in the gas storage injection project with tubing and packer completions that isolate the tubing-casing annulus. If and/or when injection in the gas storage injection project in the Field resumes, all injection and production shall be through tubing only.
- (6) Equip all wells to be employed in the gas storage injection project with real-time pressure monitors that provide immediate notification to the operator when pressures in the well's production tubing or tubing-casing annular space deviate from normal.

- (7) If and/or when injection in the gas storage injection project in the Field resumes, all wells shall be operated with lowest possible operating pressure on the tubing-casing annulus.
- (8) For all wells to be employed in the gas storage injection project, all downhole devices, including but not limited to any installed subsurface safety valve systems, shall be function tested prior to initial injection or withdrawal and every six months after that.
 - (9) Comply with all requirements of sections 1724.6 through 1724.10.
- (10) Ensure that the spill contingency plan filed under section 1722, subdivision (b), is complete and up-to-date.
- (11) Ensure that the Risk Management Plan filed under section 1724.9, subdivision (g), includes an effective facility-wide emergency response plan and effective geologic and geotechnical hazard mitigation protocols.

V. Operator's Appeal Rights

Operator may appeal this Order to the Director of the Department of Conservation by filing a written notice of appeal with the Supervisor as described in PRC section 3350. The Legal Office for the State Oil and Gas Supervisor (801 K Street, MS 24-03, Sacramento, California 95814-3530; Facsimile (916) 445-9916) accepts appeal notices on the Supervisor's behalf. Failing to file a notice of appeal within the timeframe prescribed in PRC section 3350, subdivision (a), waives Operator's right to challenge this Order and makes the Order final. If Operator timely files a notice of appeal, Operator will be informed of the appeal hearing date, time, and place. After the close of the hearing, Operator will receive a written decision that affirms, sets aside, or modifies the Order.

VI. Court Order and Other Potential Actions to Enforce This Order

Failing to comply with Sections IV (Actions Required of Operator) of this Order will subject Operator to potential significant further enforcement action. Such enforcement action can include a civil penalty of up to \$25,000 per violation (PRC section 3236.5) and/or

criminal prosecution, as a misdemeanor, punishable by a fine up to \$1,000, imprisonment up to six months, or both, for each offense (PRC section 3236). Similarly, the Supervisor could deny approval of proposed well operations until compliance is achieved and/or order the plugging and abandonment of wells. (Pub. Resources Code, §§ 3203, subd. (c), and 3237, subd. (a)(3)(C).DATED: March 4, 2016 Kenneth A. Harris, Jr. State Oil and Gas Supervisor Certified mail receipt number: 70121010000092699623

ATTACHMENT 1 TO DOGGR ORDER 1109

SAFETY REVIEW TESTING REGIME FOR THE ALISO CANYON NATURAL GAS STORAGE FACILITY

This document identifies the requirements of this comprehensive safety review that shall be completed by the Southern California Gas Company (Operator) and verified by the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (Division). The Operator shall use accepted industry practices and procedures.

The Division has consulted with independent technical experts from the Lawrence Berkeley, Lawrence Livermore, and Sandia National Laboratories ("National Laboratories") to develop the requirements of this facility safety review. The National Laboratories experts independently reviewed and concurred with the testing requirements for the safety review detailed below.

This comprehensive safety review requires that each of the active injection wells in the Aliso Canyon Storage facility either pass a thorough battery of tests in order to resume gas injection or be taken out of operation and isolated from the underground gas storage reservoir. Several steps, detailed below, are required in this safety review. Documentation of all testing required under this comprehensive safety review shall be provided electronically to the Division within 72 hours of completion of a test in digital (i.e. LAS) and printed (i.e. pdf) form. All pressure tests required under this comprehensive safety review shall be witnessed by Division staff. A well that is properly plugged and abandoned in accordance with Public Resources Code section 3208 is not subject to testing under this comprehensive safety review. A well that does not pass all tests must be repaired, retested, and pass all tests, or be plug and abandoned.

REQUIRED TESTS FOR EACH WELL IN THE FACILITY

- Step 1: The Operator shall perform an initial casing assessment on the well consisting of temperature and noise logs.
 - a. Temperature Log: A temperature survey shall be run from the surface to the packer to measure the temperature within the wellbore. A temperature survey that demonstrates no unexplained anomalous temperature changes in the well is one indication of casing integrity.
 - Noise Log:
 An acoustic sensor survey capable of detecting the sound of fluid flow will be conducted the length of the well above the packer to the surface. The survey will include stops at least every 250 feet and at the midpoint of any anomaly detected by the temperature survey. The absence of anomalous sound above the packer is an indication of well integrity

- Step 2: The results of the Temperature Logs and Noise Logs will be independently reviewed by Division engineers. Any unexplained abnormal findings in this set of tests shall be addressed by the Operator in one of the following ways:
 - a. Conduct further investigation and demonstrate to the Division's satisfaction that the abnormal finding is not an indicator of a lack mechanical integrity;
 - b. Remediate the well to the Division's satisfaction; or
 - c. With Division review and approval, remove the well from operation and isolate the well from the underground gas storage reservoir in accordance with Steps 4b through 7b below.

Necessary actions to remediate any abnormalities revealed by these tests will be reviewed by Division engineers. Once repairs or mitigations are completed, the Temperature Log and Noise Log must then be repeated on the well and reviewed by Division engineers to ensure that there are no additional abnormal test results and to confirm the issue was repaired.

- Step 3: After these tests are completed on the well, and all required action has been completed, the operator shall either:
 - a. Conduct the additional tests and evaluations on the well, outlined in Steps 4a through 7a below, in order to gain approval for injecting gas through that well; or
 - b. Remove the well from operation and isolate the well from the underground gas storage reservoir in accordance with Steps 4b through 7b below.

REQUIRED TESTS IF A WELL IS INTENDED TO RESUME OPERATIONS

If Temperature and Noise Logs have been completed on a well and they indicate well integrity, and the Operator designates the well to return to injection operations, then the Operator shall perform the additional testing outlined in Steps 4a through 7a. The results of these tests will be independently reviewed by Division engineers and posted publicly. Each of the following tests requires that the production tubing be removed from the well.

Step 4a: The Operator shall conduct a Casing Inspection log.

The Operator shall conduct a Casing Inspection log of the well that measures the thickness of the production casing, from the surface to the bottom of the gas storage reservoir cap rock. If the inspection reveals a reduction in wall thickness, the current minimum strength of the casing will be calculated. If the current minimum strength of the casing has diminished to the point that it cannot withstand authorized operating pressures for the well plus a built-in additional safety factor of pressure, the well has failed this test. A passing test for a casing inspection log would show no thinning of the casing that diminishes the casing's ability to contain at least 115% of the well's maximum allowable operating pressure as authorized in the current Project Approval Letter.

Step 5a: The Operator shall conduct a Cement Bond Log for the well.

The Operator shall conduct a Cement Bond Log (CBL) that measures the bonding between cement and the production casing of the well, and also the bonding between the annular cement and the formation. Cement should be solidly bonded to both the well's production casing and the geologic formation to ensure a seal that prevents fluids from migrating up or down the outside of the well. A passing test for a cement bond log shows definitive bond, as demonstrated by sonic waveform,

between cement and casing and between cement and the gas storage formation and/or cap rock for at least 100 feet above the top of the gas storage reservoir.

Step 6a: The Operator shall conduct a Multi-Arm Caliper Inspection of the well.

The operator shall conduct an inspection that measures any internal degradation or significant changes to the well's geometry from the surface to the top of the gas storage reservoir, using a minimum 32-arm caliper tool. If the inspection reveals a thinning or deformity of the casing, the current strength of the casing will be calculated. If the current strength of the casing has diminished, such that it cannot withstand authorized operating pressures plus a built-in safety factor of additional pressure, the well fails this inspection. A passing test for a Multi-Arm Caliper Inspection would show no deformation or thinning of the casing that diminishes the casing from being able to properly contain at least 115% of each well's maximum operating pressure.

Step 7a: The Operator will conduct a Pressure Test of the production casing and of the well once the production tubing has been reinstalled. The Operator may conduct the casing pressure test prior to reinstalling the production tubing. Using a digital recorder, the operator will conduct a liquid-filled positive pressure test within the production tubing of the well, and in the annular space between the production tubing and the casing, to determine the well's ability to withstand normal operating pressures. The production tubing will be isolated and then pressure tested. The annular space between tubing and casing will be pressure tested. This testing also evaluates the integrity of any packers, which seal the annular space between the tubing and casing. The pressure test will be one hour and begin at a pressure of 115% of the maximum operating pressure or the minimum yield strength of the casing and tubing, whichever is less. A passing pressure test is a pressure loss not exceeding 10% for any 30 minute period during the hour long test.

After conducting the above tests, the Operator will conduct any indicated remediation so that the well can pass these tests. All remediation will be subject to the review of Division engineers. The well would then be required to undergo the tests once again to demonstrate well integrity.

If the well passes the Casing Wall Thickness Inspection, the Cement Bond Log, the Multi-Arm Caliper inspection and the Pressure Test to the Division's satisfaction, then the Division may clear the well for use for gas injections and withdrawal, once the Division has authorized resumption of injection into the gas storage reservoir. As noted below, wells approved for operation will only be permitted to inject or withdraw gas through the production tubing.

REQUIRED ACTIONS IF THE WELL IS TO BE TAKEN OUT OF OPERATION AND ISOLATED FROM THE GAS STORAGE RESERVOIR:

If the operator elects to take a well out of service, then the following steps shall be taken to isolate the well from the gas storage reservoir:

Step 4b: The Operator shall confirm the presence of cement outside the well's external casing in the section of the well that prevents the movement of gas from the underground gas storage reservoir to shallower geologic zones above the gas storage reservoir. Existing cement bond logs and well construction

records may be used to make this confirmation. This confirmation requires concurrence from Division engineers.

- Step 5b: The Operator shall install a mechanical seal or "packer" within the well's production casing and install a mechanical plug within the well's production tubing, if applicable. These seals shall be set in place near the bottom of the well, within the portion of the well surrounded by cement. This kind of seal is an industry standard practice for isolating a well from reservoir gases or fluids and will further protect the casing from internal gas pressure.
- **Step 6b:** The Operator shall fill the well with fluid to the well's surface in order to create appropriate downward hydrostatic pressure in the well that further contributes to the integrity of the well seal.

These measures will isolate a well from the underground gas reservoir, as confirmed by National Laboratory experts. Each of the above actions is subject to review and approval by Division Engineers.

- **Step 7b:** Once the Operator has completed steps 4b, 5b, and 6b, and the seal is in place at the bottom of the well and the well is filled with fluid above the seal, the operator shall:
 - a. Conduct daily gas monitoring at the surface of the non-operational well, including monitoring the area around the well perimeter and in the annular space between the plugged casing string and the outmost casing;
 - b. Conduct noise log, temperature log and positive pressure test every six months;
 - c. Conduct weekly monitoring of fluid levels in the well or, install and operate real-time pressure monitors that provide immediate notification to the operator when pressures deviate from normal in the well's interior tubing and its annular space.

The above monitoring shall be reported to Division engineers and maintained as a part of the well file. Division engineers will review all submitted information for evaluation on a regular basis to ensure that the well taken out of service has maintained safety, and the operator shall take all necessary steps maintain the safety of the well.

Any well taken out of operation cannot be approved to resume operations and gas injection until the successful completion of the battery of tests outlined above in Steps 4a through 7a (Casing Wall Thickness Inspection, the Cement Bond Log, the Multi-Arm Caliper Extension and the Pressure Test) is completed. Those tests must be successfully completed within one year of completing step 6b. If a well cannot successfully complete all necessary steps required in this safety review after one year of completing step 6b, then the well shall be properly plugged and abandoned in accordance with Public Resources Code section 3208.

REQUIREMENTS FOR WELLS RESUMING OPERATIONS IN ALISO CANYON

The Division's authorization to resume injection in the Aliso Canyon Storage Facility will be contingent on the successful completion of this comprehensive safety review. The State Oil and Gas Supervisor must confirm in writing that all wells in the facility have either completed and passed the full battery of tests required in the safety review, been taken out of service and isolated from the underground gas storage reservoir, or been properly plugged and abandoned in accordance with Public Resources Code Section 3208.

PROOF OF SERVICE BY CERTIFIED U.S. MAIL

- I am at least 18 years of age, not a party to this action, and I am a resident of or employed in the county where the mailing took place.
- My business address is: Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 801 K St., MS-1805, Sacramento, California 95814-3530.
- 3) I served a copy of the following documents:

ORDER TO TAKE SPECIFIED ACTIONS RE: ALISO CANYON GAS STORAGE FACILITY NO. 1109
by enclosing them in an envelope and placing the envelope for collection and mailing by certified U.S. mail on the date and at the place shown in item 4 following our ordinary business practices. I am readily familiar with this business's practice for collecting and processing correspondence for mailing. On the same day that correspondence is placed for collection and mailing, it is deposited in the ordinary course of business with the United States Postal Service in a sealed envelope with postage fully prepaid.

- 4) The envelope was addressed and mailed as follows:
 - a. Name of person served:

Amy Kitson

b. Address:

Southern California Gas Company 12801 Tampa Avenue, SC9382 Northridge, CA 91326

- c. Date mailed: March 4, 2016
- d. Place of mailing: Sacramento, California
- 5) I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: 3/4/16

Name: Dana T. Lolmaugh

DANA T. Lolus.

Signature:

SENDER: COMPLETE THIS SECTION		COMPLETE THIS SECTION ON DELIVERY			
Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. Print your name and address on the reso that we can return the card to you. Attach this card to the back of the mai or on the front if space permits.	verse lpiece,	A. Signature X			
	Southern California Gas Comp 2801 Tampa Avenue, SC938 Jorthridge, CA 91326		2		
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NATURAL RESOURCES AGENCY DEPARTMENT OF CONSERVATION DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES 801 K STREET, MS 18-05 SACRAMENTO, CA 95814-3530



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