

WELL INSPECTION AND LEAK DETECTION PROTOCOL

PURPOSE *This Well Inspection and Leak Detection Protocol, together with regulations adopted by the California Division of Oil, Gas and Geothermal Resources (DOGGR) and codified at section 1724.9(e) of title 14 of the California Code of Regulations (“DOGGR Emergency Regulations”) and DOGGR Order No. 1009 issued on March 4, 2016 entitled “Order To Take Specific Actions Re: Aliso Canyon Gas Storage Facility” (“Order No. 1109”), is intended to comply with Condition 8 of the Abatement Order issued by the South Coast Air Quality Management District Hearing Board in the matter of South Coast Air Quality Management District v. Southern California Gas Company, Aliso Canyon Storage Facility (Case No. 137-76).¹*

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A. OVERVIEW

On January 23, 2016, the Hearing Board of the South Coast Air Quality Management District issued a Stipulated Order for Abatement in the matter of *South Coast Air Quality Management District v. Southern California Gas Company*, Aliso Canyon Storage Facility (Case No. 137-76) (Abatement Order). Condition 8 of the Abatement Order requires Southern California Gas Company (SoCalGas or Company) to develop an enhanced leak detection protocol applicable to the Aliso Canyon Natural Gas Storage Facility (Aliso Canyon or Facility). SoCalGas has developed this Well Inspection and Leak Detection Protocol (Protocol) to comply with Condition 8 of the Abatement Order. This Protocol shall become effective thirty (30) days following written approval by the South Coast Air Quality Management District (SCAQMD)

¹ Provisions of this Protocol that address specific requirements of Condition 8 are identified by footnotes.

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and shall remain in effect until the effective date of any rule pertaining to the matters addressed by this Protocol adopted by the California Air Resources Board or the SCAQMD Governing Board. In addition to implementing this Protocol, SoCalGas will implement the DOGGR Emergency Regulations and Order No. 1109, as each may be amended from time to time, during the effective periods of each. Implementation of Order No. 1109 shall be completed by December 31, 2016.²

1. POLICY AND SCOPE

This Protocol covers Plugged and Abandoned Wells, Active Wells, Water Injection Wells, Shallow-Zone Oil Production Wells, Idle Wells and Observation Wells (collectively, Covered Wells) owned and operated by SoCalGas at Aliso Canyon. Pursuant to this Protocol, SoCalGas will perform daily leak surveys of all Covered Wells (with the exception of Plugged and Abandoned Wells, which will be surveyed weekly) to proactively identify and address potential natural gas leaks.

2. ROLES AND RESPONSIBILITIES

2.1 Inspection and Leak Detection Protocol Roles and Responsibilities³

The Operations Group, Storage Leak Inspection Group and Field Environmental Group collectively will be responsible for the collection and reporting of the Equipment Leak Detection data generated pursuant to this Protocol. All members of OG, SLIG and FEG will receive annual training on implementation of this Protocol.

2.1.1 Operations Group (OG) - The OG is responsible for on-going Facility operations, including, but not limited to, classification and measurement of Equipment Leaks. The OG includes represented employees and supervisors whose responsibilities include, but are not limited to, maintaining operations logs to document process conditions.

2.1.2 Storage Leak Inspection Group (SLIG) – The SLIG supports data collection, as needed, including, but not limited to, conducting and documenting Equipment Leak surveys. It will provide reports that document Equipment Leak survey activities including any necessary information (e.g., measurement, equipment calibration and maintenance).

2.1.3 Field Environmental Group (FEG) – The FEG has the overall responsibility for reporting Equipment Leak inspection data developed pursuant to this Protocol. The FEG has primary responsibility for assembling the Equipment Leak data, associated emissions calculations, data documentation, reporting and recordkeeping.

2.1.4 Monitoring Plan Tasks and Associated SoCalGas Functional Groups

Task	Functional Group		
	OG	SLIG	FEG
Data Collection			
- Instrument Calibration		P	

² Addresses subsection (a) of Condition 8.

³ Addresses subsection (c) of Condition 8.

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- Equipment Leak Survey		P	
QA/QC (Leak detection data)	S		P
Reporting	P		S
Recordkeeping			P
FEG - Field Environmental Group	P - Primary		
SLIG - Storage Leak Inspection Group	S - Secondary		
OG - Operations Group			

3. DEFINITIONS

- 3.1 **Active Well** means a well that is in active operation.
- 3.2 **Breakdown** means a significant operating event that requires reporting to the Division of Oil, Gas and Geothermal Resources (DOGGR).
- 3.3 **Covered Wells** means all Plugged and Abandoned Wells, Active Wells, Water Injection Wells, Shallow Zone Oil Production Wells, Idle Wells and Observation Wells owned and operated by SoCalGas at Aliso Canyon.
- 3.4 **Equipment Leak Detection** means the process of identifying natural gas emissions from Covered Wells and determining whether such emissions constitute an Equipment Leak.
- 3.5 **Equipment Leak** means natural gas emissions that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. An Equipment Leak does not include intentional emissions or non-hazardous emissions that can be eliminated by lubrication, adjustment, or tightening.
- 3.6 **Facility** means the Aliso Canyon Natural Gas Storage Facility.
- 3.7 **Idle Well** means any well that has not produced oil or natural gas or has not been used for injection for at least six consecutive months of continuous operation during the preceding five years.
- 3.8 **Natural Gas Storage Injection Well** means a well drilled or converted for the purpose of injecting natural gas.
- 3.9 **Natural Gas Storage Withdrawal Well** means a well that is used to retrieve stored natural gas.
- 3.10 **Observation Well** means a well used for monitoring purposes.
- 3.11 **Plugged and Abandoned Well** means a well which after its productive/useful life has been plugged with cement and heavy mud in accordance with DOGGR regulations.
- 3.12 **Repair** means a temporary or permanent adjustment or modification to a Covered Well that eliminates an Equipment Leak.
- 3.13 **Shallow-Zone Oil Production Well** means a well that is used to retrieve natural gas, oil, or water from a non-storage reservoir.

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- 3.14 **Valve** means any device for halting or regulating the flow of a liquid or gas through a passage, pipeline, inlet, outlet, or orifice, including, but not limited to, gate, globe, plug, ball, and needle valves.
- 3.15 **Vantage Point** means a predetermined location providing a clear view of Covered Wells. Several Vantage Points may be required to survey a specific area. Vantage Point locations will be determined for each well site to ensure the efficient, safe and consistent use of leak detection equipment, taking into account the manufacturer's guidelines, technical specifications and capabilities of the leak detection equipment to detect Equipment Leaks from the Vantage Point.
- 3.16 **Water Injection Well** means a well that is used to dispose of the produced water from wells.
- 3.17 **Wellhead** means the piping, casing, tubing and connected valves protruding above the earth's surface for an oil and/or natural gas well. The Wellhead ends where the flow line connects to a Wellhead valve.

4. INSPECTION AND LEAK DETECTION PROCEDURE⁴

4.1 Daily and Weekly Inspection Procedure

SoCalGas will conduct daily inspections of Covered Wells, with the exception of Plugged and Abandoned Wells which will be inspected weekly, in accordance with this Protocol.⁵ The daily and weekly inspections will incorporate one or more leak detection equipment types or methods set forth below, taking into account variable factors such as inclement weather, as further set forth below.

- 4.1.1 **The Storage Leak Inspection Group (SLIG)** will conduct a daily route to inspect all Covered Wells with the exception of Plugged Abandoned Wells, and a weekly route to inspect all Plugged and Abandoned Wells, at the Facility using the sample Daily and Weekly Well Inspection Form (see Appendix "A").

4.1.1.1 If SLIG is using OGI equipment, an OGI trained operator will conduct a daily instrument check of the OGI equipment to confirm device functionality and ability to detect Equipment Leaks at each Vantage Point.

4.1.1.2 The SLIG will travel to each Vantage Point to inspect for Equipment Leaks.

4.1.1.3 If natural gas emissions are detected, the location will be recorded and tagged.

4.1.1.4 Daily inspection findings will be assembled for submission to the Field Environmental Group (FEG).

4.1.1.5 If SLIG intends to use OGI equipment, but inclement weather (such as high winds or high moisture conditions such as rain and fog) or other external factors affect the ability of OGI equipment to detect Equipment Leaks from a Vantage Point, the inspection will instead be performed with an alternative leak detection device type set forth in Section 4.4 below. If inclement weather conditions also prevent the use of alternative leak detection equipment, the

⁴ Addresses subsection (a) of Condition 8.

⁵ Addresses subsection (b) of Condition 8.

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inspection will be performed manually (audio-visual and smell) by the inspector. In such cases, the use of leak detection equipment will resume the next day (or week in the case of Plugged and Abandoned Wells) that inclement weather does not prevent such use.

4.1.1.6 If a particular leak detection device malfunction occurs, the occurrence will be documented and thereafter the inspection will be performed using alternative leak detection equipment. The malfunctioning device will not be placed back into service until it is repaired or replaced.

4.1.2 **Field Environmental Group (FEG)** will review and assess the daily inspection findings identified by SLIG.

4.1.2.1 If natural gas emissions are detected, the FEG will coordinate with Operations Group (OG) to determine if the emissions constitute an Equipment Leak, and, if so, to classify the Equipment Leak (which includes emission measurements) in accordance with Section 4.5 below.⁶

4.1.2.2 Equipment Leak prioritization and maintenance will be undertaken according to Section 4.5 below.

4.2 Employee Safety in the Field

4.2.1 From time to time, access to specific sites at a Facility may be restricted due to well maintenance, well work activities or similar situations. In such situations, the SLIG will document this event in the daily report.

4.2.2 Weather conditions (e.g., fog, high winds, rain, ice and snow) may result in unsafe conditions and prevent employees from conducting Equipment Leak inspections. In such situations, the SLIG will document unsafe conditions in the daily report.

4.2.3 Employees will adhere to:

4.2.3.1 Existing safety programs, plans, and procedures in place that address specified infrastructure or areas of Company activity.

4.2.3.2 Staying out of construction zones to the greatest extent possible while performing Equipment Leak Detection. A supervisor or construction project manager must be consulted prior to entry into an active construction zone.

4.2.3.3 Wearing proper clothing, footwear, and all required personal protective equipment.

4.2.3.4 Reporting unsafe actions or conditions to their supervisors.

4.2.3.5 Taking action to prevent any person from entering a situation that poses immediate potential for serious injury or death.

4.3 Safety Considerations for Equipment Leak Survey Work

⁶ Addresses subsection (d) of Condition 8.

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Each Facility may contain areas that are designated as potentially hazardous locations (e.g., locations where in instances fire or explosion hazards may exist due to the presence of flammable gases, vapors, liquids, combustible dust, or ignitable fibers or filings). OGI equipment will not be used for Equipment Leak Detection in potentially hazardous locations unless the location is first cleared through a hot work permit or the location is otherwise determined to be non-hazardous through the use of a Four-Gas Monitor, Gas Scope or equivalent equipment to ensure the safety of the operator prior to conducting the Equipment Leak Detection.

4.4 Equipment Leak Detection Technology⁷

- 4.4.1 Selection and use of Equipment Leak Detection equipment will take into consideration manufacturer's guidelines, technical specifications and capabilities of the equipment to detect Equipment Leaks at a particular Vantage Point. Other considerations include remote detection of difficult to access locations, response time, reproducibility, accuracy, data transfer capabilities, distance from source, background lighting conditions, geography, and meteorology.
- 4.4.2 For the purposes of this Protocol, daily use of OGI equipment or equivalent technologies will be used to detect Equipment Leaks. Toxic Vapor Analyzer (TVA), Organic Vapor Analyzer (OVA), Detecto-Pak Infrared (DP-IR), and Remote Methane Leak Detection (RMLD) may also be utilized for Equipment Leak classification. Measurements of leak concentrations shall be conducted according to the United States Environmental Protection Agency (U.S. EPA) Reference Method 21 using an appropriate analyzer calibrated with methane. In addition to equipment-based methods, the FEG may also employ a screening procedure based on the formation of soap bubbles to locate the source of emissions and classify Equipment Leaks in accordance with Section 8.3.3 of EPA Method 21 – Determination of Volatile Organic Compound Leaks.
- 4.4.3 The specifications for the leak detection equipment to be used are set forth on Exhibit "B" attached hereto.
- 4.4.4 All equipment will be calibrated per manufacturer's specifications.

4.5 Equipment Leak Classification and Maintenance

- 4.5.1 Equipment Leaks will be classified and repaired as expeditiously as practicable and within the repair periods described in Table A below except in cases where repairing the Equipment Leak within the specified time period would unreasonably interfere with providing safe and reliable service, in which case the Equipment Leak will be repaired as soon as reasonably practicable consistent with providing safe and reliable service, but in no event later than 12 months from the date of initial leak detection.⁸

⁷ Addresses subsection (h) of Condition 8.

⁸ Addresses subsection (b) of Condition 8.

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Table A: EQUIPMENT LEAK CLASSIFICATIONS AND REPAIR PERIODS

Equipment Leak Classification	Repair Period
Leaks with measured total hydrocarbons greater than or equal to 10,000 ppmv but not greater than 49,999 ppmv	Successfully repaired or removed from service within 14 calendar days of initial leak detection
Leaks with measured total hydrocarbons greater than or equal to 50,000 ppmv	Successfully repaired or removed from service within five (5) calendar days of initial leak detection

5. EQUIPMENT MAINTENANCE AND TRAINING

- 5.1 **Equipment Maintenance:** All equipment used for leak detection and leak classification will be maintained in accordance with manufacturer's recommendations.
- 5.2 **Operator training:** All personnel operating leak detection and leak classification equipment will be trained in accordance with manufacturer's recommendations.

6. RECORDKEEPING⁹

- 6.1 SoCalGas shall maintain all records of inspection, measurements, maintenance, repair and any other activities conducted pursuant to this Protocol at the Facility or Company headquarters for a period of five (5) years and make such records available for inspection by SCAQMD upon request.
- 6.2 SoCalGas shall summarize the results of the daily inspections on a quarterly basis and deliver such reports to SCAQMD within thirty (30) days of the end of each quarter.
- 6.3 All pertinent data regarding well operations and Wellhead conditions, including any well Breakdowns, will be collected and recorded on Facility daily field reports.
- 6.4 Records related to any Covered Wells taken out of service or installed will be retained at the Facility or Company headquarters for a period of five (5) years and made available for inspection by SCAQMD upon request.

⁹ Addresses subsections (a), (e), (f), (g), (h) and (i) of Condition 8.

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7. APPENDICES

Appendix “A” Sample Daily Well Inspection Form

Appendix “B” Equipment Specifications

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Appendix A

Sample Daily Well Inspection Form

Daily Well Inspection Form								
Date: _____		Weather Conditions: _____		Technician Name: _____				
Device Model: _____		Device Number: _____		Technician Title: _____				
Device Serial Number: _____		Page: _____ of _____		Company: _____				
Inspection Description: Wellhead assembly and attached pipeline, and the surrounding area within a 100' radius of the wellhead.								
Time	Well Name	Location	Leak Detected		Leak Location	Device Record Number(s)	Leak Concentration (ppm)	Comments
			Yes	No				
Inspections Form submitted to:			Technician Signature:			Written By Name/Signature:		
Company Name:			Submittal Date/Time:			Submittal Date/Time:		

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Appendix B

Leak Detection Equipment Specifications

Manufacturer: FLIR Systems Inc.
Model: GF 320
Spectral Response: 3.2 – 3.4 μm
Temperature Range: -20°C to 350°C (-40°F to 662°F)
Accuracy: $\pm 1^\circ\text{C}$ ($\pm 1.8^\circ\text{F}$) for temperature range 0°C to +100°C (+32°F to +212°F)
or $\pm 2\%$ of reading for temperature range $> +100^\circ\text{C}$ ($> +212^\circ\text{F}$)

Manufacturer: Heath Consultants
Model: Detecto Pak-Infrared - DP-IR
Measurement range: 0-100,000 ppm; 1 to 100% Gas
Sensitivity: 0-1000 ppm: 1 ppm
1000-10,000 ppm: 5 ppm
1-100% Gas: 0.5%

Manufacturer: Heath Consultants
Model: Remote Methane Leak Detector Intrinsically Safe (RMLD-IS)
Measurement range: 0 – 99,999 ppm-m
Sensitivity: 5 ppm-m at distance from 0 to 50 ft (15 m)
10 ppm-m or better from 50 to 100 ft (15 to 30 m)

Manufacturer: Thermo Scientific
Model: Toxic Vapor Analyzer TV-1000
Measurement range: 0.5 – 50,000 ppm
Accuracy: 1-10,000 ppm: 25% of reading or 2.5 ppm, whichever is greater