



Cal OES
GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

2015 Aliso Canyon Gas Leak After Action/Corrective Action Report



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Gavin Newsom
Governor, State of California

Mark S. Ghilarducci
Director, Governor's Office of Emergency Services

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Prepared by Cal OES Preparedness Branch

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FOREWORD

In accordance with the *Emergency Services Act, Article 9.5, Government Code Section 8607(f)*, the California Governor's Office of Emergency Services (Cal OES) shall, in cooperation with involved state and local agencies, complete an After Action Report after each gubernatorial proclaimed disaster. This report shall provide a review of public safety response and disaster recovery activities and shall be made available by Cal OES within 120 days of the close of incident to all interested public safety and emergency management organizations.

An After Action/Corrective Action Report serves the following important functions:

- Provides a source for documenting response and early recovery activities
- Identifies problems and successes during emergency operations
- Analyzes the effectiveness of the different components of SEMS
- Describes and defines a plan of corrective action for implementing recommended improvements to existing emergency response efforts

If you are a representative of a public safety or emergency management organization, a copy of this report can be acquired by submitting your request to: SharedMail.CalAAR@CalOES.ca.gov.

EXECUTIVE SUMMARY

The Aliso Canyon gas leak (also called Porter Ranch gas leak and Porter Ranch gas blowout) was a massive natural gas leak that Southern California Gas (SoCal Gas) employees discovered on October 23, 2015. Gas was escaping from a well within the Aliso Canyon's underground storage facility in the Santa Susana Mountains near Porter Ranch, California. The gas storage facility is the second largest of its kind in the United States and belongs to SoCal Gas, a subsidiary of Sempra Energy.

The leak resulted from a breach in the casing of injection/extraction well "Standard Sesnon 25" located below the surface. SoCal Gas had estimated that the leak was no more than 500 feet (150 m) down in the column used to move gas in and out of the well. By the end of November, SoCal Gas had attempted six well kill procedures to stop the gas flow. All six attempts failed.

On December 4, 2015, SoCal Gas started drilling a relief well, 8,000 feet down. Meanwhile, the leak had an effect on the local residents, who reported headaches, nausea, and severe nosebleeds. SoCal Gas relocated 2,824 families from the Porter Ranch neighborhood. Two schools were also relocated.

Given the prolonged and continuing duration of the Aliso Canyon gas leak and at the request of residents and local officials, Governor Edmund G. Brown Jr. on January 6, 2016, proclaimed a State of Emergency that detailed the administration's ongoing efforts to help stop the leak. The proclamation also directed further action to protect public health and safety, ensure accountability, and strengthen oversight of all gas storage facilities.

The proclamation was built on months of regulatory and oversight actions from seven state agencies mobilized to protect public health, oversee SoCal Gas's actions to stop the leak, track methane emissions, ensure worker safety, safeguard energy reliability, and address any other problems stemming from the leak. Actions by the seven state agencies are as follows:

- Governor's Office of Emergency Services (Cal OES)
Cal OES established an incident command structure, including a physical post on-site at Aliso Canyon to better coordinate the local, state and federal response and information sharing and maintained a public webpage to provide real-time information regarding the state's multi-agency response and air quality monitoring.

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- California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR)
DOGGR investigated the leak and overseeing SoCal Gas' efforts to stop it, including issuing emergency orders in November and December directing SoCal Gas to halt gas injections into the storage facility, immediately work on alternatives to stop the leak and provide testing results, data, daily briefings and a written plan and schedule for sealing the well.

DOGGR also established a panel of experts from the Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and the Sandia National Laboratory to provide independent monitoring and technical expertise and review SoCal Gas data and information reported to the Division.

- California Environmental Protection Agency (Cal EPA), Office of Environmental Health Hazard Assessment (OEHHA)
OEHHA reviewed air quality measurements, evaluating public health concerns from the gas leak and assisted other state agencies in determining whether additional actions are needed beyond those already required by local public health agencies.
- California Public Utilities Commission (CPUC)
The CPUC investigated the gas leak to determine its cause, any possible violations, and collected information about the costs of responding to and fixing the leak. The Commission and Division of Oil, Gas and Geothermal Resources also directed SoCal Gas to retain and pay for an independent, third party to perform a technical analysis of the well failure and its cause and share the results with regulators and the public.
- California Air Resources Board (CARB)
CARB measured the leak rate and estimating total methane emissions over the duration of the leak and used ground-level monitoring, specially-equipped airplanes, and satellite information to provide updates of emissions.
- Division of Occupational Safety and Health (Cal OSHA)
Cal OSHA ensured on-site worker safety at Aliso Canyon.
- California Energy Commission (CEC)
The CEC coordinated with CPUC to maintain energy reliability during this incident.

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The State regulators also promulgated emergency regulations for gas storage facility operators throughout the State, requiring: at least daily inspections of gas storage well heads using gas leak detection technology such as infrared imaging; ongoing verification of the mechanical integrity of all gas storage wells; ongoing measurement of annular gas pressure or annular gas flow within wells; regular testing of all safety valves used in wells; minimum and maximum pressure limits for each gas storage facility in the state; and a comprehensive risk management plan for each facility that evaluates and prepares for risks, including corrosion potential of pipes and equipment. In response to Governor Brown's proclamation regarding the Aliso Canyon gas leak, Governor directed DOGGR, CPUC, CARB and the CEC to submit a report that assesses the long-term viability of natural gas storage facilities in California. CPUC contracted the California Council on Science and Technology (CCST) to conduct a study that was approved via Senate Bill 826, The Budget Act of 2016. CCST presented the report findings for the Governor's Office on January 18, 2018.

After all the attempts to stop the leak, the relief well, mentioned earlier, intercepted the base of the leaking well and SoCal Gas pumped heavy fluids to control the flow of gas out of the leaking well. On February 18, 2016, state officials announced that the leak was permanently sealed.

Incident Period

October 23, 2015 – February 18, 2016

Declarations and Proclamations

Local

Los Angeles County – December 10, 2015

State

January 6, 2016

Federal

None

Statistical Summary

Estimated amount of methane released: 97,100 tons
Estimated amount of ethane released: 7,300 tons
Number of days the release occurred: 118 days
Number of people temporarily relocated: 11,296

Lessons Learned and Improvements

Overall, emergency personnel managed the event effectively. First responders and support personnel provided vital resources. The event occurred on private property and was the responsibility of a public utility. The response required a unified command (UC) of emergency response organizations and the utility emergency response personnel. Due to challenges faced with coordination and communication, it took approximately three months after the initial incident to stand up the UC. SoCal Gas management personnel lacked knowledge of the fundamental Incident Command System (ICS) and practical experience in using a UC for communication, planning, inter-operability, and system integration. Cal OES Fire and Rescue Region I Assistant Chief along with Los Angeles County Fire Department (LACoFD) Planning personnel were utilized to provide instruction and guidance in the use of the system. All entities worked in coordination to ensure the communication and emergency response was unified and successful in addressing the impact of the gas leak to the public and the environment.

Summary of Successes

Contributors highlighted the following successes:

- The UC with LACoFD and Los Angeles Department of Public Health (LADPH) with SoCal Gas was effective. The UC assisted by bringing additional personnel to manage the Public Relations portion for the community affected by the gas leak. Personnel also assisted in managing the safety of the workers and residents during high risk well operations by bringing in specialized rescue resources.
- The UC implemented a Planning Section to provide an operations and evacuation plan for the event with daily meetings for strategic planning.
- A Joint Information Center (JIC) was established that included both private and public agencies. The challenge was maintaining and conveying unified messaging amongst the stakeholders and the public. Cal OES Public Information Office provided support and guidance to the Public Information Officers (PIOs). In the incident after action review, the support was highlighted as a positive outcome of the incident. The JIC's PIOs worked together to distribute a timely, coordinated, and uniform message to the public and media.

Summary of Areas Needing Improvement

Report contributors identified the following issues:

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- SoCal Gas employees were not trained in the Standardized Emergency Management System (SEMS). As a result:
 - Lack of clear flow of information.
 - Lack of clear understanding of Emergency Operations Center (EOC) structure for communication flow.
 - Staff did not create an Incident Action Plan (IAP).
 - ICS was not used to manage field response.
- There was no plan in place for a gas leak of this magnitude/type. It was developed during the incident.
- Local jurisdictions needed more coordination with SoCal Gas to ensure proper response in their EOC.

Organizations Contributing to this Report

State Agencies

Governor's Office of Emergency Services (Cal OES)
Cal OES Fire
Cal OES Southern Region

California Environmental Protection Agency (Cal EPA)
Office of Environmental Health Hazard Assessment (OEHHA)

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

Operational Areas

Los Angeles County Office of Emergency Management (LA OEM)

No Report Received

California Public Utilities Commission (CPUC)
California Division of Occupations Safety and Health (Cal OSHA)
California Air Resources Board (CARB)
California Energy Commission (CEC)

DESCRIPTION OF EVENTS

Background

The Aliso Canyon gas leak (also called Porter Ranch gas leak and Porter Ranch gas blowout) was a massive natural gas leak that was discovered by Southern California Gas employees on October 23, 2015. Methane and Ethane gases were escaping from a well within the Aliso Canyon's underground storage facility in the Santa Susana Mountains near Porter Ranch, California. The Aliso Canyon Natural Gas Storage Field is one of SoCal Gas' underground natural gas storage facilities. The leak resulted from a breach in the casing of injection/extraction well "Standard Sesnon 25" located approximately 500 feet (150m) below the surface. The nearest residential dwelling is located approximately one mile away and 1,200 feet below the leaking well head. On January 6, 2016, Governor Jerry Brown issued a state of emergency.

Local residents reported headaches, nausea, and severe nosebleeds. About 50 children per day saw school nurses for severe nosebleeds. There was a higher-than-usual incidence of eye, ear, and throat infections. As of January 7, 2016, the total number of people temporarily relocated by SoCal Gas was 11,296. Two schools were also relocated in January.

On January 21, 2016, LACoFD with LADPH and SoCal Gas joined the UC. The UC assisted the operation by bringing additional personnel to manage the public relations for the community affected by the gas leak. UC personnel also assisted in managing the safety of the workers and residents during high risk well operations by bringing in specialized rescue resources. Upon going into UC, 144 personnel were assigned to stabilize the incident. An incident contingency plan and evacuation plan were developed.

On February 11, 2016, the relief well intercepted the base of the leaking well and heavy fluids were pumped into it to control the flow of gas out of the leaking well. On February 18, 2016, state officials announced that the leak was permanently sealed.

RESPONSE ACTIVITIES

State Agencies

Governor's Office of Emergency Services (Cal OES)

Cal OES activated the Southern Region Emergency Operation Center (REOC), and the State Operations Center (SOC) in support of local government and to coordinate the state agency involvement and response.

CalOES Fire and Rescue

Cal OES Fire and Rescue utilized the Region I Assistant Chief throughout the length of the incident as an ICS Advisor and Liaison to the various assigned state agencies. The Assistant Chief was responsible for the coordination of the response and mitigation efforts of SoCal Gas, the county and local government agencies.

California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA)

The state agency provided the following support tactics:

- Evaluated odor suppressant toxicity for South Coast Air Quality Management District (SCAQMD)
- Analyzed SoCal Gas air monitoring data for air toxics content
- Posted health risk analysis and graph of Porter Ranch air benzene levels
- Participated in Porter Ranch town hall meeting on Aliso Canyon impacts
- Participated in daily Governor's Office (GO) Aliso Canyon emergency response meetings
- Participated in biweekly SoCal Gas Porter Ranch air monitoring meetings
- Provided input on SoCal Gas air monitoring plan
- Provided content for Governor's Aliso Canyon Emergency Proclamation
- Formed external expert panel on Aliso Canyon gas leak health effects
- Assisted Los Angeles County Department of Public Health (LADPH) on air monitoring plan
- Provided Aliso Canyon health effects information to the state Legislature and PIO
- Provided general consultative assistance to state and local governmental entities
- Presented information on Aliso Canyon gas leak health effects to Porter Ranch Community Advisory Committee

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California Department of Conservation, Division of Oil and Gas and Geothermal Resources (DOGGR)

The department responded by having on-site personnel monitor the activities of SoCal Gas and its contractors in trying to stem the flow of gas. They issued formal orders directing SoCal Gas to provide pertinent data and to take specific action.

Operational Areas

Los Angeles County

The Operational Area (OA) EOC was monitoring the event through completion. The EOC coordinated the response with the county departments and Cal OES Region and State support.

The Health Hazardous Materials Division (HHMD) of the LACoFD responded to the incident on October 26, 2015 in response to a spill notification by SoCal Gas to Cal OES. The responders assessed the situation and performed real time air monitoring at the fence-line of the facility.

In the following weeks, LACoFD in conjunction with the LADPH and the SCAQMD continued monitoring the release and progress in stopping the leak.

RECOVERY ACTIVITIES

The initial recovery activities were performed by SoCal Gas personnel. By the end of November 2015 SoCal Gas had attempted six well kill procedures to stop the gas flow by pumping a mixture of mud and brine down the well, the last being on November 25. The attempts failed. After all the attempts to stop the leak failed, the relief well that was put in place intercepted the base of the leaking well where the company pumped heavy fluids to control the flow of gas out of the leaking well. On February 18, 2016, state officials announced that the leak was permanently sealed.

The Los Angeles county OA organized resources to provide the necessary monitoring and support for the people and the environment to ensure the safety of the residents as they returned home.

AREAS OF CONCERN

- 1) Utility emergency response personnel were not SEMS trained, causing communication and coordination difficulties with assisting entities.
 - There were no clear lines of communication.
 - Staff did not have clear understanding of EOC structure for information flow.
 - Staff did not create an Incident Action Plan (IAP).
 - ICS was not used to manage field response.
- 2) There was no plan in place for a gas leak. It was developed during the incident.
- 3) Local jurisdictions need more coordination experience with SoCal Gas agency to ensure an integrated response within the EOC.

CORRECTIVE ACTION RECOMMENDATIONS

- 1) It is recommended that utility emergency response personnel attend SEMS on-going refresher courses and exercises to maintain current knowledge and practical application.
- 2) It is recommended that local jurisdictions exercise with utility emergency response personnel and other appropriate stakeholders to enhance the ability to coordinate during an emergency response.
- 3) As a result of the 2015 Aliso Canyon Gas Leak, three bills were enacted and one of the bills, SB 801 was signed into law in 2017. The three bills outline standards and regulations for operator of a gas storage well, requirement to provide electric services by the local publically owned utilities, and establishment of Cal OES as the lead emergency response agency for on-scene coordination.
 - a. **SB 801(Stern, Statutes of 2017, Chapter 814)**- This bill required a local publicly owned electric utility that provides electric service to 250,000 or more customers within the Los Angeles Basin to make publicly available, upon request of any person, electrical grid data necessary or useful to enable distributed energy resource providers to target solutions that support reliability in the area where electrical reliability has been impacted as a result of reductions in gas storage capacity and gas deliverability resulting from the well failure at the Aliso Canyon natural gas storage facility.

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- b. **SB 888 (Allen, Statutes of 2016, Chapter 536)**- This bill established Cal OES as the lead agency for emergency response to a large, ongoing leak or release of natural gas and associated gases from a natural gas storage facility that poses a significant present or potential hazard to the public health and safety, property, or the environment.

This bill also required Cal OES to coordinate among other state and local agencies, the emergency response, public health and environmental assessment, monitoring, and long-term management and control of the leak.
 - c. **SB 887 (Pavley, Statutes of 2016, Chapter 673)**- This bill required the operator of a gas storage well, before January 1, 2018, to have commenced a mechanical integrity testing regime specified by DOGGR and required the division to promulgate regulations that establish standards for all gas storage wells.
- 4) A requirement for all similar type of gas storage facilities in the State to have a robust Gas Leak Response Plan should be put in place following the guidelines and requirements of Senate Bills 801 and 887.

LIST OF ACRONYMS

Cal EPA	California Environmental Protection Agency
Cal OES	California Governor's Office of Emergency Services
Cal OSHA	Division of Occupational Safety and Health
CARB	California Air Resources Board
CCST	California Council on Science and Technology
CEC	California Energy Commission
CPUC	California Public Utilities Commission
DOGGR	Division of Oil, Gas and Geothermal Resources
EOC	Emergency Operations Center
GO	Governor's Office
HHMD	Health Hazardous Materials Division
ICS	Incident Command System
JIC	Joint Information Center
LACoFD	Los Angeles County Fire Department
OA	Operational Area
OEM	Office of Emergency Management
OEHHA	Office of Environmental Health Hazard Assessment
PIO	Public Information Officer
REOC	Regional Emergency Operations Center
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SEMS	Standardized Emergency Management System
SOC	State Operations Center
SoCal Gas	Southern California Gas Company
UC	Unified Command

ISSUES AND CORRECTIVE ACTION MATRIX

ISSUES AND CORRECTIVE ACTION MATRIX

Agency	EF	Category/EF Title	Problem Statement/Issue	Corrective Action / Improvement Plan	Key Players
OA/ SoCal Gas	12	Utilities	Utility emergency response personnel were not SEMS/ICS trained in the practical application experience hampering communication and coordination.	It is recommended that utility emergency response personnel attend SEMS/ICS on-going refresher courses and exercises to maintain current knowledge and practical application.	OA/ SoCal Gas
SoCal Gas	12	Utilities	There was no plan in place for a gas leak of this magnitude/type. It was developed during the incident.	It is recommended to review the Senate Bills 801 and 887 that were enacted as a result of the Gas Leak incident to establish a robust plan in place.	SoCal Gas
SoCal Gas	12	Utilities	Local jurisdictions need more coordination with SoCal Gas agency to ensure an integrated response within the EOC.	It is recommended that local jurisdictions exercise with utility emergency response personnel to enhance the ability to coordinate during an emergency response.	SoCal Gas

RESPONSE SUMMARY

State and local agencies response activities chart

The following chart summarizes the activities of local and state agencies/departments during the 2015 Aliso Canyon Gas Leak. It reflects the various mutual aid systems (fire and rescue, law enforcement, medical), as well as other state response capabilities.

Note: Agencies and organizations should provide specific information on personnel and equipment deployment if available. N/A= data not available or not submitted.

Agency/Dept.	Period of Commitment	Personnel	Equipment
Department of Conservation, Division of Oil, Gas, & Geothermal Resources	11/09/2015 – 02/18/2016	3	N/A
Activities:			
Monitor the activities of SoCal Gas and its contractors in trying to stem the flow of gas from SS-25. Issues formal orders directing SoCal Gas to provide pertinent data and take specific actions.			

Agency/Dept.	Period of Commitment	Personnel	Equipment
Cal OES State Operation Center	11/16/2015 – 02/19/2016	N/A	N/A
Activities:			
The Governor's Office of Emergency Services (Cal OES) has established an incident command structure to coordinate local, state and federal actions to bolster the Gas Company efforts to stop the leak and ensure public safety. This effort includes operating a physical incident command post on-site at Aliso Canyon that is staffed by the Southern California Gas Company 24 hours a day, 7 days per week. Cal OES SOC is also coordinating information sharing among governmental agencies to ensure governmental actions are well-coordinated and publicly transparent. It is maintaining a public website with updated information regarding agency actions. Cal OES will also provide frequent and timely updates to residents affected by the natural gas leak and the appropriate local officials.			

Agency/Dept.	Period of Commitment	Personnel	Equipment
Cal OES Fire and Rescue	11/16/2015 – 02/19/2016	1	N/A
Activities:			
ICS Advisor and Liaison to the various assigned state agencies and responsible for the coordination of the response and mitigation of the incident among the participating agencies (SoCal Gas, State, LA county and local governments).			

Agency/Dept.	Period of Commitment	Personnel	Equipment
CA Environmental Protection Agency, Office of Environmental Health Hazard Assessment	11/17/2015 – 07/20/2016	4	N/A
Activities:			
Evaluated odor suppressant toxicity for South Coast Air Quality Management District (SCAQMD). Analyzed SoCal Gas air monitoring data for air toxics content. Web posted health risk analysis and graph of Porter Ranch air benzene levels. Participation in town hall meetings, Governor's Office emergency response meetings. Provided subject matter expertise for air monitoring plan, proclamation content, and health effects for on-going communication and status updates.			

Agency/Dept.	Period of Commitment	Personnel	Equipment
Los Angeles County Office of Emergency Management	11/17/2015 – 02/19/2016	185	N/A
Activities:			
Monitor the activities of SoCal Gas and its contractors in trying to stem the flow of gas from SS-25. Maintained an active daily presence on site to assist in sampling and well kill activities where appropriate. Coordination of meetings and conference calls with involved agencies to receive updates and discuss strategies and activities being undertaken by the various departments.			