

On October 23, 2015, a natural gas leak was discovered at a well within the Aliso Canyon Underground Storage Field in Los Angeles County. The Southern California Gas Company (SoCalGas), which owns and maintains the natural gas storage facility and is responsible for its wells, achieved initial control of the leaking well on February 11, 2016. On Feb. 18, 2016, state regulators confirmed that the leaking natural gas well at Aliso Canyon has been permanently sealed. For information on activities around stopping the leak and after leak stoppage, visit the link to the Governor's Office of Emergency Services below (in Other Resources).

The Office of Environmental Health Hazard Assessment (OEHHA) conducts evaluations of the hazards and risks posed by chemicals in the environment. OEHHA is providing assistance to other state and local agencies in evaluating potential health impacts of emissions from the gas leak in the Porter Ranch neighborhood both prior to and following the sealing of the well. Natural gas is composed primarily of methane (approximately 80%), but contains other volatile compounds, some of which pose health risks.

Evaluation of Health Concerns

OEHHA has evaluated air sample data collected by SoCalGas at several locations in the Porter Ranch neighborhood prior to and following the February 2016 sealing of the leaking well.

OEHHA's evaluation to date has concluded:

1. The symptoms reported by many Porter Ranch residents (see below) can be attributed to odorants in the natural gas. The natural gas odorants have strong odors which can be perceived at concentrations below the levels that can be measured in air samples. These odors can evoke physiological responses (e.g. nausea, headaches) without inducing more serious or longer-lasting health effects, such as eye or respiratory system damage.
2. Overall, the available air sample data does not indicate that an acute health hazard exists from any of the volatile organic chemicals measured, including benzene, in the Porter Ranch neighborhood as a result of the Aliso Canyon natural gas leak.
3. Current measured exposures to benzene are below the level of concern for chronic health effects.
4. Benzene is a cancer-causing chemical. Any increase in cancer risk to people in the area due to benzene emissions from the natural gas leak is likely very small. Nearly all measured benzene concentrations in the Porter Ranch community during the leak are similar to background levels generally found in the Los Angeles area, including at the nearest long-term monitoring station in Burbank.

Emissions related to reported symptoms

Prior to the February 2016 sealing of the leaking well, the Los Angeles County Department of Public Health received a substantial number of reports from Porter Ranch residents, located downwind from the Aliso Canyon natural gas storage facility, describing recurring symptoms such as headaches, nausea, abdominal discomfort, dizziness and respiratory irritation.

The natural gas stored in the Aliso Canyon facility, like all natural gas provided for domestic use, contains added chemicals to enable detection of leaks by smell. The odorants in the Aliso Canyon natural gas are primarily tert-butyl mercaptan and tetrahydrothiophene, which are added to the natural gas in small amounts. Tert-butyl mercaptan and tetrahydrothiophene have strong odors which can be perceived at concentrations below the levels that can be measured in air samples. These odors can evoke responses such as nausea and headaches at levels much lower than those that would cause other health effects such as irritation to the eyes or the respiratory system. The symptoms reported by many Porter Ranch residents were consistent with low-level exposure to the two odorants.

Other emissions

The SoCalGas air samples measured levels of certain sulfur-containing compounds. The sulfur-containing compounds analyzed included mercaptans (the odorants noted above that give natural gas its distinctive “rotten egg” smell), hydrogen sulfide and sulfur dioxide. Hydrogen sulfide and sulfur dioxide can be harmful to health if the levels of these chemicals in air are high enough.

SoCal Gas has monitored for other volatile organic chemicals (VOCs) found in gas. (VOCs are organic chemicals that readily move into and spread in air at ordinary room temperature.) Examples of VOCs include benzene, ethyl benzene, and xylenes, which are commonly found in natural gas and petroleum products like gasoline. All these compounds can be harmful if the levels in the air are high enough.

OEHHA has compared the measurements to available Reference Exposure Levels (RELs), which are levels of airborne contaminants that are not anticipated to cause health effects. The levels of sulfur-containing compounds in the Porter Ranch neighborhood air samples were below the acute RELs for those compounds. The exception to this was one air sample taken at the Porter Ranch Estates location on the afternoon of November 12, 2015. This air sample contained a hydrogen sulfide level of 183 parts per billion (ppb), which exceeded the hydrogen sulfide acute REL of 30 ppb. The only other sulfur-containing compound detected to date in the Porter Ranch neighborhood was a sulfur dioxide level of 54 ppb at the same location on the same day. While detectable, this was still below the sulfur dioxide acute REL of 250 ppb.

These levels appear to be anomalous as they have not been detected in other samples. We will continue to look at the measured data to ascertain possible health impacts. As noted above, symptoms reported before the sealing of the well, such as headache and nausea, can be attributed to the sulfur-containing odorants.

The VOC concentrations listed in the SoCalGas air sampling reports did not exceed any available acute RELs. Benzene exposure is the focus of our efforts to evaluate the impacts of exposures, primarily because benzene levels tended to be highest and most closely approached the corresponding acute REL. OEHHA therefore chose peak benzene levels for further evaluation. Benzene can cause toxic effects on the blood system. OEHHA compared the values measured in air to the benzene acute Reference Exposure Level to evaluate potential effects in people of short-term exposures to benzene. OEHHA found the highest benzene level in the Porter Ranch community (measured on November 10, 2015) to be about 70 percent of the benzene acute REL. Peak Porter Ranch benzene concentrations have tended to be lower in the measurements taken after December 11, 2015, compared to earlier (November 1, 2015 to December 10, 2015).

OEHHA evaluated the additional monitoring data on peak short-term exposures and impacts from longer-term exposures. The average of the benzene levels measured in Porter Ranch are below OEHHA's Reference Exposure Level for chronic exposures (up to a lifetime) of 1 ppb. This indicates that health effects (effects on the blood system) from long term exposure are not expected.

Benzene is a cancer-causing chemical. Nearly all the measured concentrations of benzene in the Porter Ranch community during the natural gas leak are similar to background levels generally found in the Los Angeles area, including in nearby Burbank where there is an air monitoring station (part of the state's air toxics monitoring network). Any increase in cancer risk to people in the area due to the natural gas leak is very small.

Additional Information

Additional Porter Ranch neighborhood air sampling data has also been gathered by the South Coast Air Quality Management District (Oct. 26, 2015 to Apr. 7, 2016) (<http://www.aqmd.gov/home/regulations/compliance/aliso-canyon-update/air-sampling/laboratory-results---air-sampling-data>; complaint air sampling data), (<http://www.aqmd.gov/home/regulations/compliance/aliso-canyon-update/air-sampling/air-monitoring-activities/grab-sample-data>; triggered sample data), (<http://www.aqmd.gov/home/regulations/compliance/aliso-canyon-update/air-sampling/air-monitoring-activities/24-hour-integrated-sample-data>) and the Los Angeles Unified School District (Nov. 30, 2015 to Feb. 22, 2016; 8-hour samples)

(<http://achieve.lausd.net/site/Default.aspx?PageID=10329>). These measurements show similar benzene levels to those found in the SoCalGas air samples.

OEHHA has created a chart showing the highest measurement for each day that SoCalGas reported measurements from a number of locations in the Porter Ranch neighborhood to March 11, 2016. The concentrations are measured in parts per billion (ppb). (link to benzene peak levels graph, text accompanying graph)

Governor's Emergency Proclamation – OEHHA Role

The Governor issued an Emergency Proclamation on January 6 (<https://www.gov.ca.gov/news.php?id=19264>) to ensure a thorough state response to the gas leak. As part of the Emergency Proclamation, the Governor requested OEHHA to convene an independent panel of scientific and medical experts to review public health concerns stemming from the gas leak and evaluate whether additional measures are needed to protect public health beyond those already put in place. The panel was comprised of eight recognized experts from the University of California system. The panel included experts in medicine, toxicology, epidemiology and exposure sciences. A summary of the expert advisor input regarding public health measures taken for the Aliso Canyon gas leak is available on the OEHHA Web site (link to summary of the expert advisor input regarding public health measures taken for the Aliso Canyon gas leak memo).

Other Resources

California Governor's Office of Emergency Services Aliso Canyon main page:
<http://www.caloes.ca.gov/ICESite/Pages/Aliso-Canyon.aspx>

California Air Resources Board Aliso Canyon page:
http://www.arb.ca.gov/research/aliso_canyon_natural_gas_leak.htm

South Coast Air Quality Management District Aliso Canyon main page:
<http://www.aqmd.gov/home/regulations/compliance/aliso-canyon-update>

Office of Environmental Health Hazard Assessment page on the benzene REL:
http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD1_final.pdf#page=139