

ALISO CANYON DISASTER: EXISTING SECONDARY DATA SOURCES AND INFORMATION ON POTENTIAL CHEMICAL EXPOSURES AND HEALTH OUTCOMES

Sources of existing data and information related to the Aliso Canyon blowout and gas storage facility are summarized in the tables below. The tables are updated as additional data and information becomes available and as needed. Where publicly available, links to data sources are provided. Researchers may need to obtain agreement from agencies and organizations to obtain and use their respective data for research purposes.

Contents:

- **Table 1** lists compounds and chemicals of potential concern (COPC) that are associated with Well SS-25 gas blowout and well-control activities based on existing information and data including but not limited to soil and air samples and material safety data sheets (refer to the supporting information column). The COPC are listed by compound category and include carcinogens and chemicals for which there is a lack of information on their respective toxicities (e.g., mercaptans). The information presented in table 1 may be supplemented or revised based on additional sampling, testing, and research. The Aliso Canyon Disaster Health Research Study (Health Study) is needed to further assess potential community exposure to these chemicals and associated health effects.
- **Table 2** provides a list of relevant technical reports and peer-reviewed scientific publications on the Aliso Canyon disaster published to date.
- **Table 3** lists air monitoring and sampling data organized by monitoring/sampling method (continuous fixed site monitoring, integrated samples at fixed sites, other longer-term sampling, short-term samples, and other short-term sampling and investigations).
- **Table 4** provides a list of near-well air sampling including samples taken from the gas plume during the active blowout, storage gas composition analyses, and related information.
- **Table 5** lists data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.
- **Table 6** lists data sources and information on the exterior home/oily residue cleaning, interior home cleaning, and samples collected from residences and a community park in the affected area.
- **Table 7** provides other environmental data sources, sampling and relevant information related to the Aliso Canyon gas storage facility and surrounding community.
- **Table 8** lists examples of data sources related to health outcomes potentially experienced by impacted communities during and after the SS-25 gas well failure.
- **Figure 1** is a map of fixed air monitoring locations in the communities surrounding the Aliso Canyon gas storage facility during and following the blowout.
- **Figure 2** is a map of the density of symptom reporting by resident address in the communities surrounding the Aliso Canyon gas storage facility during the blowout.
- **Table 9** lists acronyms that are used throughout this document.

Table 1. Summary of compounds and COPC by compound category that are associated with Well SS-25 Gas Leak and Well-Control Activities.^{1,2}

Compound Categories	Potential Source	Supporting Information
Sulfur compounds: Sulfur Dioxide, Tert-Butyl mercaptan, Thiophene, Tetra-Hydro Thiophene	Odorants & reservoir	Soil near SS-25, air downwind of SS-25, ambient air, samples taken from natural gas wells on the Southern California Gas Company (SCG) Aliso Canyon site
Metals: Barium, Zinc, Copper, Nickel, Antimony, Arsenic, Vanadium, Cadmium, Mercury, Molybdenum, Cobalt, Chromium, Lead	Well kill materials (mud and fluids)	MSDSs, soil near SS-25, air downwind of SS-25, SCG laboratory reports of 4 waste fluid samples and 1 solid waste sample from on-site storage tanks, solid and fluid waste bin samples from onsite
Polycyclic Aromatic Hydrocarbons (PAHs): Naphthalene and others	Reservoir	Soil near SS-25, air downwind of SS-25
Minerals: Crystalline Silica, Mica, Illite	Well kill materials (solids)	MSDSs, data files on chemicals and products used in well-control operations
Aldehydes: Glutaraldehyde	Well kill materials (fluids)	Data files on chemicals and products used in well-control operations
Volatile Organic Compounds (VOCs): Benzene, Toluene, Ethylbenzene, Xylenes, 1,2,4 Trimethylbenzene.	Reservoir	Soil near SS-25, air downwind of SS-25, ambient air, samples taken from natural gas wells onsite
Particulate Matter (PM): Ultrafine, PM 2.5, PM 10	Reservoir/Well kill materials (solids)	Community air monitoring, data files on chemicals and products used in well-control operations
Sulfonated Tannin Esters	Well kill materials (fluids)	Data files on chemicals and products used in well-control operations

Table 2. Technical summary reports of data and select peer-reviewed research papers published to date related to the SS-25 well failure and assessments done after it, including the independent root cause analysis of the SS-25 well failure.

Title	Author(s)/Contributor(s)	Published	Notes
Results of Air Monitoring and Assessments of Health - Four Volumes	LACDPH	Jan - Feb 2016	<ol style="list-style-type: none"> Expanded Air Monitoring Report (Jan 31, 2016) - Overview of onsite and community sampling from Oct 30, 2015 to Jan 23, 2016. Figure 1 below (and on p. 6 of the report) shows the location of 6 real-time methane monitors in the community. Air Monitoring and Assessments of Health (Feb 5, 2016) - Summary data and map of reported symptoms (Table 6 on p. 17 and Figures 5 and 6 on pg. 21 and 22). Figure 2 below provides a visual of symptom report density. Supplemental Report (Feb 13, 2016) - Air sample results upwind and downwind of SS-25, Table 3 on p. 14 Second Supplemental Report (Feb 19, 2016) - Syndromic surveillance analysis and pet health summary

¹ Air dispersion modeling of continuous and periodic emission is needed to further refine Table 1.

² Various data sources were used to identify chemicals of potential concern: soil near Well SS-25 (7 samples collected on April 20, 2016 and are in [LACDPH's Time Critical Indoor Environmental Sampling Summary Report](#)); air downwind of Well SS-25 (3 air samples collected downwind of Well SS-25 during the gas leak in January 2016 and results are reported in LACDPH's Expanded Air Monitoring Report); [material safety data sheets](#) (list compounds used in drilling materials during attempts to seal the well); and ambient air data (outdoor air data collected during the gas leak incident in the community and from the facility by air agencies and SCG).

Table 2. Technical summary reports of data and select peer-reviewed research papers published to date related to the SS-25 well failure and assessments done after it, including the independent root cause analysis of the SS-25 well failure.

Title	Author(s)/Contributor(s)	Published	Notes
Methane emissions from the 2015 Aliso Canyon blowout in Los Angeles, CA	Conley et al.	Mar 2016	A peer-reviewed publication in <i>Science</i> , volume 351, issue 6279, p.1317-1230. DOI: 10.1126/science.aaf2348. The research team analyzed methane and ethane data from dozens of plume extracts collected during 13 research-aircraft flights during the course of the blowout (between Nov 7, 2015 and Feb 13, 2016). The analysis showed atmospheric leak rates of up to 60 metric tons of methane and 4.5 metric tons of ethane per hour.
Public Health Assessment, Indoor Environmental Study and Community Assessment for Public Health Response (CASPER)	LACDPH	Apr 2016	LACDPH Indoor Environmental Study (source soil samples, indoor air samples, indoor wipe samples). Sampling focused on the possibility of the intrusion of pollutants (especially metals) from outdoors to indoors, including the drilling mud that was sprayed out of the well in early attempts to plug the leak.
Determination of Total Methane Emissions from the Aliso Canyon Natural Gas Incident	CARB	Oct 2016	Documents CARB's determination of the total methane emissions from the Aliso Canyon natural gas incident using data collected from ambient air samples collected in late 2015 and early 2016. Also includes information on methodologies used to estimate emissions including inventory verification and tracer release.
Ensuring Safe and Reliable Underground Natural Gas Storage	Interagency Task Force, co-chaired by DOE and the DOT PHMSA	Oct 2016	Chapter 2 (p. 18) - The Aliso Canyon Incident, provides a comprehensive summary of incident events, observations and available data.
Aliso Canyon Natural Gas Leak: Air Monitoring Results	SCAQMD	Jan 2018	Compilation of SCAQMD air monitoring efforts during and after the Aliso Canyon gas blowout, including stationary and mobile air measurements in and around the facility, the Porter Ranch residential neighborhood and other nearby communities. For background information on SCAQMD air monitoring efforts, refer to the SCAQMD Aliso Canyon Facility Monitoring Network Plan .
Long-term Viability of Underground Natural Gas Storage in California	CCST	Feb 2018	An independent technical assessment answering 3 key questions about: the risks California's underground gas storage facilities pose to health, safety, environment, and infrastructure; whether California needs underground gas storage to provide for energy reliability through 2020; and how implementation of California's climate policies changes the future need for underground gas storage. Chapter 1.4 focuses on human health hazards, risks, and impacts associated with underground gas storage in California and looks into key events during the Aliso Canyon SS-25 well blowout.
Potential Chemical Hazards Associated with the Well SS-25 Well-Control Materials at the Aliso Canyon Natural Gas Storage Facility	OEHHA	May 2018	Evaluation of potential health hazards to nearby residents arising from well-control materials, including a review of onsite environmental sampling data to further understand the potential for exposure from air emissions of these materials.
Aliso Canyon Natural Gas Disaster Air Quality Monitoring and Modeling Technical Report: Exposure Modeling, Ambient Monitoring and Identification of Fugitive Emissions	GIS HEAL Labs and academic partners	Oct 2018	An air dispersion model was developed to support future study of exposures and related health impacts that occurred during the blowout at well SS-25. Data was collected when the natural gas field was not in operation for future comparative analyses on ambient background levels of airborne particulates and organic compounds. Analyses were conducted to identify whether the community may have been impacted by hazardous airborne exposures from the oil and gas industry that are not attributable to normal operations (e.g. residual off-gassing, abandoned wells).
Impact of the Aliso Canyon Gas Leak on Respiratory-Related	Lilia R. Lukowsky et al.	Oct 2018	A peer-reviewed publication in <i>Disaster Medicine and Public Health Preparedness</i> , volume 13, issue 3. The research team conducted a retrospective cohort study using US Department of Veterans Affairs (VA) administrative

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Conditions Among US Department of Veterans Affairs (VA) Users			and clinical data. The proportion of outpatient visits to VA providers with respiratory-related diagnoses between Oct 2014 and Sep 2017 were compared between a group of patients from Porter Ranch and a group of patients from the San Fernando Valley. For more information, refer to: https://doi.org/10.1017/dmp.2018.83
Blade Root Cause Analysis Report, Video, and Natural Gas Analyses Report	Blade Energy Partners	May 2019	Independent analysis of the root cause of the SS-25 well failure, including timeline of associated events.
Associations among particulate matter, hazardous air pollutants and methane emissions from the Aliso Canyon natural gas storage facility during the 2015 blowout	Diane A. Garcia-Gonzales et al.	Nov 2019	A peer-reviewed publication in <i>Environmental International</i> , volume 132. The research team investigated the association between the Aliso Canyon natural gas storage site and several measured air pollutants. Highlights include: evidence suggesting that a broad range of HAPs were co-emitted during elevated methane emission; evidence that the final well kill attempts were associated with particle emissions likely from the SS-25 site; and accidents at natural gas storage facilities have the potential to release harmful pollutants into proximate communities. For more information, refer to: https://doi.org/10.1016/j.envint.2019.05.049
Aliso Canyon Safety Ombudsman Annual Reports	Richard J. Gentges	Oct 26, 2020 (Report #1) and Jul 31, 2021 (Report #2)	The Aliso Canyon Safety Ombudsman is an impartial third-party subsurface gas storage industry expert charged with monitoring the safety of the Aliso Canyon facility. The Safety Ombudsman produces annual reports that (1) detail the work of the safety ombudsman, (2) detail the work of the Well and Storage Operations Safety Committee, and (3) make recommendations, if any, for safety improvements and prevention of leaks at the facility. More information about the role of the Safety Ombudsman and the annual reports can be found at the Aliso Canyon Safety Ombudsman website: https://j07280socalaliso.azurewebsites.net/ .
Exploratory Analysis of Selected Blood Test Results Among Residents of Porter Ranch and Two Control Populations, 2011-2019	LACDPH	March 7, 2022	An exploratory analysis of a de-identified dataset with results for selected blood tests from a large commercial clinical laboratory. The dataset included all blood tests from 2011 to 2019 for residents 5 years of age and older from the Porter Ranch zip code and from six control zip codes. For more information including the methods and results, please refer to the report on the Public Health website: http://publichealth.lacounty.gov/eh/healthresearch/health-study-research-data.htm

Table 3. Air monitoring and sampling data related to the Aliso Canyon gas storage facility and the surrounding community, including non-recurring sampling, conducted during and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
Continuous fixed site monitoring				
CO ₂ ; Nitrogen; Hydrocarbon compounds (including Methane, C6+, Ethane, Propane, i-Butane,	SCG	Aliso Canyon facility: upstream and downstream of the reservoir	Jan 1, 2009 – present	Hourly and daily averages of analyte measurements collected by an in-line sampling system with 4 gas chromatographs. The geographical coordinates of the 4 gas chromatographs are:

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Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
n-Butane, i-Pentane, n-Pentane, and Neo-Pentane)				(1) 34.30779649164158, -118.55178412988089, (2) 34.30932521589176, -118.55453875849928, (3) 34.307544092716384, -118.55089271716953, and (4) 34.30834594935705, -118.55201479984422.
Methane	CARB	Community, sites 1, 2, 5, 7, and 8	Dec 2015 (staggered start-up) – July 2016	Continuous methane monitoring provided near real-time data in the community during and following the well blowout. Refer to Figure 1 below for a map of the fixed monitoring locations. Continuous monitor type: Picarro/LGR. Measurement principle: cavity ring down spectroscopy. See Aliso Canyon Monitoring Plan for more information. Results: see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Methane	SCAQMD	Community sites 3, 4, 6, and Reseda Air Monitoring Station (background)	Dec 2015 (staggered start-up) – July 2017	Continuous methane monitoring provided near real-time data in the community during and following the well blowout. Historical methane monitoring data are available on the SCAQMD Aliso Canyon Update webpage. Refer to Figure 1 below for fixed monitoring locations. Continuous monitor type: Picarro Model G2204. Measurement principle: cavity ring down spectroscopy. See Aliso Canyon Monitoring Plan for more information. Results: see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
H ₂ S	SCAQMD	Community site 3	Dec 2015 – Feb 2017	Continuous hydrogen sulfide monitoring. Refer to Figure 1 below for fixed monitoring locations. Continuous monitor type: Picarro Model G2204. Measurement principle: cavity ring down spectroscopy. Results: Values mostly non-detect, highest levels observed were lower than 5 ppb. See Aliso Canyon Monitoring Plan for more information. Results: see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Total sulfur	SCAQMD	Community site 4	Mar 2016 – Apr 2017	Total sulfur concentrations were continuously measured to detect concentrations of sulfur containing compounds including THT and t-Butyl mercaptan. Refer to Figure 1 below for fixed monitoring locations. Continuous monitor type: Ecotech. Measurement principle: Chemiluminescence with Catalyst Converter. See Aliso Canyon Monitoring Plan for more information. Results: hourly average concentrations were consistently low throughout the measurement period. Also, see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Benzene	CARB, SCAQMD	Community, sites 4, 5 and 7	Feb 2016 – Jul 2016	Near real-time benzene levels were measured by CARB at community sites 5 and 7 from early Feb 2016 to late June 2016 and by SCAQMD at community site 4 starting mid Oct 2016. Refer to Figure 1 below for fixed monitoring locations. Continuous monitor type: IO Analytical. Measurement principle: GC FID. See Aliso Canyon Monitoring Plan for more information. Results: see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Methane	Argos Scientific	Community (Highland Estates)	Feb 2016 – present	Real time air monitoring at the fence line between the Aliso Canyon gas storage facility and the community of Porter Ranch. The system monitors for methane gas. Information from the monitoring system is regularly updated on the Porter Ranch Real-time Community Air Monitoring Data website.
Integrated samples, fixed sites				

Table 3. Air monitoring and sampling data related to the Aliso Canyon gas storage facility and the surrounding community, including non-recurring sampling, conducted during and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
TCA (including Methane, Ethane, NMNEOC, CO, and CO ₂) - SCAQMD method 25.1; VOCs (including BTEX and Styrene) – GC FID	SCAQMD	Community sites 3, 4, 6, and Reseda Air Monitoring Station (background)	Dec 21, 2015 (staggered start-up) – July 2017	24-hour time-integrated sampling during and following the well blowout. Sample collection began at Porter Ranch Elementary School. Sampling at the other three community locations began on Jan 16, 2016 (Castlebay Elementary School), Jan 28, 2016 (Highlands Community Pool Parking Lot), and February 21, 2016 (Reseda Station). Results: see laboratory reports available on the SCAQMD Aliso Canyon Update website and see SCAQMD’s final report on Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Methane – EPA TO-3 Modified; VOCs (including BTEX) – EPA TO-15; Sulfides – ASTM D 5504-12; Mercaptans – ASTM D 5504-12; TRS – ASTM D 5504-12; THT – ASTM D 5504-12	SCG	Aliso Canyon facility (3 locations), Fence-line (6 locations), Community (3 locations in southern section of Porter Ranch)	Jan 11, 2016 – Jul 22, 2016	Started with 12-hour samples but transitioned to 24-hour samples on March 3, 2016. 12-hour samples were collected twice per day. On June 18, facility, fence-line, and community monitoring were reduced to 1, 3, and 1 location respectively. Times 12-hour samples collected: varies but typically from 6:00 AM – 18:00 PM and from 18:00 PM to 6:00 AM. Times 24-hour samples collected: varies but typically from midnight to midnight.
VOCs	Diane A. Garcia-Gonzales and academic partners	Porter Ranch community (22 sites)	Jan 13 and 28, 2016 (2-week samples)	Passive TraceAir badges were deployed in two rounds across 22 locations and remained in the field for two weeks. The first round was deployed Jan 13, 2016 and the second was deployed Jan 28, 2016. Samples were analyzed for 25 different VOCs. TraceAir badges can collect organic air pollutants through passive diffusion in a time-integrated manner. For more information, see the paper published by Diane A. Garcia-Gonzales et al.: https://doi.org/10.1016/j.envint.2019.05.049
Carbonyl compounds (Formaldehyde, Acetone, Acetaldehyde)	SCAQMD	Community sites 3 and 4	Feb 2016 (site 3), Apr 2017 – May 2017 (site 4)	24-hr integrated samples were collected by drawing air through a DNPH (2,4-Dinitrophenylhydrazine) cartridge for carbonyls measurement. At site 3, samples were taken outdoors at the Porter Ranch Elementary School on 6 different days in Feb 2016 prior to the sealing of well SS-25. Results: all measured concentrations were well below chronic REL standards for acetaldehyde and formaldehyde. For more information, see Aliso Canyon Natural Gas Leak: Air Monitoring Results
Other long-term sampling				
Sulfur compounds – SCAQMD Method 307-91; Hydrocarbon speciation – EPA 18 modified; BTEX – EPA Method TO-15	LAUSD	Schools (20, but focused on 2 Porter Ranch schools)	Nov 30, 2015 – Dec 18, 2015	Samples were collected at the following schools: Alfred B Nobel Charter Middle School, Andasol Ave Elementary, Beckford Charter for Enriched Studies, Castlebay Lane Charter School, Chatsworth Park Elementary, Chatsworth Charter High School, Darby Avenue Charter, El Oro Way Charter for Enriched Sciences, Ernest Lawrence Middle School, Germain Academy for Academic Achievement, Granada Community Charter, Granada Hills Charter High School, Knollwood Preparatory Academy, Patrick Henry Middle School, Porter Ranch Community School, Robert Frost Middle School, Stoney Point Continuation High, Superior Street Elementary, Topeka Drive Charter for Advanced Studies, and Van Gogh Charter. Sampling type: grab air samples and 8-hour integrated samples. Results: see the laboratory reports of the 8-hour integrated samples, indoors and outdoors posted on the LAUSD website.

Table 3. Air monitoring and sampling data related to the Aliso Canyon gas storage facility and the surrounding community, including non-recurring sampling, conducted during and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
CO, NO, O ₃ , SO ₂ , NO ₂ , CO ₂ total VOCs and size-resolved aerosol concentrations	Diane A. Garcia-Gonzales and academic partners	Porter Ranch Community	Monitors deployed between Jan 13 and Feb 20, 2016	Six Sensor Networks for Air Quality (SNAQ) monitors were deployed between Jan 13 and Feb 20, 2016 in the Porter Ranch area. For more information, see the paper published by Diane A. Garcia-Gonzales et al.: https://doi.org/10.1016/j.envint.2019.05.049
Radon – Electret	SCG	Aliso Canyon facility (1 location)	Jan 19, 2016	12-hour sample. Results: outdoor air radon concentration level of 1.7 pCi/L. See LACDPH report dated February 13, 2016 .
VOCs - EPA TO-15; SVOCs and PAHs - EPA-2 and EPA TO-13 (M); Metals - EPA 6020/7471A	SCG	Aliso Canyon facility (4 locations). Downwind: SS-3H, SF-2/5, SF-1. Upwind: SS-1.	Jan 21 – 22, 2016	Supplemental air monitoring conducted at three downwind and one upwind (from SS-25) locations on the facility. One 12-hour sampling event was conducted and samples were analyzed for VOCs, SVOCs/PAHs, and metals. Reason for sampling: to confirm that the chemicals included in the analytical program for the Air Monitoring Program (AMP), were adequate to assess natural gas constituents in ambient air. Results: see LACDPH report dated February 13, 2016 . QA/QC: standard. Sampling type: integrated 12-hour air samples. Time collected: around 20:00 PM to 08:00 AM.
H ₂ S	Diane A. Garcia-Gonzales and academic partners	Porter Ranch Community (11 locations)	Feb 4 and 12, 2016 (1-week samples)	Radiello Cartridge Adsorbents were deployed at 11 different locations on Feb 4, 2016 for one week and on Feb 12, 2016 for one week.
Short-term samples				
Methane – SCAQMD 25.1 and ASTM D1946; Hydrocarbons – EPA 18, EPA 18 Modified, EPA TO-3 Modified; VOCs – EPA TO-15 and EPA TO-15 SIM; BTEX – CARB 410, EPA TO-14, EPA TO-15 Modified; Sulfur compounds (including Sulfides, Mercaptans and THT) – SCAQMD 307.91 and ASTM D 5504-12	SCG	Aliso Canyon facility (9 locations) and Community (11 locations)	Oct 30, 2015 – Jan 11, 2016 (Facility) Oct 30, 2015 – Mar 11, 2016 (Community)	10-minute grab samples, fixed sites and times. Time collected: twice per day, in the morning and evening.
Radon - USEPA Test Method 402-R-92-004	LAUSD	Schools (2 sites)	Dec 4 – 10, 2015	Short term radon sampling at several locations at the Porter Ranch Community School and Castlebay Lane Elementary School. Results: All samples collected from the survey area were identified to be below the EPA action level of 4.0 pCi/L. For full results, see the Indoor Air Quality Sampling for Radon Gas report prepared by CITADEL Environmental Services, Inc. available on the LAUSD website. Sampling type: LS activated charcoal canister sampling.

Table 3. Air monitoring and sampling data related to the Aliso Canyon gas storage facility and the surrounding community, including non-recurring sampling, conducted during and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
TCA – SCAQMD Method 25.1; TRS – SCAQMD Method 307-91; VOCs – GC & FID	SCAQMD	Community sites 3, 4, and 6 (Porter Ranch Elementary School, Highlands Community Pool Parking Lot, and Castlebay Elementary School)	Dec 16, 2015 – Nov 14, 2016	Triggered short term sampling. 5 min grab samples collected when elevated levels of methane detected by continuous methane monitors. Results: are available on the SCAQMD Aliso Canyon Update webpage. For more information, see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
H ₂ S – Jerome J631X Hydrogen Sulfide Analyzer; BTEX – Draeger tubes; Methane (as indicated by %LEL) - multi RAE monitor; Methane – FID; VOCs – ultra RAE 3000 PID monitor	LAUSD	Schools (20, but focused on 2 Porter Ranch schools)	Nov 30, 2015 – Feb 22, 2015	Samples were collected in indoor and outdoor spaces at the following schools: Alfred B Nobel Charter Middle School, Andasol Ave Elementary, Beckford Charter for Enriched Studies, Castlebay Lane Charter School, Chatsworth Park Elementary, Chatsworth Charter High School, Darby Avenue Charter, El Oro Way Charter for Enriched Sciences, Ernest Lawrence Middle School, Germain Academy for Academic Achievement, Granada Community Charter, Granada Hills Charter High School, Knollwood Preparatory Academy, Patrick Henry Middle School, Porter Ranch Community School, Robert Frost Middle School, Stoney Point Continuation High, Superior Street Elementary, Topeka Drive Charter for Advanced Studies, and Van Gogh Charter. Results: see the laboratory reports of the “real-time” samples collected in both indoor and outdoor spaces posted on the LAUSD website.
Other short-term sampling and investigations				
VOCs (including BTEX, Styrene, among others) – GC & FID; TCA (including Methane, Ethane, NMNEOC, other hydrocarbons, CO, and CO ₂) – SCAQMD Method 25.1; TRS (including THT, t-Butyl Mercaptan, and Carbonyl Sulfide/Sulfur Dioxide) – SCAQMD Method 307-91	SCAQMD	Community	Oct 26, 2015 – Feb 4, 2016	Grab samples as part of odor complaint response activities. Results: BTEX and styrene - concentrations consistently below their corresponding acute RELs, even during the period of the leak. More information and laboratory results of air samples are available at the SCAQMD Aliso Canyon Update webpage . Also, see Aliso Canyon Natural Gas Leak: Air Monitoring Results .
Methane (leak rates)	CARB/NASA-JPL	Aliso Canyon facility flyovers	Nov 7, 2015 – Mar 24, 2016	Flyovers of the Aliso Canyon facility. Weekly, then every 2 weeks, then as needed. Flight measurements provided an emissions rate at the time the flights were conducted. Results: See archived reports on CARB’s Aliso Canyon Natural Gas Leak website for gas leak estimates and the final report on total methane emissions . NASA-JPL flyover information can also be found on the methane source finder website .
LEL%; Oxygen; H ₂ S and CO - Altair 5X Multi-Gas Detector	SCG	Aliso Canyon Facility: various locations (see notes)	Nov 11-19, 2015	Field air monitoring logs for SS-25 well area, associated with the Aliso Canyon SS-25 Well Area Air Monitoring Plan. Monitoring type: monitoring conducted with Altair 5X Multi-Gas Detector. Reason for monitoring: industrial hygiene air monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Time

Table 3. Air monitoring and sampling data related to the Aliso Canyon gas storage facility and the surrounding community, including non-recurring sampling, conducted during and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
				collected: various, see logs. Sample locations and corresponding dates: Partial access road to P66 (Nov 17); Access road to SS-25 (Nov 11-13, 16, & 17); East road to P66 (Nov 11, 16-18); SS9 towards P66 (Nov 12, & 13); Blow down at E. Rd (Nov 12); Rd from SS9 to SS1 (Nov 19); SS3 (Nov 11, 12, 16 - 19); Rd between SS9 & SS29 (Nov 11-13, & 16); Staging Area SS-9 (Nov 11-13, 16-18); Rd to SS29 (Nov 18); West Rd (Nov 18); SS-9 (Nov 19); SS25 (Nov 11-16, 19).
Methane – LI-COR 7700	SCAQMD	Community (in and around Porter Ranch including 15 schools) and the Aliso Canyon facility	Dec 21, 2015 – Sep 13, 2017	Mobile survey measurements, using a methane analyzer (LI-COR 7700) and a GPS mounted on top of a hybrid vehicle. Reason for monitoring: to characterize methane concentration levels and concentration gradients within the community and to support fixed site monitoring efforts. Results for community monitoring: highest methane concentrations (up to 70 ppm) were recorded at night in Sesnon Blvd, south of the Aliso Canyon Facility. More information is available on SCAQMD's Aliso Canyon Updates webpage. Also, see Aliso Canyon Natural Gas Leak: Air Monitoring Results . Time collected: monitoring was conducted during different times of the day and under different meteorological conditions.
Methane – FLIR & LI-COR mobile monitoring; H ₂ S – Jerome H ₂ S analyzer; NMOCs (including VOCs, BTEX, and Styrene) – GC & FID	SCAQMD/ CalGEM	Aliso Canyon facility: within 100 meters west of SS-25	Jan 24, 2016	A joint SCAQMD-CalGEM inspection. Survey measurements were taken of remote wells at the Aliso Canyon gas storage facility including 14 wells that were previously unavailable for inspection. Results: Forward-Looking Infra-Red (FLIR) camera observed emissions from a single location; mobile LI-COR methane open path analyzer measurements of up to 63 ppm; Jerome H ₂ S analyzer readings below detection limit. The inspection resulted in the identification of a leaking oil production well operated by the Termo Company. A canister sample was taken near this source of emissions and tested for NMOCs. More information is available on the SCAQMD Aliso Canyon Update website .
Fixed gases - ASTM D-1946; VOCs - EPA TO-15; Methane & light hydrocarbons (C1-C6) - EPA TO-3M	SCG	Aliso Canyon facility: SS-31 Tubing	Feb 3, 2016	Facility air sampling (tubing) lab report (Eurofins). Collected one air sample from SS-31 tubing and analysis for fixed gases, VOCs, and methane/light hydrocarbons. Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. Sampling type: grab air sample (~20 min). QA/QC: standard. Time collected: 17:05 PM
Fixed gases - ASTM D-1946; VOCs - EPA TO-15; Methane & light hydrocarbons (C1-C6) - EPA TO-3M	SCG	Aliso Canyon facility: SS-9	Feb 4, 2016	Facility air sampling lab report (Eurofins). Collected one air sample from SS-9 and analyzed for fixed gases, VOCs, and methane/light hydrocarbons. Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. Sampling type: grab sample. QA/QC: standard. Time collected: 11:44 AM.

Table 4. Near-well air sampling including samples taken from the gas plume, storage gas composition analyses, and related information.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
Methane; Ethane; Propane; n-Butane; CO ₂	SCG	N/A	N/A	MSDS of natural gas which includes information on its composition (natural gas constituents' percentage by volume). Odorant is added to the natural gas stored at the Aliso Canyon facility which includes tertiary-butyl mercaptan, THT, and methyl mercaptan.
Helium – GC	SCG	Aliso Canyon facility: SS-25 well site	Oct 29, 2015	Helium analysis of natural gas by gas chromatography. Lab report (SoCalGas Engineering Analysis Center). Reason for sampling: natural gas composition analysis and assessment of odorant levels. Sampling type: grab gas samples.
Benzene - NIOSH 1501; Oil Mist - NIOSH N5026	SCG	Aliso Canyon facility: 4 sample locations 20-70 feet from SS-25 leaking wellhead	Dec 13, 2015 (sampling); Dec 17, 2015 (report).	Air sampling conducted by Industrial Hygiene Management, Inc. Four-hour integrated outdoor air samples were collected and submitted to EMSL Analytical, Inc. for analysis of benzene and oil mist and results compared to Cal/OSHA occupational standards. Reason for sampling: industrial hygiene air monitoring around SS-25 to assess whether the concentrations were a threat to employees working on or near the well and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: no detectable levels of the chemicals monitored were identified in the samples analyzed. QA/QC: field blank. Sampling type: integrated outdoor air samples (4 hours). Time collected: 10:00 AM – 14:00 AM.
Sulfur – GC	SCG	Aliso Canyon facility: SS-25 well site	Oct 29, 2015 Jan 8, 2016	SCG response to letter from SCAQMD for information. Response dated Feb 17, 2016. Includes information of surface pressures from Nov 8, 2015 through Nov 24, 2015 and sulfur analyses of natural gas by gas chromatography dated Oct 29, 2015 and Jan 8, 2016. The Jan 8, 2016 sulfur analysis samples were taken from the wellhead plume, below “mats”, and above “mats” (“mats” refer to demister pads that were installed over the SS-25 well in early Jan 2016 to capture liquids entrained in the gas). Reason for sampling: natural gas composition analysis, assessment of odorant levels (i.e., to determine if coalescent filters installed at SS-25 helped to reduce odorant levels in the leakage gas). QA/QC: not reported. Sampling type: grab gas samples. Time collected: Jan 8, 2016 samples: 16:06 PM – 16:12 PM.
BTEX – NIOSH 1501; H ₂ S, CO, LEL – QRAE Plus multi-gas monitor; Total Mercaptans - Draeger direct-read colorimetric tubes	SCG	Aliso Canyon facility: four downwind locations from SS-25 wellhead (SS-9, SS-5, SF-2/SF-3, and SS-3H) and one background upwind sample next to compressor building southeast of SS-25. Community: Holleigh Bernson Park	Oct 29, 2015 Oct 30, 2015	Air sampling conducted by Industrial Hygiene Management, Inc. at five facility locations and one offsite public park. Direct-reading equipment used to measure H ₂ S, CO, LEL, and total mercaptans from all 6 locations. Passive samplers were collected from the five facility locations and were submitted to EMSL Analytical, Inc. for analysis of BTEX. Wind speeds and direction were measured with northerly wind gusts ranging from 5-22 miles per hour. Reason for sampling: industrial hygiene air monitoring around SS-25. Results: No detectable levels when compared to Cal/OSHA criteria and ambient air levels measured. It was concluded that employees working on or near SS-25 would not appear to be exposed to a hazardous environment for the parameters evaluated. QA/QC: field blank. Sampling type: direct read equipment; passive sampler. Time collected: Oct 29 in the afternoon, Oct 30 in the morning.

Table 4. Near-well air sampling including samples taken from the gas plume, storage gas composition analyses, and related information.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
Helium; Hydrocarbons (air, Methane, CO ₂ , Ethane, C3+)	SCG	Aliso Canyon facility: SS-25 well site	Nov 7, 2015	Helium and hydrocarbons analyses of natural gas by gas chromatography. Reason for sampling: natural gas composition analysis and assessment of odorant levels. QA/QC: not reported. Sampling type: grab gas samples.
VOCs (including BTEX) – GC/FID; TRS – SCAQMD Method 307-91	SCAQMD	FF-38ABC	Nov 6, 2019	Storage gas reservoir sample. During an investigation of ground fire source contamination at the Catch Basins 3 location of the Aliso Canyon facility, SCAQMD sampled gas from the storage reservoir. Results: see the laboratory analysis .
N ₂ , CO ₂ , Methane, C ₆ +, i-Butane, n-Butane, i-Pentane, n-Pentane, Neo-Pentane.	SCG	Aliso Canyon facility: Dehy1 Width (Stream 1)	Nov 11-16, 2015	Gas analysis report of the gas composition of the Aliso Canyon reservoir. SCG Measurement Collection System Gas Analysis Report, Full Composition (mole %) Daily (from Nov 11-16, 2015). Gas content reported daily (6 days) in mole%.
Helium; Hydrocarbons (air, Methane, CO ₂ , Ethane, C3+)	SCG	Aliso Canyon facility: SS-25 well site	Nov 23, 2015	Natural gas analysis by gas chromatography. Hydrocarbon analyses of natural gas and helium analyses of natural gas. Reason for sampling: natural gas composition analysis and assessment of odorant levels. QA/QC: not reported. Sampling type: grab gas samples.
Helium; Hydrocarbons (air, Methane, CO ₂ , Ethane, C3+)	SCG	Aliso Canyon facility: SS-25 well site	Nov 24, 2015	Helium and hydrocarbons analysis of natural gas by gas chromatography. Reason for sampling: natural gas composition analysis. Sampling type: grab gas sample.
Methane, Ethane, TNMNEOC, other hydrocarbons, CO, CO ₂ – SCAQMD Method 25.1; BTEX – cryo GC FID normalized to NM/NEOC	SCAQMD	Aliso Canyon facility: near SS-25	Dec 17, 2015	Gas samples collected 10 feet downwind (southwest) of the SS-25 well site during the blowout. Three samples collected in total: 2 by SCAQMD and 1 by SCG (see rows below). Reason for sampling: gas composition analysis of near-well samples. Results: results and laboratory reports are available on SCAQMD's Aliso Canyon Update website .
Sulfur compounds - SCAQMD 307.91	SCG	Aliso Canyon facility: SS-25 well site	Dec 17, 2015	Sulfur compounds analysis of an ambient air sample collected 5-10 feet downwind (southwest) from well SS-25 during the blowout. Lab report (Quantum). Two other samples collected by SCAQMD (see row above). Reason for sampling: gas composition analysis of near-well gas sample. Results: not detected above lab limits. Summary of results are available on SCAQMD's Aliso Canyon Update website . QA/QC: not reported. Sampling type: grab gas sample.
Hydrocarbons and inert gases - EPA 25	SCG	Aliso Canyon facility: SS-25 well site	Dec 17, 2015	Hydrocarbons and inert gases analysis of an ambient air sample collected 5-10 feet from well SS-25. Lab report (Quantum). Two other samples collected by SCAQMD (see above). Reason for sampling: gas composition analysis of near-well gas sample. Results: summary of results are available on SCAQMD's Aliso Canyon Update website QA/QC: standard. Sampling type: grab gas sample. Time collected: 13:05 PM.
VOCs - EPA TO-14	SCG	Aliso Canyon facility: SS-25 well site	Dec 17, 2015	VOC analysis of an ambient air sample collected 5-10 feet from well SS-25. Lab report (Eurofins). Two other samples collected by SCAQMD (see above). Reason for sampling: gas composition analysis of near-well gas sample and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: Butane-6,300 ppb, Benzene-140 ppb, Toluene-230 ppb. Summary of results are available on SCAQMD's Aliso Canyon Update website . QA/QC: standard. Sampling type: grab gas sample. Time collected: 13:05 PM.

Table 4. Near-well air sampling including samples taken from the gas plume, storage gas composition analyses, and related information.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
Sulfur	SCG	Aliso Canyon facility: SS-25 well site. Wellhead plume, above mats and bellow mats.	Jan 8, 2016	Tabulated data of unnormalized and normalized sulfur results at the wellhead plume, bellow mats, and above mats (“mats” refer to demister pads that were installed over the SS-25 well in early Jan 2016 to capture liquids entrained in the gas).
BTEX - NIOSH 1501 (M)	SCG Cal/OSHA	Aliso Canyon facility: SS-25 well site (3 near-well locations)	Jan 8, 2016	Three air samples analyzed for BTEX collected at three locations near SS-25, on Jan 8, 2016. Lab report (LA Testing). Results: one sample detected benzene 0.011 ppm and toluene 0.020 ppm. Other two samples ND. See lab report for more information on results. QA/QC: field blank. Sampling type: grab or integrated gas samples.
BTEX - NIOSH 1501 (M)	SCG Cal/OSHA	Aliso Canyon facility: SS-25 well site (3 near-well locations)	Jan 8, 2016	Three air samples analyzed for BTEX collected at three locations near SS-25, on Jan 8, 2016. Lab report (LA Testing). Results: ND. QA/QC: Field blank. Sampling type: integrated air samples (3 hours). Time collected: 12:00 PM – 15:00 PM.
Hydrocarbons - air, Methane, CO2, Ethane, C3+	SCG	Aliso Canyon facility: SS-25 well site. Wellhead plume, above mats, and below mats.	Jan 14, 2016	Hydrocarbons analysis of natural gas by gas chromatography. Reason for sampling: to determine combustible gas and air concentrations present in samples. QA/QC: not reported. Sampling type: grab gas sample. Time collected: not stated.
Fixed gases - ASTM D-1946; VOCs - EPA TO-15; Methane and light hydrocarbons - EPA TO-3 (M)	SCG	Aliso Canyon facility: P-69-J, P-47, SS-25, SS-5	Feb 5, 2016	Collected one air sample from 4 locations and analyzed for fixed gases, VOCs, and methane/light hydrocarbons. Lab report (Eurofins). Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard. Sampling type: grab gas samples. Time collected: Various times between 10:09 AM to 15:30 PM.
Sulfur compounds - SCAQMD 307.91	SCG	Aliso Canyon facility: P-69-J, P-47, SS-25, SS-5	Feb 5, 2016	Collected one air sample from four locations and analyzed for sulfur compounds. Lab report (Quantum). Sampling type: grab gas samples. QA/QC: lab duplicate analysis. Time collected: Various times between 10:15 AM to 15:35 PM.
Methane – LFIR, LI-COR mobile monitoring & TVA; H ₂ S – Jerome H ₂ S analyzer	SCAQMD	Aliso Canyon facility: near well SS-25	Feb 11, 2016 – Sep 13, 2017	Reason for sampling: After the control of the SS-25 well on Feb 11, 2016, SCAQMD began conducting measurements near the well and elsewhere in the facility to monitor for potential fugitive emissions. Measurements included instantaneous methane (LI-COR mobile monitoring), Hydrogen Sulfide (Jerome), Methane imaging (FLIR camera), grab canister samples, and source Methane (TVA). Results: LI-COR mobile Methane monitoring results and FLIR videos are available on the SCAQMD Aliso Canyon Update webpage .
Natural gas composition – ASTM D1945; PCB – GC/ECD, TOL 6061; Sulfur compounds – GC, ASTM D5504 (M); VOCs – GC/MS, EPA 8260; Siloxanes – TOL 7081; Trace Metals – ICP/MS, ASTM D5673; Gaseous fuels heating value – ASTM	Blade Energy Partners	Aliso Canyon facility: 3 wells (P-69E, P-68A, and P-72A)	Mar 1, 2017	Samples taken from 3 natural gas wells on the Aliso Canyon site including a natural gas sample, activated carbon sample, and an impinged water sample for each site. Reason for sampling: to obtain a relatively full chemical composition of the natural gas from each well. Results: generally, the gases from each well are similar in composition with slight variations in the types and concentrations of some sulfur containing compounds. See report for more information. Time collected: 1:30 PM - 4:00 PM.

Table 4. Near-well air sampling including samples taken from the gas plume, storage gas composition analyses, and related information.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data Source	Location	Dates	Notes
D3588; Anions in water – ion chromatography, ASTM D4327				

Table 5. Data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
31 bins of VOC contaminated soils					
VOCs – PID	Report by AECOM to SCAQMD closing out notifications for excavation of contaminated soil	SCG	Aliso Canyon facility: VOC monitoring during excavation of soil from SS-25 and at storage locations SS-1 and SS-7	Jun 27 to Jul 22, 2016 - PID monitoring & manifest information	Report includes AECOM's various locations permit, notification form, PID instrument calibration report, PID daily calibration log, SCAQMD Rule 1166 soil monitoring records (VOC readings by 15 minute increments during excavation), summary of air monitoring at storage locations, site inspection notes for storage of VOC roll off boxes, and non-hazardous manifests for disposal of eight 20 CY bins each with approximately 15 CY of soils with TPH to Soil Safe of California in Adelanto on July 22, 2016. Reason for monitoring: SCAQMD Rule 1166. Monitoring type: air monitoring field instrument, PID. Time collected: various.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A; Barium (soluble) - EPA 6010B-STLC and TCLP	Waste characterization lab report (AETL) and supplemental lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Jul 1, 2016	Soil samples collected from three bins (Pacific 20147, 20185, 2042) and analyzed for TPH, VOCs, and metals. Supplemental lab report contains an analysis of select samples for soluble barium. Reason for sampling: waste characterization. QA/QC: standard, trip blank, equipment blank. Sampling type: grab and composite soil samples. Time collected: 9:30 AM – 10:25 AM.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A; Cadmium (soluble) - EPA 6010B STLC; Barium (soluble) - EPA 6010B STLC and TCLP; Chromium (soluble) - EPA 6010B STLC	Waste characterization lab report (AETL) and two supplemental lab reports (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Jul 8, 2016	Soil samples collected from five bins (Pacific 20183, 2007, 20106, 20155, and Dragon 158809) and analyzed for TPH, VOCs, and metals. Two supplemental lab reports contain an analysis of select samples for soluble cadmium, soluble barium, and soluble chromium. Reason for sampling: waste characterization. QA/QC: standard, trip blank, equipment blank. Sampling type: grab and composite soil samples. Time collected: 9:15 AM – 11:15 AM
VOCs - PID	Report by AECOM to SCAQMD closing	SCG	Aliso Canyon facility: VOC monitoring during	Oct 6 to 8, 2016 - PID monitoring;	Report includes AECOMs various locations permit, notification form, PID instrument calibration report, SCAQMD Rule 1166 soil monitoring records (VOC readings by 15 minute increments during excavation), and non-hazardous manifests for disposal of

Table 5. Data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
	out notifications for excavation of contaminated soil		excavation of soil from SS-25	Oct 31 to Nov 3, 2016, manifests	twenty-three 20 CY bins each with approximately 15 CY of soils with TPH to Soil Safe of California in Adelanto between Oct 31, 2016 to Nov 3, 2016. Reason for monitoring: SCAQMD Rule 1166. Monitoring type: air monitoring field instrument, PID. Time collected: various.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A; Barium (soluble) - EPA 6010B STLC and TCLP	Waste characterization lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Oct 18, 2016	Soil samples collected from five bins (Dragon 20294, 20279, 20288, 20280, 20284) and analyzed for TPH, VOCs, metals, and soluble barium. Reason for sampling: waste characterization. QA/QC: standard. Sampling type: grab and composite soil samples. Time collected: 8:30 AM – 10:00 AM.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A; Barium (soluble) - EPA 6010B STLC and TCLP	Waste characterization lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Oct 18, 2016	Soil samples collected from five bins (Dragon 20289, 20296, 20290, 20297, 20286) and analyzed for TPH, VOCs, metals, and soluble barium. Reason for sampling: waste characterization. QA/QC: standard. Sampling type: grab and composite soil samples. Time collected: 10:30 AM – 11:50 AM.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A	Waste characterization lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Oct 18, 2016	Soil samples collected from three bins (Dragon 20278, 20283, and 20287) and analyzed for TPH, VOCs, and metals. Reason for sampling: waste characterization. QA/QC: standard, trip blank, equipment blank. Sampling type: grab and composite soil samples. Time collected: 12:00 PM – 12:50 PM.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A	Waste characterization lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Oct 19, 2016	Soil samples collected from five bins (Dragon 20291, 20282, 20281, 20285, and Pacific 2079) and analyzed for TPH, VOCs, and metals. Reason for sampling: waste characterization. Sampling type: grab and composite soil samples. Time collected: 8:30 AM – 9:50 AM.
TPH-g (C4-C12) - EPA 8015 (M); TPH-d (C13-C22) & TPH-o (C23-C40) - EPA 8015 (M); VOCs - EPA 8260B; Title 22 Metals - EPA 6010B/7471A; Barium (soluble) - EPA 6010B STLC and TCLP	Waste characterization lab report (AETL)	SCG	Aliso Canyon facility: SS-25 and surrounding soils	Oct 19, 2016	Soil samples collected from five bins (Dragon 20266, 20292, 20293, 20295, 20264) and analyzed for TPH, VOCs, metals, and soluble barium. Reason for sampling: waste characterization. Sampling type: grab and composite soil samples. Time collected: 10:00 AM – 11:45 AM.
150 bins of materials and wastes from the Aliso Canyon blowout and well-control operations					
Title 22 Metals, expanded metals list and sulfur – EPA 6010B; Mercury – EPA 7471A & EPA 7470A; Hexavalent chromium – EPA 7199;	SS-25 Units Sampling and Analysis Report	LACDPH	Aliso Canyon facility: hazardous waste bins of materials from the SS-25 well blowout	Aug 4, 2020	Bins (units) of waste materials from the SS-25 well blowout and well-kill attempts (well-control fluids and materials) were sampled on August 4, 2020. Twenty units were selected. Priority was given to those that contained sludge or water from SS-25 that was considered to have the highest potential of dispersing through the air

Table 5. Data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
soluble hexavalent chromium STLC - CA WET DI STLC/EPA 7199; soluble hexavalent chromium TCLP - 1311 TCLP/EPA 7199; TPH-cc (C6-C44) - EPA 8015B; Gasoline-range organics (C4-C12) - EPA 5035/8015B; VOC super list + TICs - EPA 5035/8260B; SVOCs super list + TICs - EPA 8270C; PAHs - EPA 8270C SIM; PCBs - EPA 8082; Chloride - EPA 300.0; Carbonyl compounds (aldehydes) - EPA 8315A; Mercaptans - LACSD 258; Alkalinity – SM 2320B; pH - EPA 9045C; Crystalline silica - NIOSH 7500; Po-210 isotopes – GA-01-R-Radium-226 & Other Gamma Emitters (GS); Pb-210 isotopes - A-01-R-Isotopic Polonium (Alpha Spectrometry)					and reaching the community during failed well-kill attempts. Reason for sampling: to assess materials derived from the remediation of well SS-25 and identify potential chemicals of concern and their concentration in materials that may have affected the surrounding community during the gas well blowout. QA/QC: duplicate samples, equipment blanks, trip blanks. Results: see the SS-25 Units Sampling and Analysis Report . Sampling type: grab water and soil samples Collection time: 8:21 AM – 2:10 PM
Title 22 metals, expanded metals list, and sulfur – EPA 6010B; Mercury – EPA 7471A & EPA 7470A; TPH-cc (C6-C44) – EPA 8015B; Gasoline range organics (C4-C12) – EPA 5035/8015B; VOCs – EPA 5035/8260B; Po-210 isotopes – GA-01-R-Radium 226 & other gamma emitters (GS); Pb-210 isotopes – A-01-R-isotopic polonium (alpha spectrometry)	Supplemental SS-25 Units Sampling and Analysis Report	LACDPH	Aliso Canyon facility: hazardous waste bins of materials from the SS-25 well blowout	Oct 29, 2020	Bins (units) of waste materials from the well blowout and well-kill attempts (well-control fluids and materials) were sampled on October 29, 2020. Reasons for sampling: to collect and store samples from the bins for potential observation and/or analysis at a later date by independent third-party researchers as part of the Health Study, to analyze sludge samples for radioisotopes, and to analyze samples for typical waste characterization analytes. QA/QC: duplicate samples, equipment blanks, trip blanks. Results: refer to report. Sampling type: grab water and solid samples. Collection Time: 7:50 – 11:00 AM.
Alpha, beta, and gamma radiation – radiation meters	SS-25 Units Radiation Survey Summary Report	LACDPH	Aliso Canyon facility: hazardous waste bins of materials from the SS-25 well blowout	Nov 12, 2020	Radiation surveys of waste materials from the well blowout and well-kill attempts were taken on Nov 12, 2020 using radiation meters to detect alpha, beta, and gamma radiation. Results: the min, max, and average alpha survey readings were 0 dpm, 120 dpm, and 28 dpm respectively. For more information, see the Aliso Canyon Survey Summary Report .

Table 5. Data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
<p><u>Most lab reports include test results for:</u> VOCs - GC/MS (SW846), Method 8260B; SVOCs - GC/MS (SW846), Method 8270C; TPH-g - GC/FID, Method M8015G; TPH-d - GC/FID, Method M8015D; PCBs - GC, Method 8082; Title 22 Metals - (SW846), Method 6010B/7000CAM; Ignitability - Method 1010; Reactive Cyanide and Sulfide - Method 9014-9030B and EPA 9010B; pH - Method 9040B and 9045C; Aquatic Toxicity - Bioassay-1 DOHS Title 22 and other methods</p> <p><u>Several lab reports also include test results for:</u> Hexavalent Chromium – Method 7199; Barium and Cadmium - Method 6010B-STLC; Barium - EPA 1311 TCLP, Method 6010/7000 TCLP; Total Cyanide - Method 9012; Total Sulfide - Method MS-4500SD; Total Mercury – Method 7470A</p>	Waste Characterization Laboratory Reports	SCG	Aliso Canyon facility	Varied: Dec 4, 2015 to Jul 28, 2020	Waste characterization laboratory reports of soils and wastes from the well blowout that were collected and stored into waste bins. Reason for sampling: waste characterization. Results: refer to laboratory reports. QA/QC: refer to laboratory reports. Sampling type: mostly grab and composite soil samples and liquid samples. Time collected: various, refer to laboratory reports.
Other sampling and information					
Amber Guard 215; Barite; Bentonite; Calcium Carbonate (limestone); Calcium Chloride solution; CF Desco® II Deflocculant; Diaseal M® Lost Circulation Material; Drispac® (Regular and Superlo®) Polymer; Nut Plug; PolyTeK+; Potassium Chloride solution; Sodium Hydroxide solid; Walnut shell grit and flour; Water based mud; Wood and wood dust; Xanthan Gum	MSDSs of Well Control Products and Additives	SCG	Aliso Canyon facility	N/A	Information on the types and percent compositions of well control materials/fluids and additives used during the well-control attempts. Refer to Table 2 in the OEHHA report on Potential Chemical Hazards Associated with the Well SS-25 Well Control Materials at the Aliso Canyon Natural Gas Storage Facility Near Porter Ranch, California for the amounts of well control products used during each of the SS-25 well control attempts.
TPH-cc (C8-C44) - EPA 8015CC; VOCs - EPA 8260B; Title 22 Metals -	Facility well control fluid	SCG	Aliso Canyon facility: TK 196, TK 130, TK	Dec 4, 2015 Dec 18, 2015	Two laboratory reports of captured well control fluid samples analyzed for TPH, VOCs, metals, etc. Samples collected on Dec 18, 2015 analyzed for fish bioassay.

Table 5. Data and information on well-control products used during the well-control attempts and materials released from the well during the blowout including laboratory test results of waste materials that had been collected into bins, soil monitoring records, and waste manifests.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
EPA 6010B/7470A; pH - EPA 9040; Flash Point - EPA 1010; Total Sulfide - SM 4500SD; Total Cyanide - EPA 9012; Fish Bioassay - CA F&G/DHS 1988	sampling - lab reports (BC Labs and subcontracted labs)		144, Frac Tank Wash Water, TK JJ-5, Frac Tank Wash Water A3079		Samples collected on Dec 4, 2015 underwent all other analyses. TCLP test for TK 130. Reason for sampling: waste characterization, to determine the composition of the chemicals released into the atmosphere as a result of the leak, and to determine the composition and concentration of chemicals released from the leak that were detected in the residential communities located in proximity to Aliso Canyon. QA/QC: standard. Sampling type: grab aqueous samples. Time collected: Dec 18: 10:11 AM – 11:15 AM and 10:52 AM – 11:42 AM. Dec 4: 9:54 AM – 10:51 AM.
<u>Wipe sampling:</u> Metals – NIOSH 9102/7300 by ICP/MS; Hydrocarbons – NIOSH 1500 by GC/MS; Petroleum hydrocarbons – GC/MS Qualitative fingerprinting; SVOCs – EPA Method 8270 <u>Air sampling:</u> VOCs – TO-15 low level; SVOCs – TO-13A; Particulates and Metals – NIOSH 0500/7300 by ICP/MS; Sulfur compounds – ASTM D5504-12.	Public Health Assessment	LACDPH	Aliso Canyon facility: source soil. Residential: indoors (103 Porter Ranch residences, 11 residences 6 miles southeast of well SS-25, Porter Ranch Community School, Castlebay Lane Elementary School).	Source: Apr 20, 2016 Indoor: Mar – Apr, 2016	Indoor community wipe and air samples. Soil and bulk material sampling in and around SS-25 well location was also conducted (samples consisted of surficial soils and particulates including contact tape samples from various surfaces and upwind at well SS-1). Reasons for sampling: 1) identify potential contaminants in the indoor environment that may be associated with the gas leak and 2) determine whether or not contaminants from the sealed well pose a health risk to communities near Aliso Canyon. Results for surface wipe samples: detection of 13 metals (out of 16 metals tested). Barium most frequently detected with concentration range of 0.05 – 1.0 ug/cm ² . Four SVOCs detected (out of 67 tested). Results for indoor air samples: 143 chemicals detected (out of 250 tested) with levels within normal ranges for indoor home environments. For more information, see the following Public Health Assessment attachment: Time Critical Indoor Environmental Sampling Summary Report .

Table 6. Data and information on exterior home/oily residue cleaning, interior home cleaning, and samples collected from residences and a community park in the affected area.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
TPH-cc (C6-C44) - EPA 8015B(M)	Residential pool sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch residence	Nov 29, 2015	Two pool water samples collected and analyzed. Reason for sampling: exterior home cleaning/residue sampling. Results: 1st sample 125 mg/kg in C29-C36 range and 130 mg/kg in C6-C44 range; 2nd sample <100 mg/kg. QA/QC: standard. Sampling type: grab water sample. Time collected: 15:25 PM – 15:33 PM. Retest conducted on Mar 16, 2016.
TPH-cc (C6-C44) - EPA 8015B (M)	Residential water sampling – lab	SCG	Residential: Porter Ranch	Dec 4, 2015	Two aqueous samples collected from a residential pool and analyzed for TPH. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: both

Table 6. Data and information on exterior home/oily residue cleaning, interior home cleaning, and samples collected from residences and a community park in the affected area.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
	report (Eurofins)				ND/below lab detection limits. QA/QC: standard. Sampling type: grab water samples. Time collected: 8:25 AM – 8:30 AM.
TPH-cc (C6-C44) - EPA 8015B (M); BTEX - EPA 8260B	Residential Indoor wipe sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch residence	Dec 9, 2015	Two wipe samples collected and analyzed for TPH and BTEX. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: both ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Sampling time: 9:05 AM – 9:10 AM.
TPH-cc (C6-C44) - EPA 8015B (M); BTEX - EPA 8260B	Residential Indoor wipe sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch residence and Northridge residence	Dec 17, 2015	Four wipe samples collected and analyzed for TPH and BTEX from two different residences. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: one sample C21-C28 range (0.209 mg/sample), C6-C44 range (0.30 mg/sample). Remaining samples ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 15:00 PM – 15:50 PM.
TPH-cc (C6-C44) - EPA 8015B (M); PAHs - EPA 8270C SIM PAHs; BTEX - EPA 8260B	Residential Indoor wipe sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch	Jan 14, 2016	Two wipe samples collected and analyzed for TPH, BTEX, and PAHs. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: one sample: C6-C44 range (0.071 mg/sample); remaining: ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 14:10 PM – 14:20 PM.
TPH-cc (C6-C44) – EPA 8015B (M); PAHs – EPA 8270C SIM PAHs; BTEX – EPA 8260B	Residential indoor wipe sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch	Jan 14, 2016	Two wipe samples collected and analyzed for TPH, BTEX, and PAHs. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: All ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 13:35 PM – 13:45 PM.
Oily residue (density)	Exterior home cleaning database	SCG	Residences in nearby neighborhoods including Porter Ranch, Northridge, Granada Hills, Chatsworth, Reseda, Sylmar, and Winnetka	Mar – Sep 2016	Two Excel spreadsheets of exterior home cleaning information identifying the homes cleaned, the dates of cleaning, the observed degree of residue, and other information relating to the exterior home cleaning program.
TPH-cc (C6-C44) - EPA 8015B (M); PAHs - EPA 8270C SIM PAHs; BTEX - EPA 8260B	Residential wipe sampling - lab report (Eurofins)	SCG	Residential: Porter Ranch residence	Mar 7, 2016	Two wipe samples collected and analyzed for TPH, BTEX, and PAHs. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the leak that were detected in the residential communities located in proximity to Aliso Canyon. Results: Detection of

Table 6. Data and information on exterior home/oily residue cleaning, interior home cleaning, and samples collected from residences and a community park in the affected area.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
					C25-C28 (0.53 & 0.51 mg/sample) and C6-C44 (0.60 & 0.65 mg/sample) in both wipe samples; Naphthalene (0.22 µg/sample) in one sample. Remainder ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 10:27 AM – 10:35 AM.
Oily residue (visual inspections)	Oily residue inspection	LACDPH	Holleigh Bernson Memorial Park, Northridge	Mar 2016	LACDPH Environmental Health Strike team investigated a complaint of oily residue on playground equipment. This investigation had null findings and led to several follow-up investigations including the collection and testing of 3 side-by-side surface samples from three locations by SCG and overseen by LACDPH (see row below).
TPH-cc (C6-C44) - EPA 8015B (M); PAHs - EPA 8270C SIM PAHs; BTEX - EPA 8260B	Residential wipe (oily residue) sampling - lab report (Eurofins)	SCG	Holleigh Bernson Memorial Park, Northridge	Mar 9, 2016	Three wipe samples collected and analyzed for TPH, BTEX, and PAHs. Samples collected from 3 locations in Holleigh Bernson Memorial Park: white fence running along the perimeter of the parking area, playground equipment, and peripheral landmarks. Reason for sampling: residue sampling, to assess the possibility of direct-contact transferability of substance to human hands, and to determine the composition and concentration of chemicals from the gas well blowout that were detected in the residential communities located in the proximity to Aliso Canyon. Results: All ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 14:38 PM – 15:20 PM.
TPH-cc (C6-C44) - EPA 8015B (M)	Residential water sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch residence	Mar 16, 2016	Three water samples collected from a residential pool and analyzed for TPH. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the gas well blowout that were detected in the residential communities located in the proximity to Aliso Canyon. Results: all ND/below lab detection limits. QA/QC: standard. Sampling type: water, likely grab sample. Time collected: 14:46 PM – 14:52 PM.
TPH-cc (C6-C44) - EPA 8015B (M); PAHs - EPA 8270C SIM PAHs; BTEX - EPA 8260B	Residential wipe sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch	Mar 29, 2016	Two wipe samples collected and analyzed for TPH, BTEX, and PAHs. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the gas well blowout that were detected in the residential communities located in the proximity to Aliso Canyon. Results: Both samples contained TPH: C37-C44 range (0.115 mg/sample), C6-C44 range (0.19 mg/sample). Remaining ND/below lab detection limits. QA/QC: standard. Sampling type: wipe. Time collected: 10:20 AM – 10:35 AM.
TPH-cc (C6-C44) - EPA 8015B (M)	Residential water sampling – lab report (Eurofins)	SCG	Residential: Porter Ranch	April 4, 2016	Three water samples collected from a residential pool and analyzed for TPH. Reason for sampling: exterior home cleaning/residue sampling and to determine the composition and concentration of chemicals from the gas well blowout that were detected in the residential communities located in the proximity to Aliso Canyon. Results: One sample TPH: C11-C12 range (260 µg/L) C6-C44 range (490 µg/L). Remaining two: ND/below lab detection limits. QA/QC: standard. Sampling type: water, likely grab sample. Time collected: 9:15 AM – 9:45 AM.

Table 6. Data and information on exterior home/oily residue cleaning, interior home cleaning, and samples collected from residences and a community park in the affected area.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
<p><u>Air samples:</u> VOCs - EPA TO-15; Methane & light hydrocarbons - EPA TO-3M; PAHs/SVOCs - EPA TO-13A; Particulates (total dust) - NIOSH 0500; Metals - NIOSH 7300M; Sulfur compounds - ASTM D 5504-12</p> <p><u>Wipe samples:</u> VOCs - EPA 3M 3520/OVM 3M (M); Hydrocarbons-qualitative hydrocarbon fingerprint analysis - EPA 8015B-Fingerprint; TPH-cc (C6-C44) - EPA 8105B (M); SVOCs - EPA 8270C; PAHs - EPA 8270C SIM; Particulates - PLM/e-RLM Stereo Microscopy; Total Dust - NIOSH 0500; Metals - EPA 610B (M); Total hydrocarbons/organic vapors - AT GC-FID</p>	Residential indoor/outdoor air sampling - summary memo from Geosyntec and lab reports (Eurofins & subcontracted labs)	SCG	Residential: Porter Ranch residence	Apr 8-9, 2016	One indoor air and one outdoor air sample were collected over a 24-hour period. One set of wipe samples was also collected. Samples analyzed for hydrocarbons, VOCs, metals, etc. Geosyntec concluded no constituents were detected in indoor air and wipe samples at concentrations that would represent a threat to human health. Indoor air noted to be below health-based screening levels and similar to outdoor air or within background ranges. Reason for sampling: assess residential exposure and exterior home cleaning/residue sampling. Results: See summary letter and lab report. Select VOCs, SVOCs, methane, and total particulates detected in indoor air. Hydrocarbons, particulates, and zinc detected in wipe sample. Qualitative discussion of hydrocarbon fingerprint (C26-C30). Zinc detected in both indoor wipe and trip blank indicating zinc likely associated with sampling material. QA/QC: standard, duplicates and trip blanks. Sampling type: integrated air samples (24-hours), grab sulfur air sample, and wipe samples. Time collected: varies, see file and COCs.
TPH-cc (C6-C44) – EPA 8015; Metals – EPA 6010; Mercury – EPA 7471A	Community pool water sampling	LACDPH	3 Porter Ranch community pools	Jun 23, 2016 Jul 9, 2016	LACDPH sampled three community pools and analyzed samples for petroleum hydrocarbons and metals. Reason for sampling: to assess if the Aliso Canyon blowout and/or subsequent well sealing operations may have affected the water quality. Results: of the five metals of concern from the Public Health Assessment, two were detected in the community pools sampled (Barium and Vanadium). Both were at levels below drinking water standards. For more information, see the community pool water sampling protocol and results . Sampling type: grab water samples. Time collected: Jun 23: 10:25 AM and 12:01 PM, Jul 9: 11:00 AM.
N/A	Interior Home Cleaning Performance Reviews	LACDPH	Community	Jul 2016	LACDPH reviewed SCG’s compliance with the court mandated cleaning protocol. Performance review logs for home cleanings include information on ventilation, cleaning of HVAC systems/ducts, deep cleaning of the home interior and quality assurance measures.

Table 7. Other environmental data (e.g., soil and water samples) and relevant information related to the Aliso Canyon gas storage facility and the surrounding community prior to, during, and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
Hazardous materials and wastes	CERS submittals	SCG	Aliso Canyon facility	2013 – present	Submittals include site maps, hazardous materials and wastes inventory reports, and business activities reports. The LACFD HHMD is the local regulatory agency that ensures businesses in Los Angeles County are compliant with CERS requirements.
VOCs – GC/FID; TCA (including Methane, Ethane, NMNEOC, CO, CO ₂) – SCAQMD Method 25.1; TRS (including Mercaptans, THT, Carbonyl Sulfide/Sulfur Dioxide) – SCAQMD Method 307-91	Air quality reports	SCAQMD	Community	Oct 24, 2015 – present	Air quality reports regarding odors filed with SCAQMD. The first air quality report was received on Oct 24, 2015 and through Feb 11, 2016, 2,340 reports were received. A log of these reports are available on the SCAQMD Responding to Odor Complaints webpage. Air sampling data associated with air quality reporting are available in the complaint air sampling data table on the SCAQMD website.
TPH-cc (C6-C44) – EPA 8015B (M); VOCs – EPA 8260B; Title 22 Metals – EPA 6010B/7470A; pH – EPA 9045D; Flash Point – EPA 1010A (M); Total Sulfide – EPA 376.2M; Total Cyanide – EPA 9010C/9014; Chloride SM 4500-Cl C	Facility well fluid and sludge sampling - lab report (Eurofins).	SCG	Aliso Canyon facility: Well fluid & Junction of SS-25 and SS-9	Nov 13, 2015	One sample collected each of well fluid and sludge from SS-25 & SS-9 Junction and analyzed for TPH, VOCs, metals, etc. Reason for sampling: likely waste characterization and to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard, equipment blank. Sampling type: grab well fluid and sludge sample. Time collected: 18:25 – 18:50 PM.
TPH-cc (C6-C44) – EPA 8015B (M); VOCs - EPA 8260B; Title 22 Metals + Potassium – EPA 6010B/7470A; pH - SM 4500 H+B; Flash Point – EPA 1010A; Total Sulfide – SIM 4500 S2-D; Total Cyanide – SM 4500-CN E; Chloride SM 4500-Cl C	Facility liquid sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: Patriot 909	Nov 13, 2015	Collected one liquid sample and analyzed for TPH, VOCs, metals, etc. Reason for sampling: likely waste characterization and to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: 19:14 PM.
<u>Water Samples (02-B & 04-B):</u> Metals: As, Cr, Cu, Pb, Ni, Zn – EPA 6010B <u>Solid Samples (01-B & 03-B):</u> TPH-cc (C6-C44) – EPA 8015B (M); VOCs - EPA 8260B; Metals (AS, CR, Cu, Pb, Ni, Zn) – EPA 6010B; Total Sulfide – EPA 376.2M	Facility liquid & solids sampling - lab report (Eurofins)	SCG / LACFD	Aliso Canyon facility: V-Ditch downstream SS-25: 01-A & 01-B (Solid-mud/rocks), Patriot Truck #905: 02-A & 02-B (gray wastewater), Doby Hagar Truck #SS24: 03-A & 03-B (white opaque liquid, noted to be sludge by lab), 25' from SS-24	Nov 14, 2015	Samples 01-B, 02-B, and 03-B were acquired by LACFD. Samples were collected in unpreserved glass jars. Solid samples analyzed for TPH, VOCs, and select metals. Around 150 mL of water sample collected in a soil jar for samples 2 and 4. Water samples tested for metals. Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard. Sampling type: grab aqueous and solid samples. Time collected: 12:00 – 13:15 PM.

Table 7. Other environmental data (e.g., soil and water samples) and relevant information related to the Aliso Canyon gas storage facility and the surrounding community prior to, during, and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
			(brown liquid): 04-A & 04-B		
TPH-cc (C6-C44) – EPA 8015B (M)	Facility solids tank sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: Sesnon Gathering Plant, Tank H-6	Dec 21, 2015	Collected one sample from Tank H-6 and analyzed for TPH. Results: C6-C44: 370,000 mg/kg. See lab report for TPH breakdown results. Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard. Sampling type: grab solids sample. Time collected: 13:10 PM.
TPH-cc (C6-C44) – EPA 8015B (M); VOCs – EPA 8260B; Title 22 Metals – EPA 6010B/7470A; pH – EPA 9045D; Flash Point – EPA 1010A(M); Total Sulfide – EPA 376.2M; Total Cyanide – EPA 9010C/9014	Facility composite soil sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: Bin Anterra #054 and Two Drums	Dec 29, 2015	Collected one composite soil sample from Bin Anterra #054 and two drums (dated Sep 17, 2015) and analyze for TPH, VOCs, metals, etc. Reason for sampling: likely waste characterization and to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard, equipment blank. Sampling type: composite soil sample. Time collected: 9:45 – 10:50 AM.
TSS – SM 2540 D; Oil and Grease – EPA 1664A	Facility liquid sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: Monitoring Point #1, Dehy 2, Sesnon Gathering Plant	Jan 5, 2016	Collected one liquid sample from stormwater Monitoring Pt#1 and analyzed for total suspended solids and oil and grease. Liquid samples also collected from two other locations (Dehy 2 and Sesnon Gathering Plant). Reason for sampling: likely stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: TSS: MP#1 - 107 mg/L, Dehy 2 - 4.6 mg/L, Sesnon - 4.5 mg/L. Oil & Grease: MP#1 - 1.8 mg/L, Dehy/Sesnon - <1.0 mg/L. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: MP1: 9:45 AM, Dehy2: 11:40 AM, SGP: 16:00 PM.
TSS – SM 2540 D; Oil and Grease – EPA 1664A; TPH (C6-C44) – EPA 8015B (M); VOCs – EPA 8260B; Title 22 Metals – EPA 6010B/7470A; Turbidity – SM 2130B; pH – SM 4500 H+B	Facility liquid tank sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: SS-13 - Tank A2290 and Tank A3134	Jan 7, 2016	Collected liquid samples from two tanks and analyzed for total suspended solids, oil and grease, TPH, VOCs, metals, turbidity, and pH. Reason for sampling: likely waste characterization and/or stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: 15:17 – 15:44 PM.
TSS – SM 2540 D; Oil and Grease – EPA 1664A	Facility liquid tank sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: B-Tank	Jan 8, 2016	Collected one liquid sample from B-tank and analyzed for total suspended solids and oil and grease. Reason for sampling: likely stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: TSS - 2.5 mg/L, Oil & Grease - <0.8 mg/L. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: 11:00 AM.
TSS – SM 2540 D; Oil and Grease – EPA 1664A	Facility liquid sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: Monitoring Point #1	Jan 19, 2016	Collected one liquid sample from Monitoring Pt#1 and analyzed for total suspended solids and oil and grease. Reason for sampling: likely stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: TSS - 94 mg/L, Oil & Grease - <0.8 mg/L. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: 16:00 PM.

Table 7. Other environmental data (e.g., soil and water samples) and relevant information related to the Aliso Canyon gas storage facility and the surrounding community prior to, during, and after the SS-25 well failure.

Target Chemicals – Sampling or Laboratory Test Method(s)	Data element	Data Source	Location	Dates	Notes
TSS – SM 2540 D; Oil and Grease – EPA 1664A	Facility stormwater monitoring - lab report (Eurofins)	SCG	Aliso Canyon facility: SS-25 Monitoring Point drainage south of SS-5	Jan 31, 2016	Collected one liquid sample from an SS-25 monitoring point located in the drainage south of SS-5 and analyzed for TSS and oil and grease. Reason for sampling: stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: TSS - 286 mg/L, Oil & Grease - 6.1 mg/L. QA/QC: standard. Sampling Type: grab aqueous sample. Time collected: 10:21 AM.
TSS – SM 2540 D; Oil and Grease – EPA 1664A; TPH-cc (C6-C44) – EPA 8015B (M)	Facility liquid tank sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: SS-13 - Tank A2499	Feb 12, 2016	Collected one sample from Tank A2499 and analyzed for TSS, oil and grease, and TPH. Reason for sampling: likely stormwater monitoring and/or waste characterization and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: C6-C44: 950 mg/kg Oil & Grease: 1.2 mg/L, TSS: <1.0 mg/L. See lab report for TPH breakdown results. QA/QC: standard. Sampling Type: grab aqueous sample. Time collected: 16:22 PM.
Anions – EPA 300.0; Cations (Ca, Mg, Na, K) – EPA 6010B	Facility liquid sampling - lab report (Eurofins)	SCG	Aliso Canyon facility: SS-3 Check Point, SS-9 Tank 169, and SS-22 (Old Well)	Feb 19, 2016	Collected one sample from three locations (SS-3, SS-9, and SS-22) and analyzed for cations (Ca, Mg, Na, K) and Anions. QA/QC: standard and equipment blank. Reason for sampling: to determine the composition of the chemicals released into the atmosphere as a result of the leak. Sampling type: grab aqueous sample. Time collected: 15:10 – 16:17 PM.
TSS - SM 2540 D; Oil and Grease - EPA 1664A	Facility stormwater monitoring - lab report (Eurofins)	SCG	Aliso Canyon facility: SS-11	Apr 29, 2016	Collected one sample from SS-11 and analyzed for total suspended solids and oil and grease. Reason for sampling: stormwater monitoring and to determine the composition of the chemicals released into the atmosphere as a result of the leak. Results: TSS - 1.5 mg/L, Oil & Grease - <0.8 mg/L. QA/QC: standard. Sampling type: grab aqueous sample. Time collected: 11:30 – 11:34 AM.
Metals – spectrometer	Air and surface soil screening	SCAQMD	Surface soils (7 locations in Porter Ranch, 1 location in Granada Hills, 3 at the Aliso Canyon facility)	May 2016	SCAQMD took outdoor air samples and 13 surface soil samples. Reason for sampling: to assess whether the metals found in the LACDPH indoor environmental study/public health assessment were present in the outside air or surface soil. Results: see the report on air and soil samples at Aliso Canyon and Porter Ranch .

Table 8. Examples of data sources related to health outcomes (including acute symptoms) potentially experienced by impacted communities during and after the SS-25 gas well failure.

Data element	Data Source	Location	Dates	Notes
Health symptoms survey (CASPER study)	LACDPH	Community	Mar 10-12, 2016	Survey of community members on their health symptoms during the gas well blowout and soon after the well was sealed. Survey also collected information on healthcare sought after the well was sealed, odors and oily residue, methods to improve indoor air quality, activities of relocated households upon returning home, and households' greatest needs.
California School Climate, Health, and Learning Surveys (CalSCHLS)	CDE	California	2007-present (conducted annually)	CalSCHLS assess key indicators linked to success in school, career, and life. The surveys are used as a tool to help school districts improve school climate, pupil engagement, parent involvement, and academic achievement. CalSCHLS consists of three surveys: the California Healthy Kids Survey (CHKS), the California School Staff Survey (CSSS), and the California School Parent Survey (CSPS). School districts must register to take part in the surveys. Sample sizes vary by year and school district. To learn more about the surveys, visit the following website: https://calschls.org/about/the-surveys/ . District and county reports for every administration of the CHKS since 2017 are available here: https://calschls.org/reports-data/search-lea-reports/ . For information on requesting school-level data and raw data, visit the following website: https://calschls.org/reports-data/#slcr .
Cancer registry data	USC Cancer Surveillance Program at the Keck School of Medicine	Los Angeles County	1972 – present	Cancer registry data on all new cancer diagnoses made among residents of Los Angeles County since 1972. The USC Cancer Surveillance Program is a member of the statewide population-based cancer surveillance system, the California Cancer Registry, and is the largest registry of the National Cancer Institute-funded Surveillance, Epidemiology, and End Results (SEER) program. More information is available on the USC Cancer Surveillance Program website .
California Vital Statistics (Birth and Death) Data	CalDPH	California	Dependent on data of interest	Vital records data and statics cover a wide range of health topics including births, deaths, and fetal death/still births. Birth data include state registered births and births to California residents that occurred out-of-state. Birth data also include demographic information related to the child and the parents as well as medical information related to the birth such as birthweight and preterm births. Death data include in-state California deaths and deaths of California residents that occurred out-of-state. Death data also include other details related to the death including the underlying causes of death. For more information including how to request vital records data, visit the CalDPH Vital Records Data and Statistics website .
CDC Wide-Ranging On-line Data for Epidemiologic Research (WONDER)	CDC	Geographical granularity dependent on data of interest	Dependent on data of interest	CDC WONDER is an integrated information and communication system that makes information resources of the CDC available to public health professionals and the public at large. CDC WONDER manages over 20 collections of public use data on a variety of health-related topics including U.S. births, deaths, cancer diagnoses, tuberculosis cases, vaccinations, and environmental exposures among others. Data summary descriptions are available here . For more information, visit the CDC WONDER website .
Hospital discharge data	HCAI	California	1983 – present	Every six months, California hospitals submit information from individual patient records including the patient's ZIP code, birthdate, diagnoses, and treatments/procedures. For more information on the available data and to request data for research purposes, visit the HCAI website and the CHHS Open Data website .

Table 8. Examples of data sources related to health outcomes (including acute symptoms) potentially experienced by impacted communities during and after the SS-25 gas well failure.

Data element	Data Source	Location	Dates	Notes
Emergency Department (ED) Encounters data	HCAI	California	2005 – present	Every three months, EDs in California submit abstract information from individual patient records including the patient’s ZIP code, birthdate, service date, diagnoses, external cause of injury/morbidity, and treatments/procedures. For more information on the available data and to request data for research purposes, visit the HCAI website and the CHHS Open Data website .
Quest Diagnostics laboratory data	LACDPH	Porter Ranch and 6 comparison zip codes	2011 – 2019	Laboratory data includes information on complete blood counts, liver function and kidney function. Includes residents of the Porter Ranch zip code (91326) and 6 other comparison zip codes. Residents include adults and children ages 5 and older who received one or more laboratory tests between 2011 and 2019 ordered by a medical provider through Quest Diagnostics. Use of this data for research requires a data-use agreement.
Data Quest	CDE	California	2007-2018	Data Quest is a web-based data reporting system for information about California students, teachers, and schools. Reports are available for a variety of different topics including school performance, test results, student enrollment, graduation and dropout rates, absenteeism, school staffing, and course enrollment among others. Reports are available at various geographical levels including State, County, District, and school. Information on requesting data from CDE is available here: https://www.cde.ca.gov/ds/da/ .

Figure 1. Map of fixed air monitoring locations in the community surrounding the Aliso Canyon Gas Storage Facility during and following the blowout.

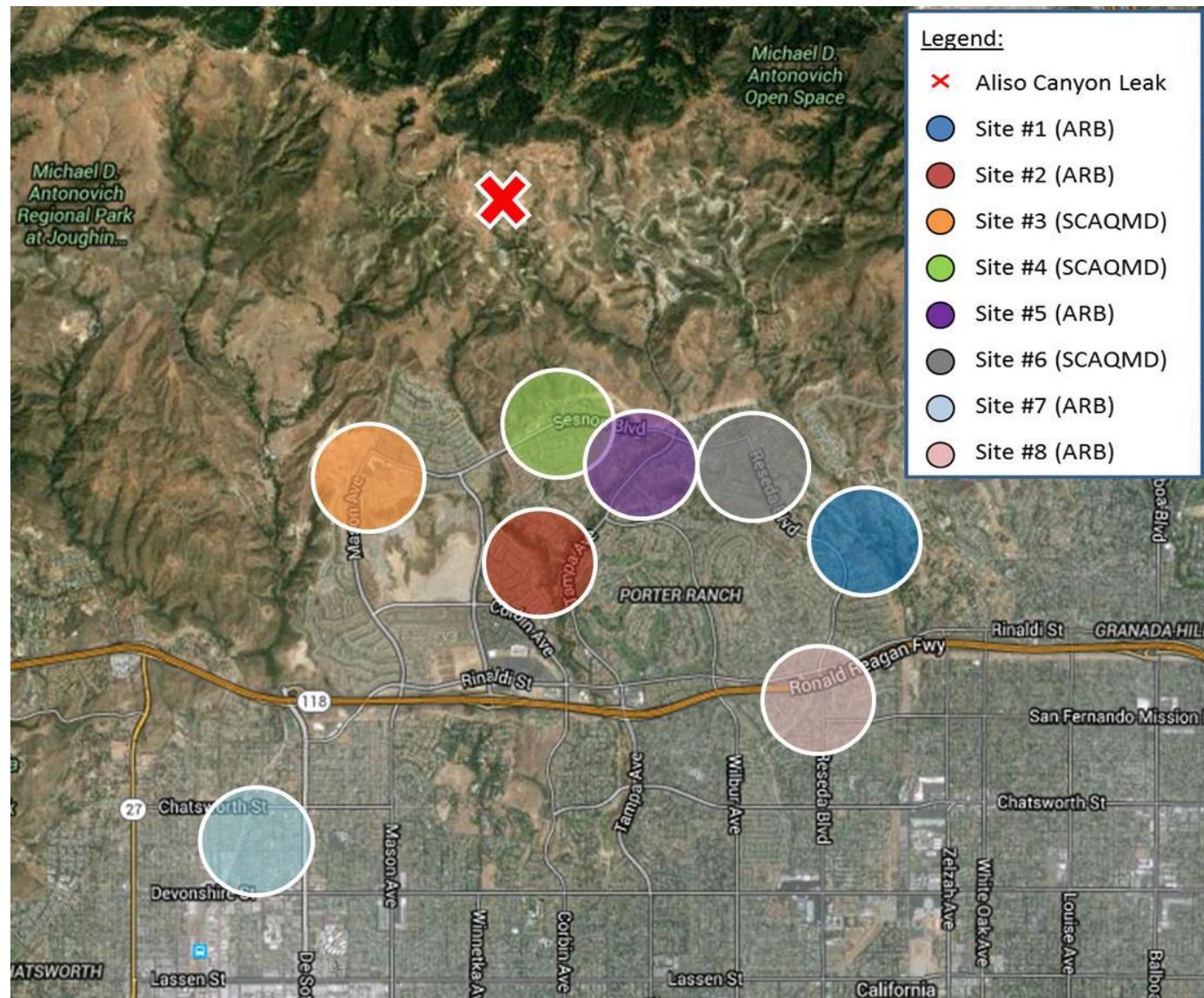
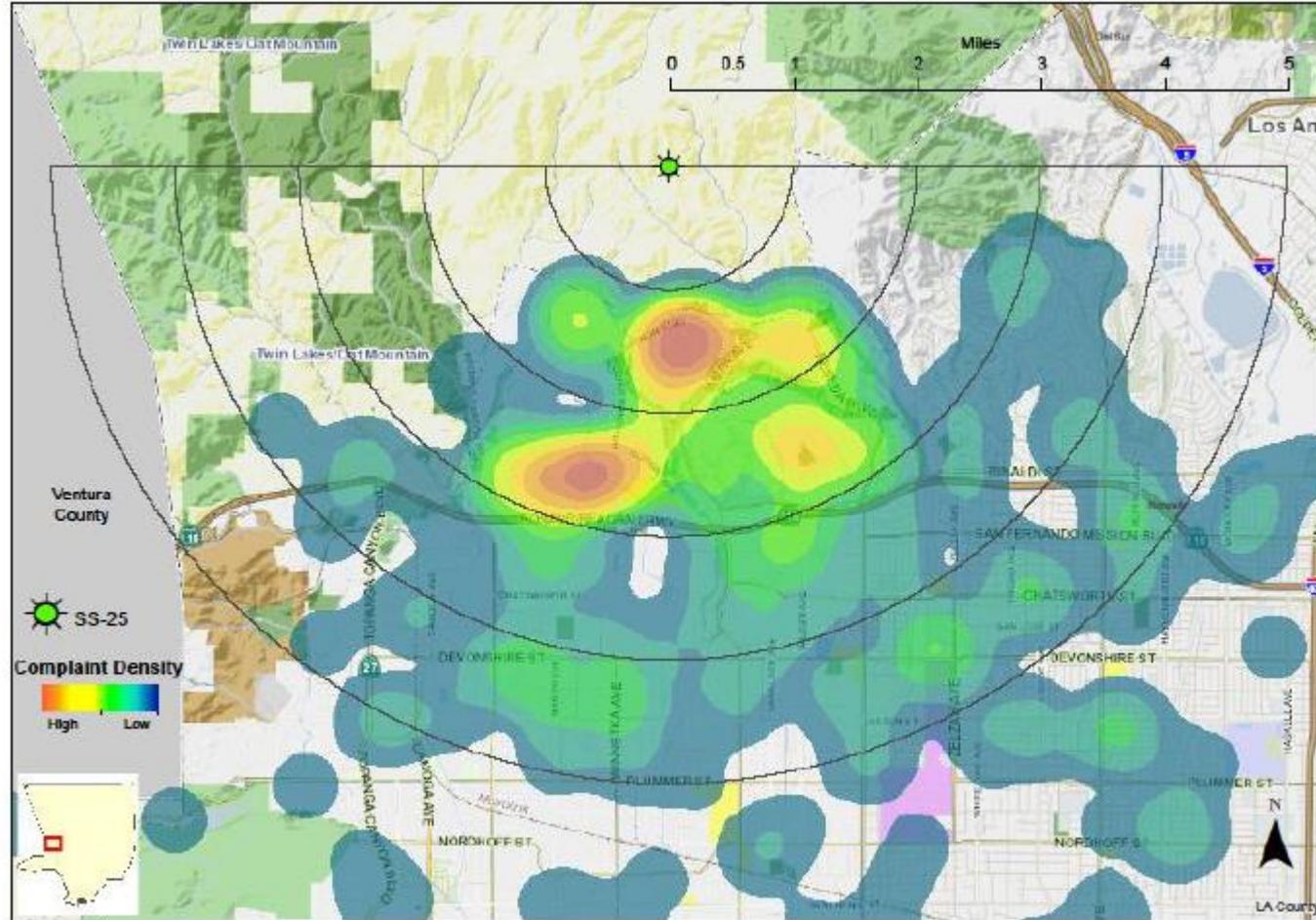


Figure 2. Map of the density of symptom reporting by resident address in the communities surrounding the Aliso Canyon Gas Storage Facility.



Created by: Office of Health Assessment and Epidemiology, Epidemiology Unit. 02/03/16. Map shows the density of symptoms by respondent's addresses. 511 of 687 addresses were located (the rest were excluded due to incorrect or missing addresses).

Table 9. Acronyms, Abbreviations, and Notes

AETL	American Environmental Testing Laboratory, Inc.
AMP	Air Monitoring Program
ASTM	ASTM International, formerly known as American Society for Testing and Materials
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CalEd	California Department of Education
CalDPH	California Department of Public Health
CalGEM	California Geologic Energy Management Division (formerly the California Department of Gas and Geothermal Resources)
Cal/OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CCST	California Council on Science and Technology
CDC	Centers for Disease Control and Prevention
CDE	California Department of Education
CERS	California Environmental Reporting System
CHHS	California Health and Human Services
CMS	The Centers for Medicare and Medicaid Services
CO	Carbon monoxide
CO ₂	Carbon dioxide
COC	Chain of Custody
COPC	Chemicals of Potential Concern
CPUC	California Public Utilities Commission
CY	Cubic yard
DOE	Department of Energy
DOT PHMSA	Department of Transportation's Pipeline and Hazardous Materials Safety Administration
dpm	Disintegrations per minute
ED	Emergency Department
EPA	Environmental Protection Agency
e-RLM	epi-Reflected Light Microscopy
FF-#	Fernando Fee '# - refers to well pad area/number on the SCG Aliso Canyon facility
FID	Flame ionization detector
FLIR camera	Forward-looking infrared camera
GC	Gas chromatography

GIS HEAL Labs	Geographical Information Systems Health Exposure Analysis Laboratories
GC/MS	Gas Chromatography/Mass Spectroscopy
GPS	Global Positioning System
HAPs	Hazardous Air Pollutants
HCAI	California Department of Health Care Access and Information (formerly known as the Office of Statewide Health Planning and Development)
Health Study	Aliso Canyon Disaster Health Research Study
H ₂ S	Hydrogen Sulfide
J-flagged	Analyte concentration is an estimated value because it was detected at a level between the method detection limit and practical quantitation limit
LACDPH	Los Angeles County Department of Public Health
LACFD HHMD	Los Angeles County Fire Department Health Hazardous Materials Division
LAUSD	Los Angeles Unified School District
LEL	Lower Explosive Limit
LS	Liquid scintillation
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliters
MSDS	Material Safety Data Sheet
NASA-JPL	National Aeronautics and Space Administration's Jet Propulsion Laboratory
ND	Not detected, below laboratory detection limits
NH ₃	Ammonia
NIOSH	National Institute of Occupational Safety and Health
NMOCs	Non-methane organic compounds
NMNEOC	Non-methane non-ethane organic carbon
NO	Nitrogen oxide
NO ₂	Nitrogen dioxide
TRS	Total reduce sulfur
N ₂	Nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
O ₃	Ozone
PAHs	Polyaromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
pH	Acidity/basicity

PID	Photoionization detector
PLM	Polarized Light Microscopy
ppb	Parts per billion
ppm	Parts per million
P-‘#’	Porter ‘#’ - refers to well pad area/number on the SCG Aliso Canyon facility
QA/QC	Quality assurance, quality control.
SCAQMD	South Coast Air Quality Management District
SCG	Southern California Gas Company
SF-‘#’	Sesnon Fee ‘#’ - refers to well pad area/number on the SCG Aliso Canyon facility
SIM	Stability Indicating Method
SM	Standard Methods
SNAQ	Sensor Networks for Air Quality
SCG	Southern California Gas Company
SO ₂	Sulfur Dioxide
SS-‘#’	Standard Sesnon ‘#’ - refers to well pad area/number on the SCG Aliso Canyon facility
STLC	Soluble threshold limit concentration
SVOCs	Semi-volatile organic compounds
TCA	Total Carbon Analysis
TCLP	Toxicity characteristic leaching procedure
THT	Tetrahydrothiophene
TICs	Tentatively identified compounds
TK	Tank
TPH	Total petroleum hydrocarbons
TPH-cc	Total petroleum hydrocarbons-carbon chain (C#-C# notes the range of carbon included)
TPH-g	Total petroleum hydrocarbons as gasoline
TPH-d	Total petroleum hydrocarbons as diesel
TPH-o	Total petroleum hydrocarbons as oil or heavy hydrocarbons
TRS	Total Reduced Sulfur
TSS	Total Suspended Solids
TVA	Toxic Vapor Analyzer
µg	Micrograms
µg/L	Micrograms per liter

USC University of Southern California
TPH Total petroleum hydrocarbons
TPH-cc Total petroleum hydrocarbons-carbon chain (C#-C# notes the range of carbon included)
VOCs Volatile organic compounds

Notes:
Standard lab QA/QC: this generally includes a method blank, matrix spike, matrix spike duplicate, laboratory control sample, laboratory control sample duplicates, and/or a surrogate spike.