Aliso Canyon Disaster
Health Research Study

County of Los Angeles
Public Health

Goals and Priorities for the Aliso Canyon Disaster Health Research Study

January 2022

Message from the Scientific Oversight Committee

The Aliso Canyon Disaster Health Research Study's (Health Study's) Scientific Oversight Committee (SOC) thanks community members who provided their thoughtful and candid comments on the draft goals and priorities for the Health Study. This input has been invaluable in ensuring that the Health Study is informed by, and accurately reflects, the hopes and concerns of those directly impacted by the Aliso Canyon disaster.

The final goals and priorities for the Health Study reflect and incorporate feedback we received from residents of the communities affected by the blowout and its aftermath and the concerned public. Much of the feedback was consistent with previous comments and expressions of concern from the communities before the Health Study was proposed. Many respondents indicated that the draft goals and priorities do represent what they hope the Health Study will focus on and prioritize. This reassured us that our approach was consistent with the community's priorities.

A report on the feedback received is available on the Health Study website: http://publichealth.lacounty.gov/eh/docs/healthresearch/public-feedback-draft-goals-priorities.pdf. This report is one of several available resources for researchers to learn about the concerns and priorities of communities surrounding the Aliso Canyon gas storage facility.

It is clear to the SOC that unanswered questions and concerns remain, including those raised about the quality and availability of existing data for the Health Study. As with any research study, we recognize the limitations of some of the existing data, such as the limited amount of air monitoring that was conducted during the early days of the blowout. However, over time, a significant amount of information has been collected on potential chemical exposures, such as air monitoring data and environmental sampling from the facility and community, which may be useful to researchers conducting the Health Study. The researchers may use the available data, collect new data, or both, depending on the needs of their study.

Many community members urged the SOC to require clinical evaluations and long-term monitoring as part of the Health Study. In any research study, various research designs and methods might be used to answer scientific research questions, each with its own strengths and weaknesses. We anticipate that proposers will offer an array of study designs which may or may not include clinical aspects, depending on the specific research objectives and the health outcomes the third-party researchers propose to study.

The Request for Proposals (RFP) purposely does not exclude any particular study design or research method. Instead, it anticipates that highly accomplished researchers will draw upon their experience and skill sets to propose their best ideas to evaluate the impacts to health, quality of life and wellbeing experienced by area residents due to the Aliso Canyon disaster and gas storage facility operations.

The goal of the RFP solicitation process currently underway is to award a contract to a research team that proposes scientifically-based and valid research methods that have the greatest potential to address priority health concerns and achieve the goals that have been outlined for this Health Study, which can be found below and in the RFP materials. We look forward to guiding research that may provide all of us with a better understanding of the health impacts of this disaster.

Table of Contents

Aliso Canyon Disaster and Health Study Background

On October 23, 2015, the largest gas blowout in the history of the United States was discovered by the Southern California Gas Company (SoCal Gas) at well SS-25 in the Aliso Canyon gas storage facility in Los Angeles, California.[1] An estimated total of 109,000 metric tons of methane (1) and natural gas constituents flowed uncontrolled from Aliso Canyon well SS-25 for nearly four months. The leak was exacerbated by seven surface well-control attempts over the course of the first two months of the disaster. A relief well was drilled and intercepted the leaking well, stopping the flow of escaping gas on February 12, 2016. The well was subsequently cemented and sealed.[2]

During the blowout, residents in nearby communities experienced foul odors, oily mists, and a range of health symptoms – including irritations of the eyes/nose/throat, nausea, abdominal discomfort, headaches/migraines, dizziness/light-headedness, nose bleeds, shortness of breath, skin rashes/irritations and other mucous membrane irritations – most of which were consistent with, and were attributed to, low-level exposure to natural gas odorants.[3]

SoCal Gas was directed by the Los Angeles County Department of Public Health (Public Health) on November 19, 2015 to expedite efforts to stop the blowout and, in the interim, offer free, temporary relocation to any area residents affected by odors from the Aliso Canyon gas storage facility. Over 8,000 households were relocated. In addition, on December 16, 2015, SoCal Gas was directed to assist the Los Angeles Unified School District (LAUSD) in the temporary relocation of affected students and staff of Porter Ranch Community School and Castlebay Lane Charter School to alternative school facilities.

After Well SS-25 was sealed and outdoor air contaminants returned to background levels (2), symptoms continued to persist. A Community Assessment for Public Health Emergency Response (CASPER) found that 63% of surveyed households reported health symptoms in the month after the well was sealed - only a modest improvement from the 81% of households that reported experiencing health symptoms during the blowout (3). In addition, household dust samples found trace amounts of a consistent combination of metals that may have been emitted from well SS-25 during the blowout and may have contributed to the persistent symptoms (4). In response, SoCal Gas was directed by Public Health and ordered by the Los Angeles Superior Court to pay for professional, comprehensive cleaning of homes.

In addition to the potential exposure to natural gas, odorants, constituents of crude oil and other combinations of chemical compounds, many nearby residents experienced economic hardship including business and income loss, disruption of their daily lives from school and household relocation, and other consequential impacts of the disaster possibly leading to psychological distress. The combination of these stressors may all adversely impact health and quality of life.

1 SoCal Gas, a subsidiary of Sempra Energy, is the owner and operator of the Aliso Canyon gas storage facility.

2 The California Public Utilities Commission (CPUC) and the Geologic Energy Management Division (GalGem) contracted Blade Energy Partners (Blade) to conduct an independent root cause analysis of the SS-25 well blowout. The final report and video provide detailed information on the root causes of the well failure and the well-kill attempts and can be found on the CPUC website: https://www.cpuc.ca.gov/aliso/.

3 Refer to the Office of Environmental Health Hazard Assessment (OEHHA) website for more information: https://oehha.ca.gov/air/general-info/aliso-canyon-underground-storage-field-los-angeles-county

The Aliso Canyon Disaster Health Research Study (Health Study) is a supplemental environmental project (SEP) agreement in The People of the State of California v. Southern California Gas Company's Consent Decree (Appendix D) approved by the Los Angeles Superior Court on February 25, 2019. Funding for the Health Study was received by the County in March 2019. Public Health was tasked with overseeing the development and implementation of the study with the guidance of a Scientific Oversight Committee (SOC). The Health Study will be a multi-year investigation of health impacts in communities affected by the Aliso Canyon blowout.

Due in part to the unprecedented scale and length of the Aliso Canyon blowout, there is limited extant research that can provide insight on potential health impacts of this gas storage facility disaster. Few epidemiologic studies of populations living near oil and gas operations have been conducted and these studies provide limited or mixed evidence of the possibility for harmful health effects (5; 6). However, other experimental, toxicological and epidemiological research suggests that chemicals of potential concern associated with the Aliso Canyon blowout and well-control operations – including volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), heavy metals, particulate matter, and aldehydes – do have harmful long-term health effects when exposures reach toxic levels. Additionally, there is a growing body of research on the unexpected, mental health, and social consequences of human-made environmental disasters and their aftermath (7; 8; 9; 10; 11). The Health Study is needed to increase the collective understanding of potential short- and long-term health impacts and advance the scientific body of knowledge on human-made environmental disasters of this nature.

As mandated by the Consent Decree, the SOC is tasked with determining the goals of the study. The feedback community members have provided at open houses, Community Advisory Group (CAG) meetings, Neighborhood Council meetings, a virtual town hall, and via surveys and the Health Study website has helped identify the Health Study Goals and Priorities developed by the SOC and outlined below.

For more background information on the Aliso Canyon disaster and the Health Study, please visit the Aliso Canyon Disaster Health Research Study website. Also, to learn more about what a health study is, please refer to the "What is a Health Study?" fact sheet and video.

Health Study Goals

The Health Study will be scientifically robust and responsive to the Health Study goals. Residents of the impacted communities have expressed a strong desire for a comprehensive health study.

The overarching goal of the Health Study is to contribute to the understanding of the potential short-term and long-term physical, mental, behavioral, social, and community health impacts of exposure to the Aliso Canyon disaster.[4]

Specific goals of the Health Study are to:

- Evaluate relationships between exposures to airborne chemicals and other potential toxicants during and/or following the disaster and adverse health impacts to the community, which could include, but are not limited to, physical and mental health;
- Assess the impact of stressors related to the Aliso Canyon disaster on the quality of life and functioning of residents in the impacted communities during and following the disaster, and;
- Evaluate outcomes among vulnerable populations, such as children and older adults, in the impacted communities.

Health Study Priorities

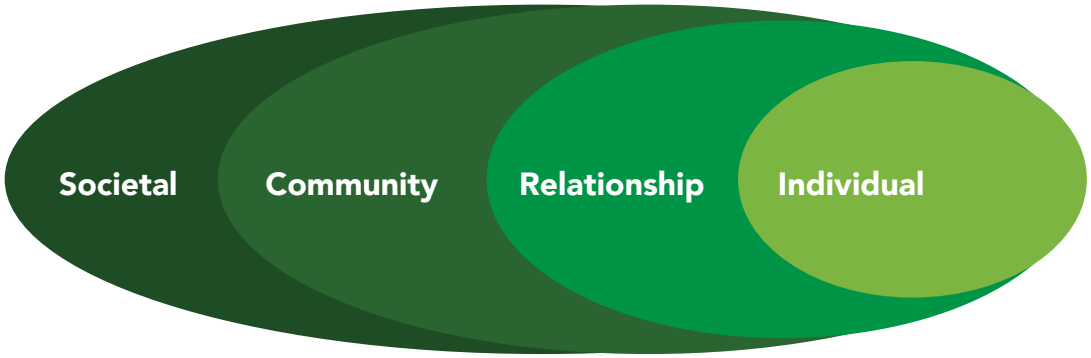
Priorities for the Health Study, outlined below, were informed by both (1) a wealth of input from residents directly impacted by the Aliso Canyon disaster and the public at large and (2) the SOC's subject matter expertise. Priorities fall into the following categories: health study approach; study outcomes related to health, quality of life and well-being; study populations; environmental disaster-related exposures; and data sources and collection. The purpose of the Health Study goals, outlined above, and priorities are to help guide independent third-party researchers in their development of research proposals for the Health Study. The researchers will propose study types and research methods that they feel have the greatest potential to achieve the goals and that also align with the priorities. It is expected that various study types will be proposed and may include population-based studies, clinical studies, records-based epidemiological studies, toxicology studies, community-based participatory research projects, and risk assessments, among others.

4 For the purposes of the Health Study, the Aliso Canyon disaster includes the incident, subsequent remediation efforts, ongoing facility operations and associated activities, and disturbances to the community.

Study Approach

Health, quality of life and well-being are influenced by interactions of characteristics at the individual, interpersonal, community and societal levels. Therefore, the Health Study will take a social-ecological approach[5] to the investigation of potential health outcomes and impacts to quality of life and well-being resulting from the Aliso Canyon disaster. This means that the Health Study will assess impacts on health, quality of life and well-being at various levels of influence (refer to Figure 1 below of CDC's 4-level social-ecological model).

Figure 1. CDC Social-Ecological Model



Study Outcomes

It is expected that the Health Study researchers will investigate multiple potential health outcomes of concern – examples of which are outlined below.

1. Health Outcomes

While the community is most concerned about potential long-term or chronic health outcomes, they are also highly concerned about potential health outcomes at other time points.[6]

- *Chronic Health Outcomes* – Input from the community indicates that they are highly concerned about cancers, respiratory conditions, immune system dysfunction, nervous system disorders, cardiovascular disease, and worsening pre-existing conditions. They have also expressed concern about mental and emotional health.
- *Intermediate Term Health Outcomes* – These include but are not limited to adverse birth outcomes such as pre-term birth or low birth weight, and possible harms or impacts to the health of pregnant persons and developing children.

5 For more information on the social-ecological model for health, visit: https://www.atsdr.cdc.gov/communityengagement/pce_models.html

6 Refer to the report on public feedback for more information available on the Public Health website: http://publichealth.lacounty.gov/eh/docs/healthresearch/public-feedback-draft-goals-priorities.pdf

- *Acute Health Outcomes* – Community members have expressed high levels of concern about both acute physical symptoms and mental and emotional symptoms, including worsened pre-existing conditions, during the well blowout and after the well was sealed. Physical health symptoms reported to Public Health during and following the disaster included, but were not limited to, skin and mucous membrane irritations, headaches/migraines, and gastrointestinal, cardiovascular, and respiratory outcomes. Emotional and mental health symptoms that may have been experienced include, but are not limited to, stress and psychological trauma.

2. Quality of Life and Well-being

The Aliso Canyon disaster disrupted the lives of thousands of residents in far reaching ways from displacement and financial impacts to ongoing safety concerns. Therefore, in addition to health outcomes, the Health Study will investigate the impact of the Aliso Canyon disaster on quality of life and well-being, especially since overall quality of life and well-being can affect physical and/or mental health. Changes in quality of life and well-being can be acute, chronic, or in-between. Aspects of quality of life and well-being that may be affected by an environmental disaster include social health, behavioral health, community health, and community resilience, as described below.

- Social health is the ability to interact and form meaningful relationships and support networks with others. Relationships that are nurturing and supportive are especially important when recovering from stressful or traumatic situations such as environmental disasters.
- Behavioral health is the connection between behaviors and health and well-being. Behaviors such as eating habits, substance use, and exercise can affect physical and/or mental health.
- Community health is the overall health status and functioning of a defined group of people with common characteristics and includes conditions and activities that promote, protect, and preserve health (12).
- Community resilience is the sustained ability of communities to withstand, adapt to, and recover from adversity.

Study Populations

The Health Study will include residents of neighborhoods surrounding the Aliso Canyon gas storage facility and directly impacted by the Aliso Canyon disaster. While community members have expressed concern about all members of their community, including those who have moved away from the impacted area following the Aliso Canyon disaster, they are also concerned about vulnerable groups of people including those with pre-existing conditions, older adults, children and infants, pregnant persons, workers, and minority groups. Environmental disasters, like the Aliso Canyon disaster, can have a greater negative impact on vulnerable groups of people. Therefore, the Health Study must include vulnerable groups. Additionally, the community has expressed concerns about the impact of the Aliso Canyon disaster on the health of animals and pets.

Environmental Disaster-related Exposures

The Health Study seeks to assess the health impacts of a broad range of exposures related to the Aliso Canyon blowout and gas storage facility operations. For the purpose of the Health Study, exposures are broadly defined as those that may have led to health impacts, including an increased risk for adverse health outcomes and include: chemicals released during the Aliso Canyon blowout and well-control attempts; potential exposures to chemicals released as part ongoing, current, and regular operations at the Aliso Canyon gas storage facility; and exposure to social and other stressors arising from the environmental disaster situation and remediation efforts.

Community members have expressed concerns about identifying the types of chemicals and toxicants that they were exposed to and the duration of exposures. Therefore, the Health Study will aim to quantify toxic exposures experienced by residents of the impacted communities before, during, and after the Aliso Canyon disaster with as much specificity as possible. In addition, studying the combined effects of chemical exposures and multiple stressors on health and well-being is considered a high priority to impacted residents. Examples of exposures of concern include but are not limited to:

- *Chemical Exposures* – These include natural gas and constituents released from Well SS-25 during the blowout and/or during ongoing facility operations (including but not limited to sulfur odorants, VOCs, semivolatile organic compounds (SVOCs), PAHs, and particulate matter), constituents of well-control muds and fluids that were used during well-control operations and remediation efforts (such as select metals and minerals, aldehydes, and sulfonated tannin esters), and constituents of crude oil. Of particular interest to community members is the potential cumulative and/or synergistic impact of multiple and concurrent toxic exposures.
- *Social and Other Stressors* – These include but are not limited to changes in home/school environments, social networks, socioeconomic status, activity level, and stigmatization resulting from real and perceived community exposures.

Data Sources and Collection

The Health Study researchers will determine what data are needed for their proposed research. The data that they use may come from a variety of sources. In addition to gathering their own data ("primary data") they may also use existing data that was collected for purposes other than research ("secondary data"). Primary and secondary data are further described below. Community members have expressed the desire for the Health Study researchers to gather health information from the people affected by the disaster, including medical records and healthcare data.

- Primary data refers to data gathered by researchers specifically for their research. The researchers may use or develop data collection tools tailored to their research objectives (such as surveys and psychometric tools) to collect high-quality data on exposure and/or outcomes measures. Additionally, they may use various methods to collect data, including performing appropriate and validated clinical or physiological evaluations and laboratory testing, using appropriate exposure assessment methods, and using appropriate and validated methods for collecting data directly from residents (such as focus groups, key informant interviews, surveys, and participant observation), among others.

- Secondary data refers to existing data (e.g., administrative, clinical etc.) that was collected by government institutions, companies, academic institutions, healthcare facilities, nonprofits, religious groups, recreational, social, and cultural organizations etc., as part of their record-keeping that may or may not be specific to the researcher's needs. The Health Study researchers may utilize acceptable forms of secondary data including, but not limited to, air monitoring and environmental sampling data, patient health records, hospital and emergency department discharge data, prehospital care reports, poison control center data, surveillance and monitoring data, birth and death records, cancer registries, veterinarian clinic records, and health outcome indicators. During and following the Aliso Canyon disaster, a number of government agencies and organizations collected environmental samples to monitor levels of chemicals that could pose a risk to health. A summary of existing secondary data sources on potential chemical exposures and health outcomes can be found on the Health Study website. Researchers may need to obtain agreement from agencies and organizations to use their respective data for research purposes.

References

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