An aerial photograph of a residential area in Aliso Canyon, California, with rolling hills in the background. A large white semi-transparent box is centered over the image, containing the title and date of the study.

Public Feedback on Draft Goals and Priorities for the Aliso Canyon Disaster Health Research Study

July 2021

Message from the Executive Lead on the Aliso Canyon Disaster Health Research Study

The Los Angeles County Department of Public Health (Public Health) is pleased to provide you with this report, which highlights key messages and findings from hundreds of comments on the draft goals and priorities for the Aliso Canyon Disaster Health Research Study (Health Study), received over a 6-week public review and comment period. Public input and comments were collected through an online form and by email.

The Aliso Canyon disaster/blowout at the Southern California Gas Company's Aliso Canyon natural gas storage facility was the largest uncontrolled release from a natural gas storage facility in U.S. history. This was extremely disturbing and disruptive for the residents, businesses, schools, and workers surrounding the blowout.

We look forward to having leading third party researchers conduct a comprehensive Health Study to evaluate the potential short- and long-term health impacts of this exposure to natural gas and its constituents.

In the coming months, we will release the Request for Proposals (RFP) for potential researchers to submit their proposals and qualifications for conducting the Health Study. The overarching goal of the Health Study is to answer important questions about the health impacts of the disaster on area residents. A Scientific Oversight Committee (SOC) composed of independent nationally renowned subject matter experts and public agency representatives has been tasked with finalizing the Health Study's focus and priorities, reviewing research plans, evaluating research progress, and providing expert advice to the selected research team(s). The SOC prepared and released the draft Health Study Goals and Priorities, which were developed with input from the community through multiple community engagement efforts led by Public Health. We are grateful for the wealth of input we received from the Community Advisory Group (CAG), Neighborhood Councils, and other impacted residents regarding health concerns and priorities related to the disaster. The SOC is using the input and feedback on the draft Health Study Goals and Priorities to inform the development of the RFP for the Health Study.

Getting to this point has been a lengthy process, particularly for the people directly impacted by this disaster. Since the settlement agreement was finalized, it has taken time to 1) to lay the foundation for the Health Study that is consistent with requirements outlined in the consent decree and 2) ensure opportunities for engagement with and feedback from the community throughout the process.

We appreciate your feedback and engagement in this process and look forward to having a scientifically based Health Study that enhances our collective understanding of the disaster and its impact on the community.

Sincerely,

Dr. Muntu Davis, MD, MPH

Los Angeles County Health Officer

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Introduction

As a result of the Aliso Canyon Disaster, the largest gas blowout in the history of the United States, many nearby residents experienced different types of symptoms during the blowout and after the gas well was sealed. In 2019, a settlement was approved requiring SoCal Gas to pay \$25 million for a study of health impacts to be administratively overseen by the Los Angeles County Department of Public Health (Public Health) and reviewed, advised and evaluated by a scientific oversight committee (SOC) of subject matter experts and agency representatives. Public Health will launch a competitive Request for Proposals (RFP) process to recruit an independent research team to conduct the Aliso Canyon Disaster Health Study (Health Study). One of the foundational elements of the RFP is the Health Study Goals and Priorities, which identifies key areas of potential focus for the Health Study. Developed by the SOC with prior input received from the affected community, the draft document was released for further community review and input prior to finalizing the Health Study goals and RFP.

The following report is a summary of the feedback and responses received during the public review and comment period for the draft Health Study Goals and Priorities document.

Methods of Gathering Public Comment

Public Health posted the draft Health Study Goals and Priorities document to the Health Study website on March 18, 2021, opening a 30-day public review and comment period. This comment period was later extended by two weeks at the request of community members. Comments were received from March 18, 2021 through April 30, 2021.

At the start of the comment period, Public Health invited the public, especially community members living and working in the northwestern neighborhoods of the San Fernando Valley, to review and provide feedback on the draft Health Study Goals and Priorities. The opportunity to provide comment was promoted in the following ways:

- Email communications to the Health Study email list
- Paid social media advertising
- Geotargeted digital banner ads through Southern California Newspaper Group
- Offices of local elected officials
- Neighborhood Councils and Community Advisory Group (CAG) members
- Monthly newsletter

Community members provided comments through either (1) an online form that solicited feedback about each section of the draft Health Study Goals and Priorities; or (2) they could email their comments directly to the Health Study email address.

Online Form Questions

Respondents selected their neighborhood of residence and answered questions about each of the following topics in the Health Study Goals and Priorities: study goals, study outcomes (including health and quality of life impacts), study populations, study exposures, data sources and collection, and study process.

Closed-ended questions asked respondents: how well the Health Study Goals and Priorities reflect their wishes for the Health Study; to prioritize between short-, intermediate- and long-term outcomes; and to characterize their level of concern or interest for each of twelve short-, intermediate- and long-term health impacts (most, less, or least concerned/interested for each). Responses were required for closed-ended questions.

Open-ended questions (10 total) asked for general feedback and reactions on the Health Study Goals and Priorities (one question); particular quality of life concerns and other reactions (two questions); study populations (one question); particular concerns and reactions about exposures (two questions); data sources and collection methods (one question); and feedback on the study process, other areas the study should focus on, and any other thoughts to share (three questions). Responses were optional for open-ended questions and many respondents left them blank.

Analysis of Qualitative Data

Open-ended responses were divided between five Health Study team members who independently conducted an initial review of a subset of responses to the ten questions, generating a preliminary set of common themes for each survey topic. Through group discussion, the preliminary themes were reconciled into a final set of themes including an “other” category for each question. Team members then independently “coded” qualitative responses (i.e., assigned final theme(s) to open-ended survey responses) for their set of surveys. Responses touching on different themes received more than one code. Two team members reviewed the full set of coded responses to identify discrepancies, discussed them and reached agreement on appropriate code(s) for the responses. Codes were tallied to determine how frequently themes were mentioned. Responses that did not align with a previously identified theme were further reviewed to determine if a new theme should be generated or if a response was among those that did not coalesce into a common theme.

Email Responses

Respondents submitting comments via email were encouraged to provide their neighborhood of residence and their level of concern and/or interest for the following: acute health impacts, intermediate-term health impacts, chronic health impacts, and susceptible groups of people. They were also encouraged to consider indicating whether the draft Health Study Goals and Priorities document represents what they hope the Health Study will focus on and prioritize.

Themes from the email responses are described separately from the online survey form, as the two formats are not comparable.

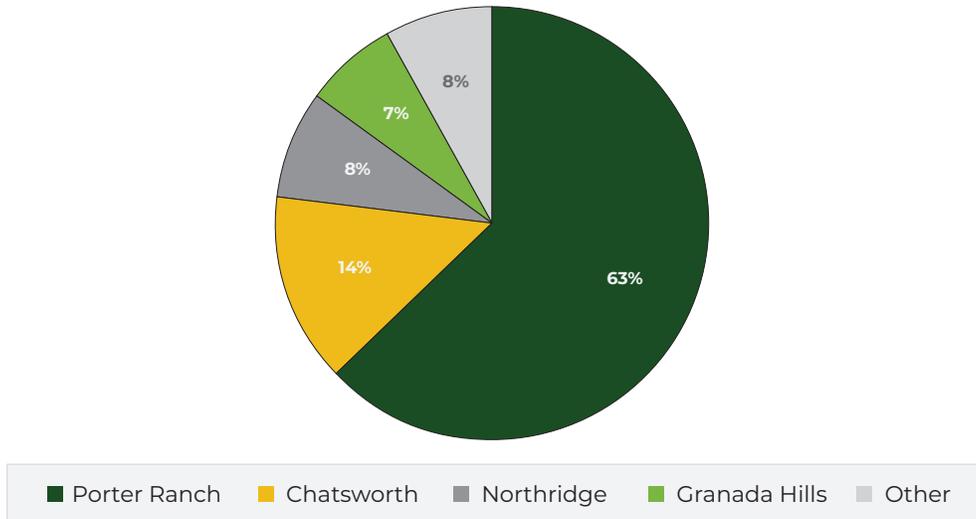
Results: Online Survey Form

During the 45-day public comment period, Public Health received 287 responses via the online form, of which 28 were duplicates, resulting in 259 unique survey responses.

Neighborhood of Residence

More than half of the survey responses (63%) were from Porter Ranch residents. Smaller percentages were from Chatsworth, Northridge and Granada Hills residents (14%, 8%, and 7%, respectively), and 8% were from other neighborhoods.

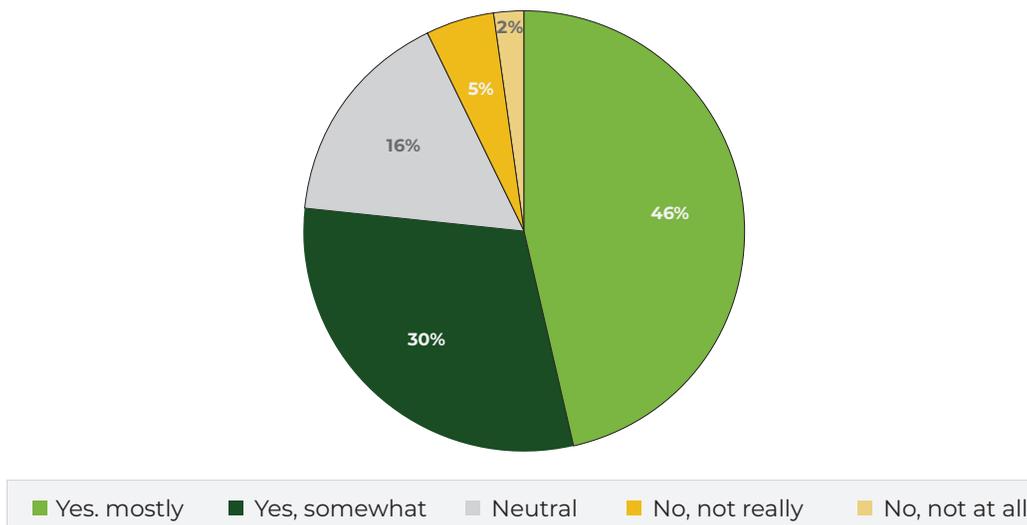
Neighborhood of Residence



Health Study Goals

Of the 259 total survey responses, 76% indicated that the draft Health Study Goals and Priorities document either mostly or somewhat represents what respondents hope the Study will focus on and prioritize, as opposed to 7% who felt it does not. Fewer than one in five (16%) provided a neutral response.

Does the draft Health Study Goals and Priorities document largely represent what you hope the Study will focus on and prioritize?



Themes Related to Study Goals

One hundred sixteen respondents answered the question:

- Do you have any reactions or thoughts that you would like to share with the SOC about the draft study goals?

The majority of responses reflected concerns about health effects of the disaster on people and/or pets, many seeking to understand what risks to health exist and if specific symptoms and health conditions were caused by the blowout. Respondents also expressed a desire to understand specifics about the chemicals released and the duration of exposure.

Effects on human health and/or pet health (79 responses)

- *Interest in learning about cases and/or prevalence and causation of particular conditions and disease clusters, including long term health effects*

“I think they may want to identify if this had any impact on those pregnant at the time.”

“My family and pets were perfectly healthy until we moved into our home in Porter Ranch. I would like to know... if there’s a [cancer] cluster or auto immune disease [resulting from the blowout].”

“I’m interested in seeing if some of the symptoms I am experiencing are similar to others affected by the event.”

Exposures and pollutants (19 responses)

- *Interest in learning about duration of exposure; concerns about exposures before, during, and after the blowout, including identification of chemicals and pollutants*

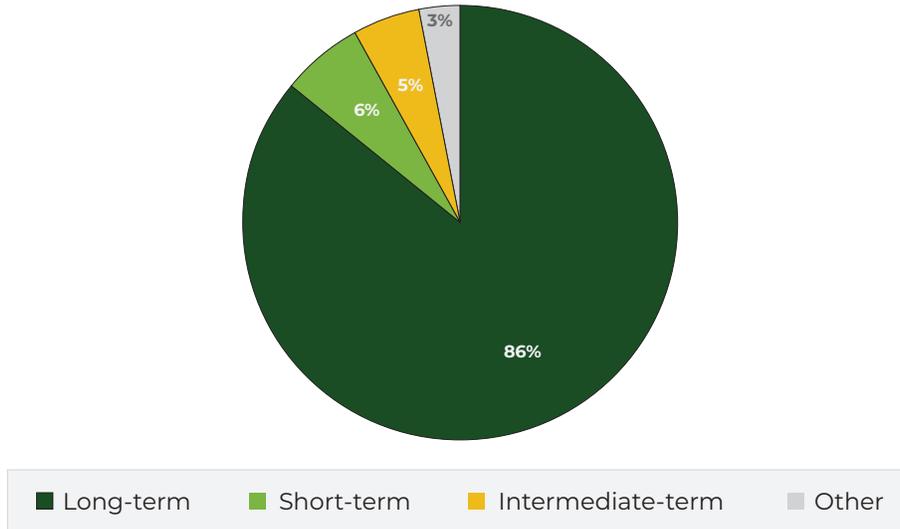
“I worry about what is happening daily & are there further methane/chemical leaks?”

“This would be great to find out the specifics of what’s being released. Especially the toxic smells that fill our home!”

Health Study Priorities

When asked to select which time frame for health outcomes (short-, intermediate-, and long-term) was of greatest concern or interest, the overwhelming majority of respondents (86%) indicated that long-term outcomes were of highest concern or interest to them. Few respondents reported that intermediate- or short-term outcomes were most important (both less than 7%).

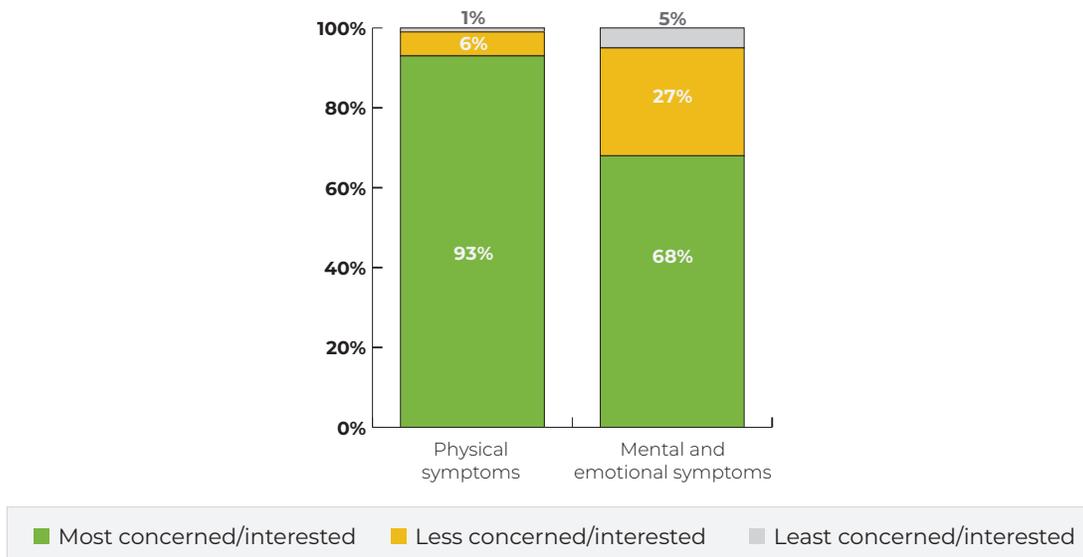
Although all three time frames are important, please identify the one that is of greatest concern or interest to you



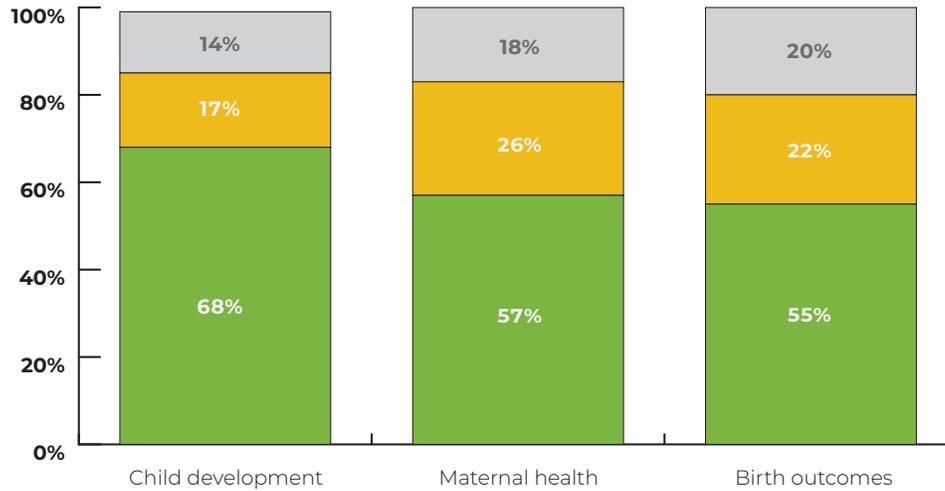
Priority of Short-, Intermediate-, and Long-term Health Impacts

Overall, respondents indicated high levels of concern for all health outcomes listed in the online form. More than half of respondents ranked every outcome as being at the highest level of concern, varying from a low of 55% (birth outcomes) to a high of 95% (cancer).

Please identify your level of concern and/or interest in the following short term health impacts

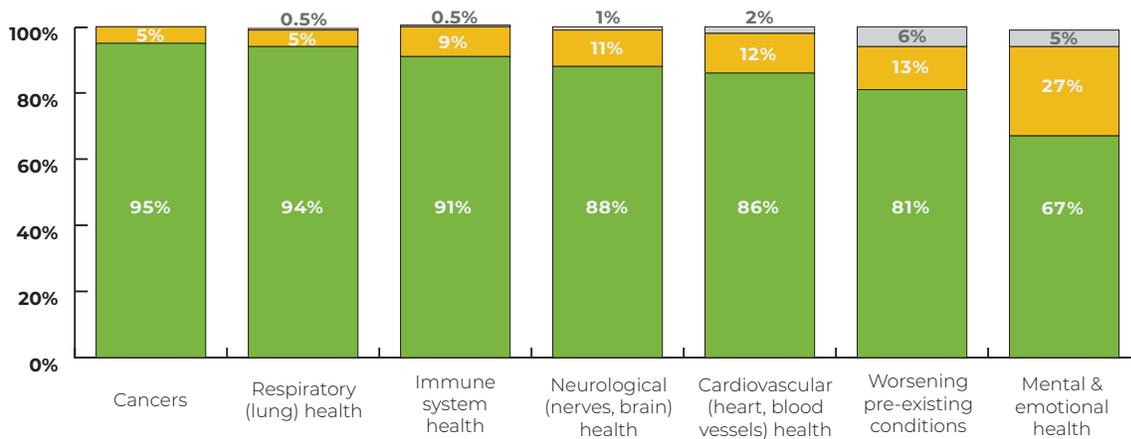


Please identify your level of concern and/or interest in the following intermediate term health impacts



■ Most concerned/interested
 ■ Less concerned/interested
 ■ Least concerned/interested

Please identify your level of concern and/or interest in the following long term health impacts



■ Most concerned/interested
 ■ Less concerned/interested
 ■ Least concerned/interested

Although statistical comparisons are not possible, some general patterns are evident. For example, physical health outcomes appeared to be of greater concern than mental health outcomes; and cancer, respiratory (lung), immune system, neurological and cardiovascular health, as well as worsening of pre-existing conditions, were all of highest concern to more than 80% of respondents.

Themes Related to Quality of Life Outcomes

There were a total of 283 responses to the two questions on quality of life outcomes:

- Considering how the quality of life areas described can be affected by a disaster, are any of these areas of particular concern or interest to you? If so, please explain.
- Do you have any other reactions or thoughts that you would like to share about the draft health or quality of life outcomes?

The majority of responses reflected concern about one or more dimensions of health, including personal, social, and community health. In addition, a significant number of responses focused on the connection between the disruptions and hardships caused by the blow-out, and subsequent negative effects on quality of life.

Health outcomes (182 responses)

- *Concerns about overall and future physical health; including pre-existing conditions and new and continuing symptoms; children's health issues; community and social health*
- *Emotional impacts, stress, and mental health outcomes, including depression and anxiety*
- *Interaction of physical and mental health issues*

”

“My youngest child has suffered from a severe depression and anxiety disorder since 2016. There is no evidence that this runs in our family and there has been no significant trauma that would have caused it, except perhaps the gas leak!”

”

“My health has been declining since the toxic overload that occurred when living through the gas blow out.”

”

“We’re constantly worried about the safety and if we’re putting ourselves and family at risk by living in this area.”

Life disruptions and hardships (63 responses)

- *Displacement; separation from family and friends; interruption and loss of daily activities*
- *Financial impact, including loss of income, cost of medical care*
- *Fears of another blowout, ongoing safety concerns; continued air quality concerns*

”

“The overall feeling of uncertainty and displacement ... can affect you moving forward.”

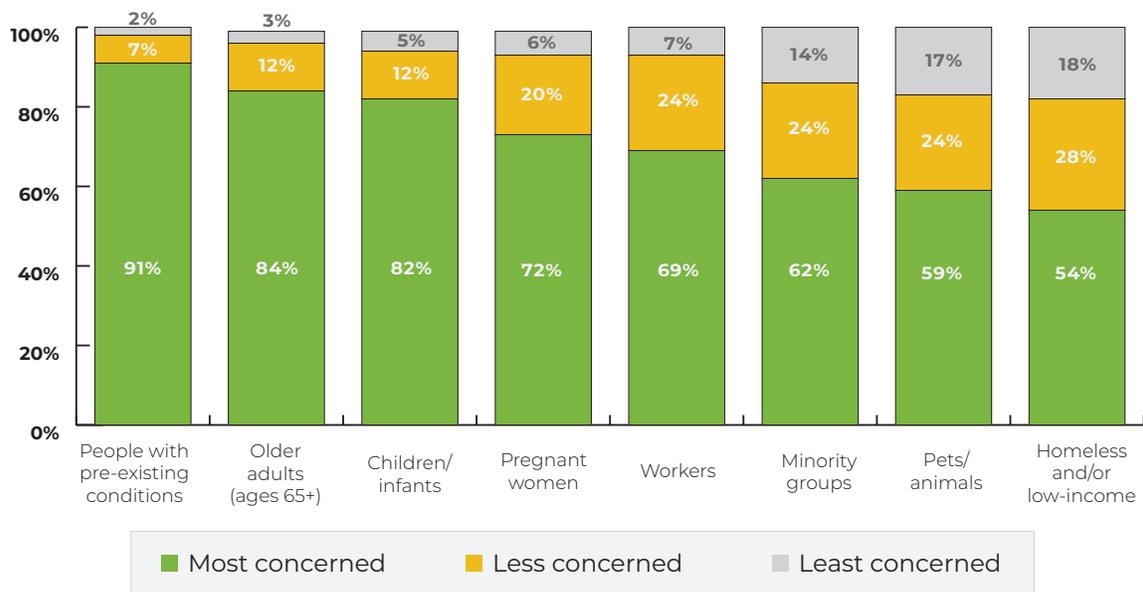


"Being forced out of our home, fending for ourselves, our livelihood, our work - then relocating - first to hotels then to an interim housing solution ...impacted all aspects of our life and health and that of our pets."

Study Populations

In general, respondents expressed concern about all members of their community; however, quantitative results showed higher levels of concern about some potentially vulnerable groups, including people with pre-existing conditions, older adults and children, as opposed to homeless and/or low-income groups. Seventy-eight respondents provided additional comments on study populations; however, those responses were split among those who emphasized paying equivalent attention to all potentially exposed members of the community (27), those who pointed out particular groups to focus on (31), and those whose responses did not coalesce into meaningful themes (23).

Please indicate your level of concern for the following susceptible populations



"It is frightening to think of all those children at nearby schools being contaminated by the polluted air."



"Everyone is susceptible to pollution and toxic exposure."

Themes Related to Exposures of Concern/Interest

There were a total of 233 responses to the two questions on exposures of concerns:

- Considering the broad definition of exposures provided above, are there certain exposures that are of particular concern or interest to you? If so, please explain.
- Do you have any other reactions or thoughts that you would like to share with the Scientific Oversight Committee about the exposures defined in the draft Health Study Goals and Priorities document?

The most common theme emerging from the responses to these questions reflected community members' concerns with how the exposures impacted them, their families, and communities. A significant number also expressed concern and interest in knowing more about the chemicals they were exposed to, and a smaller number made comments indicating that they wanted to know or were concerned about when they were exposed and for how long.

Impacts of exposure (96 responses)

- *Health and mental health impacts, including concerns about potential implications for long term health*
- *Non-health impacts such as having to relocate (i.e., life disruptions and hardships)*

”

“The very fact that toxins were released and they were inhaled and multiple side effects were experienced as well as respiratory illness and yes in addition to that it caused emotional stress, always having to go to the doctors and not to mention, the constant worry about long term damage.”

”

“My children became very ill and we ended up moving. I am concerned about their future and if they will have issues in the future.”

”

“The Scientific Oversight Committee should focus their study on any findings that can cause cancer.”

Chemicals exposed to (74 responses)

- *Concern about exposure to odors, gases and chemicals in general*
- *Identification of and information on general and specific harmful, toxic, and carcinogenic chemicals*

”

“Any toxins that are detrimental to our health are of immense concern.”

”

“Unknown exposures...what else have we been exposed to that we are not aware of??”

Concerned with duration of exposure (32 responses)

- *Concern of other leaks before blowout, length of exposure and current or ongoing exposure*

”

“The ongoing exposure to these toxic chemicals should be the number one concern at this point because those of us who were victims are already permanently damaged.”

Data Sources and Collection

Sixty-nine respondents answered the question:

- Do you have any reactions or thoughts that you would like to share about the various data sources and data collection as described above and in the draft Health Study Goals and Priorities?

Responses varied widely and many did not address data. One clear theme emerged focusing on the importance of gathering health information from the people affected by the disaster.

”

“Those exposed should be allowed to provide info, (without) their specific identity, from health care providers.”

Data sources reflecting impacts on people (26 responses)

- *Use medical records, healthcare data*
- *Collect data from the people who have been impacted*

Study Process, Areas of Focus, and Other Comments

Respondents provided a total of 155 responses to the last three questions:

- Do you have any reactions or thoughts you would like to share about the research proposal process;
- If the draft Health Study Goals and Priorities document does NOT represent what you hope the study will focus on and prioritize, please describe what you hope the study will focus on and/or prioritize; and
- Please provide any further feedback.

The largest subset of responses focused on the study methodology and process, offering suggestions or urging particular approaches. A smaller but significant number offered hopes for other desired outcomes that the study might produce. A small number cited trust issues.

Study methodology and/or process concerns and feedback (45 responses)

- *Focus on current health and long-term health outcomes among people who lived through the blowout*
- *Ensure study is detailed, comprehensive, and accurate; examine multiple avenues of contamination*
- *Involve and focus on the local community*

” **“SMART goals. Chemical spread, exposure, and health ramifications. Social, behavior, community, and quality of life impacts are too nebulous and at this point too intertwined with the pandemic to have any rational cause and effect connection.”**

” **“I just hope everything’s done methodically, ethically get the right results so we can all move forward.”**

Other desired outcomes (35 responses)

- *Provide help and compensation to the community; financial compensation and help with medical care*
- *Use study results to help prevent another blowout, improve safety of site*
- *Provide information people can use, particularly to mitigate health impacts now and in the future*

” **“I would like to see information about what individuals in the local community should do to mitigate the negative health impacts now.”**

Issues with Trust and Bias (19 responses)

- *Concern that SoCal Gas has influence over study process and/or results; distrust of SoCal Gas*
- *Expressing mistrust of government; concern about politics affecting study outcomes*
- *Concern about study bias and fairness*

” **“I hope that the results of the study will show the need for us to end the use of fossil fuels and move towards Green Energy. Also, help us be more prepared when there’s an ecological disaster.”**

” **“I hope the truth overcomes politics”**

Cross-Cutting Themes and Other Findings

A few themes were seen repeatedly across questions but not in large numbers. First, many respondents expressed frustration at what they perceive as a lack of progress to date, and a desire for the study to move quickly, stating that the study is taking too long and they want answers and resolution of ongoing problems. Second, respondents expressed the desire for comprehensiveness in the Health Study. When asked to prioritize, a small number consistently stated that everything is important - all health outcomes, all quality of life impacts, all population groups, all of the data available, and all exposures. Finally, a small number called for shutting down the gas company and holding responsible parties accountable.

In addition, many responses did not address the question asked but instead offered personal stories of what has happened to them and their families as a result of the blowout. Many expressed anger and frustration with the agencies involved, while a few others offered thanks and appreciation.

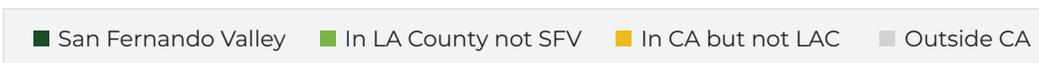
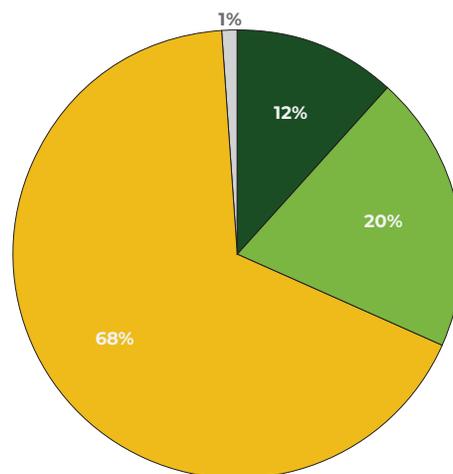
Results: Emailed Responses

Of the 429 emails received, the vast majority (412) were identical (i.e., form letters). We have attached the form letter as an Appendix. Seventeen were unique emails from community members. There was some overlap between the emails and online forms as described further below.

Area of Residence

Respondents provided their area of residence below their email signature. Of the 412 emailed form letters, 12% were from a residence in the San Fernando Valley, 20% from a Los Angeles County residence not in the San Fernando Valley, and 68% from California counties outside of Los Angeles. Aside from three respondents who indicated they formerly resided in Porter Ranch, no information is available regarding whether those from areas outside the San Fernando Valley may have resided in the area during the blowout. Of the 17 unique emails, most were from Porter Ranch (7) or another San Fernando Valley Community (5).

Area of Residence



Themes from Emailed Responses

Themes from emailed responses were mostly similar to those provided via the online survey form. The emailed responses, 96% of which were identical to the form letter in Appendix I, stressed the following themes:

- Desire for a clinically-based study including examinations of study participants and long-term monitoring and follow-up
- Identification of all chemicals, pollutants and other exposures
- Examination of exposures prior to, during, and after the blowout, as well as ongoing exposures
- Delivery of comprehensive and complete data by Public Health
- Transparency in limitations of existing data

Summary

- The majority (76%) of online form respondents indicated that the draft Health Study Goals and Priorities document mostly or somewhat represents what they hope the Health Study will focus on and prioritize.
- The overwhelming majority (86%) of online form respondents expressed concern about/interest in long-term health outcomes.
- While respondents listed similarly high levels of concern for short-, intermediate-, and long-term health outcomes, some patterns were observed:
 - » Respondents expressed a somewhat greater level of concern for physical health outcomes compared to mental.
 - » Cancer, respiratory (lung), immune system, neurological and cardiovascular health, as well as worsening of pre-existing conditions, were all of highest concern to 80% or more of respondents.
- Respondents emphasized the importance of gathering health information from the people affected (e.g., medical records).
- Respondents expressed concern about the impacts of the disaster on health at different levels of influence (personal, social, community) and outside the realm of physical health (i.e., mental, emotional, behavioral etc.). Additionally, personal anecdotes of life disruptions and hardships point to the far-reaching impacts of the disaster on quality of life.
- Respondents underscored the importance of the study process to be unbiased, comprehensive, and focused on the local, impacted community.
- While respondents expressed higher levels of concern about some potentially vulnerable groups (including older adults, children, and people with pre-existing conditions), respondents also emphasized paying equivalent attention to all potentially exposed members of the community.
- Respondents expressed desire for the outcomes of the Health Study to include the dissemination/use of study results to improve public safety, inform health-related decisions, and mitigate/prevent health impacts.

Appendix I - Identical Email Responses (Form Letter)

The Aliso Canyon Disaster Health Research Study (ACDHRS) must primarily require a clinical-based, patient-centric study of the people affected by the SoCalGas Aliso Canyon gas storage facility. To do this appropriately and to meet the level of scientific review needed to assess the unprecedented nature of this national disaster, it must meet the scientific gold standard.

The ACDHRS Goals and Priorities must:

- Require research be clinically focused, including clinical examinations.
- Require long-term clinical monitoring and evaluation.
- Require evaluation of the acute disaster exposures, as well as the chronic exposure before and after the blowout.
- Require evaluation of all chemicals and substances of exposure, including radiation, crude oil and particulate matter exposure.
- Require transparency about the flaws of existing data, especially air monitoring.
- Require DPH deliver foundational, scientific data about the exposure chemicals and substances, as researchers will not have subpoena authority to compel SoCalGas to provide it.

Require transparency about the following flaws in existing data:

- Data based on estimates of known chemical exposure, much is unknown.
- California Council on Science & Technology (CCST) deemed the air monitoring measurements to be flawed and unusable for a Health Assessment.
- No air monitoring data in the early days of the blowout when the release was most intense.
- Air monitoring toxic trigger points were set arbitrarily and well above safety limits.
- Majority of the air monitoring during the blowout was done by SoCalGas.

The required information needed to complete the study objectives above includes:

- Complete chemical use list in daily operations
- Complete composition of gas, liquids and solids from the blowout
- Complete composition well-kill elements and quantities
- Contents of missing evidence bins (radiation finding)
- Complete CBC study data and findings

This study is extremely important to me and my community. The blowout itself set a precedent as the largest methane and polytoxin release in U.S. history. It demands nothing less than a top-notch study that meets the scientific rigor as outlined above.

The goals and priorities of the Aliso Canyon Disaster Health Research Study must prioritize looking at the people sickened by SoCalGas, Aliso Canyon and the gas blowout, as well as the ongoing chronic exposures from the daily leaks that occur. The study must require the clinical evaluation of the physical and mental health of the people and require long-term evaluations representing the Gold Standard of such studies.

Appendix II - Draft Health Study Goals and Priorities



Aliso Canyon Disaster
Health Research Study
Goals and Priorities

-DRAFT-

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 Castleby 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

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>

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.

The Aliso Canyon Disaster Health Research Study (ACDHRS) 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 ACDHRS was allocated to Public Health in March 2019 to oversee the development and implementation of the study with the guidance of a Scientific Oversight Committee (SOC). The ACDHRS 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 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 - may have harmful long-term health effects. 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 ACDHRS 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 will determine 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 ACDHRS website has helped identify the draft Study Goals and Priorities developed by the SOC and outlined below.

For more background information on the Aliso Canyon disaster and the ACDHRS, 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 ACDHRS will be a multi-faceted and multi-disciplinary study of basic and applied research that is scientifically promising and will investigate multiple potential health impacts of concern to the residents affected by the Aliso Canyon disaster. The study will take a participatory approach to engaging members of the impacted communities.⁴

The overarching goal of the ACDHRS is to contribute to the understanding of the potential short-, and long-term physical, mental, community, and social health impacts of exposure to the Aliso Canyon disaster.⁵

Specifically, the ACDHRS project(s) will:

- Evaluate the relationship between the exposures to air pollutants, chemicals, and other potential pollutants during and/or following the disaster and adverse health impacts of priority to the community, which could include, but is not limited to, physical and mental health.
- Investigate the impact of the stressors related to the Aliso Canyon disaster⁵ on the quality of life and functioning of residents in the impacted communities during and following the disaster
- Include susceptible populations, such as children and older adults, in the impacted communities.

Health Study Priorities:

Feedback from people who lived near and experienced the Aliso Canyon disaster and expert guidance from the SOC are the basis for the identification of the priority research and study elements for the ACDHRS outlined below.

Study Outcomes

The ACDHRS seeks to have independent researchers examine the health and quality of life impacts resulting from the Aliso Canyon disaster. Health impacts of concern to the community and raised by the SOC include:

- *Acute Health Impacts*
These include acute symptoms and worsening pre-existing conditions experienced by residents in the communities surrounding the gas storage facility during the well blowout and after the well was sealed. Physical health symptoms include, but are not limited to, skin and mucous membrane irritations, headaches/migraines, and gastrointestinal, cardiovascular, and respiratory outcomes. Emotional and mental

⁴ Community engagement may take several forms including but not limited to soliciting community input on research progress and participation in research as survey respondents or study subjects.

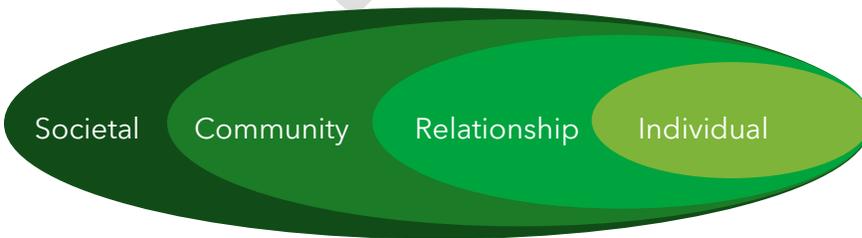
⁵ Including subsequent remediation efforts, ongoing and current operations and regular activities, and disturbance to the community.

health symptoms include but are not limited to stress and possible psychological trauma.

- *Intermediate Term Health Impacts*
These include but are not limited to birth outcomes such as pre-term birth or reduced birth weight, possible harms to the health of pregnant women, and developing fetuses, and possible impacts on child development.
- *Chronic Health Impacts*
These include but are not limited to cancers, lung disease, psychological or mental health conditions, harm to immune system function, nervous system disorders, cardiovascular disease, and worsening pre-existing conditions. Of these long-term health impacts, the community is most concerned about cancers and respiratory health.

Some aspects of overall quality of life can affect physical and/or mental health. Changes in quality of life can be acute, chronic, or in-between. Aspects of quality of life that may be affected by a disaster include social health, behavioral health, and community health and resilience. **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/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. Health and quality of life are influenced by interactions of characteristics at the individual, interpersonal, community and societal levels. Therefore, the ACDHRS will prioritize a *social-ecological*⁶ approach to the study of health and quality of life impacts of the Aliso Canyon disaster - meaning that it will seek to analyze impacts on health at various levels of influence (refer to Figure 1 below of CDC's 4-level socio-ecological model).

Figure 1. CDC Social-Ecological Model



⁶ For more information on the socioecological model for health, visit:
https://www.atsdr.cdc.gov/communityengagement/pce_models.html

Study Populations

The ACDHRS will include people in communities surrounding the Aliso Canyon gas storage facility. Environmental disasters, like the Aliso Canyon blowout, can have a greater negative impact on susceptible groups of people. Therefore, the ACDHRS project(s) must include susceptible groups, as well as the general population, and individuals who have moved away following the Aliso Canyon blowout where feasible. Susceptible populations of concern to the community include older adults, children, newborns, pregnant women, homeless or low income, minority groups, workers, and people with pre-existing conditions. Additionally, the community has expressed concern about the health of animals and pets.⁷

Study Exposures

The ACDHRS seeks to assess the health impacts of a broad range of exposures. For the purpose of the Study, exposures that may have led to health impacts, including an increased risk for adverse health outcomes, will be broadly defined as: exposures to 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. Studying the combined effects of multiple stressors on health and well-being is considered a high priority to the impacted community. Examples of priority exposures 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 operations (including but not limited to sulfur odorants, VOCs, semi-VOCs, 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 is the concurrent exposure to multiple chemicals and their cumulative, and potential synergistic, impact.
- *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.

⁷ Populations listed in no particular order of priority.

Data Sources and Collection

Researchers can use data from a variety of sources. They may gather their own data (“primary data”), use existing data that was collected for other purposes (“secondary data”) and/or use proxy measures to make estimates. The researchers will determine what data sources will best support the research. A summary of existing data sources can be found on the ACDHRS website. Researchers may need to obtain agreement from agencies and organizations to use their respective data for research purposes.

Primary data refers to data gathered by the researchers specifically for the project. The researchers may use or develop data collection tools tailored to their research objectives (such as surveys and psychometric tools) or perform clinical evaluations to collect high-quality data on exposure and/or outcomes measures. In addition, they may collect high quality data through other means including but not limited to focus groups, interviews, participant observation, and community-based participatory research methods.

Secondary data refers to existing data (e.g., administrative, clinical etc.) that was collected by government 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 need. The ACDHRS researchers may utilize acceptable forms of secondary data including but not limited to patient health records, hospital and emergency department discharge data, prehospital care reports, poison control center data, surveillance and monitoring data, birth and death records, birth registries, cancer registries, veterinarian clinic records, and several of the indicators and/or proxies described below.

Measuring environmental exposures and health outcomes may, and often involve, the use of proxies. For example, predictions of ambient air pollutant concentrations have been used to study effects of air pollutants on an array of health outcomes including impacts to cardiovascular, respiratory, and neurological health, as well as cancer risk and overall mortality (13; 14). Odors have also been used as a proxy measure for ambient pollution exposures (15; 16). Additionally, a wide variety of indicators or proxies can be used to measure quality of life, social health, and community health and resilience such as trends in home sales, domestic violence, and self-reported well-being.

Study Types

The ACDHRS may consist of various types of research studies including but not limited to population-based studies, clinical studies, records-based epidemiological studies, toxicology studies, community-based participatory research projects, and risk assessments. Study types and research methods will be proposed by independent third-party researchers recruited through a competitive bid process following the release of a Request for Proposals (RFP) later this year.

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