UCLA

Aliso Canyon Disaster
Health Research Study

Community Meeting #6

Agenda

- Welcome
- Resident Health Survey, Clinical Assessments Q&A
- Preliminary Results
  - Natural Gas Monitoring
  - Air Monitoring
- Evaluation
- Study Updates
- Closing

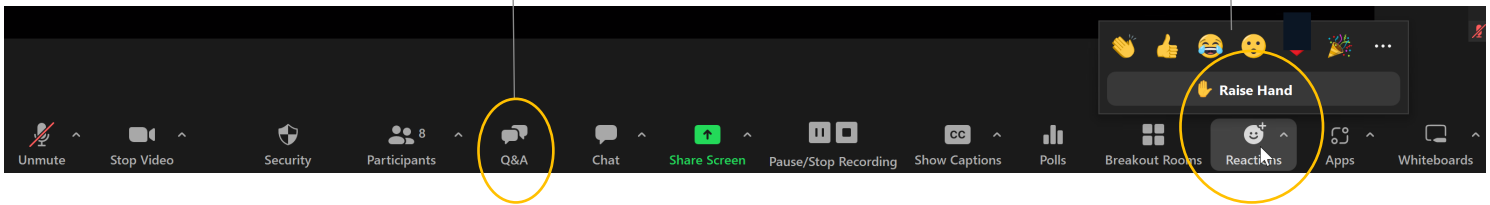
Zoom Meeting Discussion Tools

Q & A

- *Ask questions*
- *Leave comments*
- *Upvote*

Raise Hand

Request to give a verbal question or comment



Meeting Guidelines

- **Treat all meeting participants, comments, and questions with respect**
- **All ideas and points of view have value. Challenge ideas, not the person voicing the ideas**
- **Use common conversational courtesy. Inappropriate language will not be permitted**
- **Stay focused on today's agenda**
- **Honor time**

Survey and Clinical Assessments

Presentation: To review the residential health survey, clinical assessment, and biomarker studies (all ongoing)

- Study Rationale:
  - To determine if people living in the communities affected by the blowout disaster and ongoing operations of the Aliso facility are less healthy or likely to develop more new onset disease than comparison communities unaffected by the Aliso facility, and
  - To assess whether any differences in health are linked to exposures from the blowout or from ongoing operations

Survey and Clinical Assessments - Purpose

Purpose of the Resident Health Survey

- Understand residents' short- and long-term health effects of the Aliso Canyon disaster among people living in proximity to the blowout.

Purpose of the Clinical Assessments

- Examine health effects between affected and comparison communities and across health survey and clinical assessments.
- Provide a fuller picture of health by assessing how routine and disaster-related facility exposures explain observed differences.

Resident Health Survey

Participants Take Survey Online

- Survey is done online, but participants can also contact the research team for assistance in completing the survey over telephone or in-person, if needed

Recruitment Strategy

Target

- 2,000 participants for the health survey (1,400 from affected area, 600 from comparison area).
  - Of the 2,000, 600 participants (400 from affected area, 200 from comparison area) will also take Clinical Assessment.

Recruitment Process

- Initial invitation letters are mailed to selected potential participants, in waves.
- The invitation letter includes direct web survey access, QR code, support phone line, and other contact options.
- Two reminder letters will be mailed to follow up, two weeks apart.

Survey Invitation Letters

UCLA Aliso Canyon Disaster Health Research Study

TAKE THE
ALISO CANYON DISASTER
RESIDENT HEALTH SURVEY

UCLA Aliso Canyon Disaster Health Research Study

Survey Processing Center
PO BOX 5703 Hopkins, MN 55343

PRESORTED
FIRST-CLASS MAIL
U.S. POSTAGE
PAID
TWIN CITIES, MN
PERMIT NO. 90100

TAKE OUR HEALTH SURVEY - **GET $35!**

Opt. Endorsement Line Calculated Text
Nameline
Title
Delivery Address
City St ZIP+4Province Postal Code

VeDrSequenc

Dear Name or Current Resident,

The UCLA Aliso Canyon Disaster Health Research Study team invites you to participate in a **confidential** Health Survey of individuals who lived in the area during the 2015–2016 Aliso Canyon blowout disaster. This Survey is a crucial component of the overall assessment of the health effects of the disaster.

Your participation in this is very important. You will contribute to a greater understanding of the health effects associated with exposure to pollutants from the blowout and ongoing facility operations. By completing the Survey, you may have an additional opportunity to participate in clinical assessments.

Only one adult from your household who lived in the area during the 2015–2016 blowout disaster can participate in the Survey.

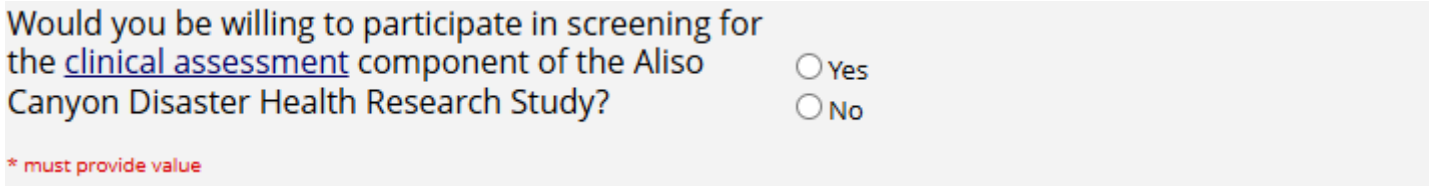
WANT TO PARTICIPATE?

1. **Go to the Link: https://alisostudy.ucla.edu/example-link-to-survey or scan the QR code**
2. **Answer a few questions to confirm you're eligible.**
3. **Enter this Subject ID code to begin: _____**
   This ID is unique to your household. Please do not share.

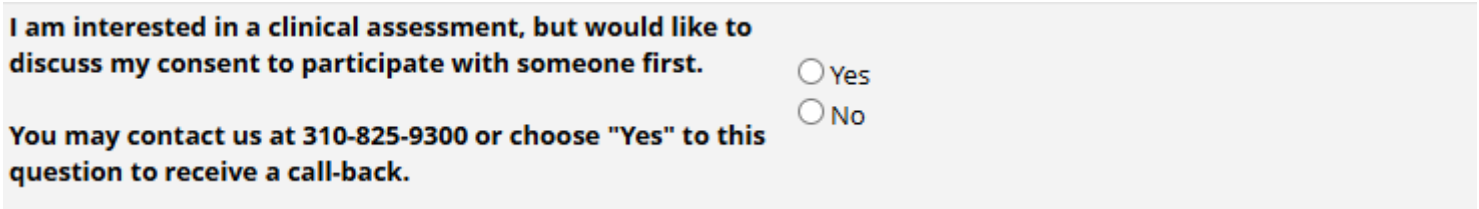
Para responder a esta encuesta de salud en español, visite:
https://alisostudy.ucla.edu/ejemplo-link-esp

How to opt in to a Clinical Assessment

Last question in the Resident Health Survey:



Call-back option on Clinical Assessment Consent form:



Recruitment Updates

- **Recruitment letters are sent in waves**
  - **The 1st wave of >6,600 letters were already mailed out about 2 weeks ago**
- **Many people have already responded, and more responses are being received as we move forward**
  - **>100 participants have already finished the survey**
- **Good consent rate for the clinical assessment**
  - **>30% from the survey participants were eligible and signed consent for the clinical assessment**
- **With multiple waves of mailing prepared, we will be able to recruit 2,000 participants for the survey with 600 survey responders also agreeing to conduct the clinical assessment**

Clinical Assessments

PROCEDURE STATIONS

- Vital signs and Anthropomorphic measures
- Lab draw & urine sample
- Cognitive assessment
- Spirometry (lung function test)

Vital Signs & Anthropomorphic Measures

Vital Signs:

- Provide information on general health status
- Ensure blood pressure is not elevated prior to spirometry

Anthropomorphic Measurements:

- Body fat - is related to general health, is used to interpret certain clinical tests, affects chemical accumulation and storage of fat-soluble toxins in the body

Clinical Blood Tests

Complete Blood Cell Count, Differential, and Platelets:

- Certain disaster exposures are known to be toxic to bone marrow/blood-forming tissue
- Often part of a regular physical exam, can help detect abnormalities that warrant further work-up

Total Protein and Protein Electrophoresis:

- Used to help detect abnormalities that warrant further work-up for some blood related cancers

Clinical Blood Tests / Urine Assays

Comprehensive Metabolic Panel:

- 14 tests that provide an overview of liver, kidney, metabolic, electrolyte and fluid balance

Lipid Panel:

- Analyzes types and amount of circulating blood fats
- Indicates risk for cardiovascular, metabolic, and liver disease

Blood C-Reactive Protein, IL-6, TNF-alpha:

- Certain blowout exposures are known to affect immune and inflammatory responses that can increase the risk of many diseases

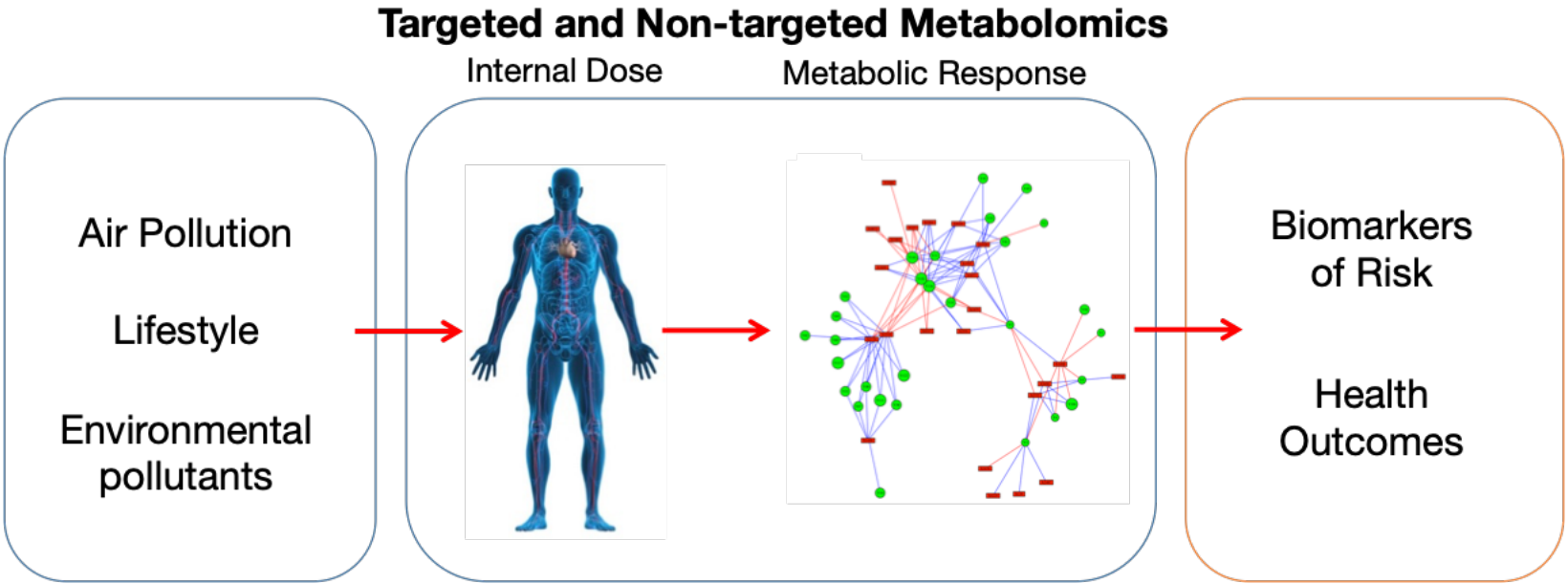
.

Metabolomics analysis

- Looks for markers of exposure associated with the blowout
- Identifies potential health risks

https://alisostudy.ucla.edu/study-overview/study-approach/metabolomics-analysis/

Metabolomics analysis provides connection between exposures and outcomes

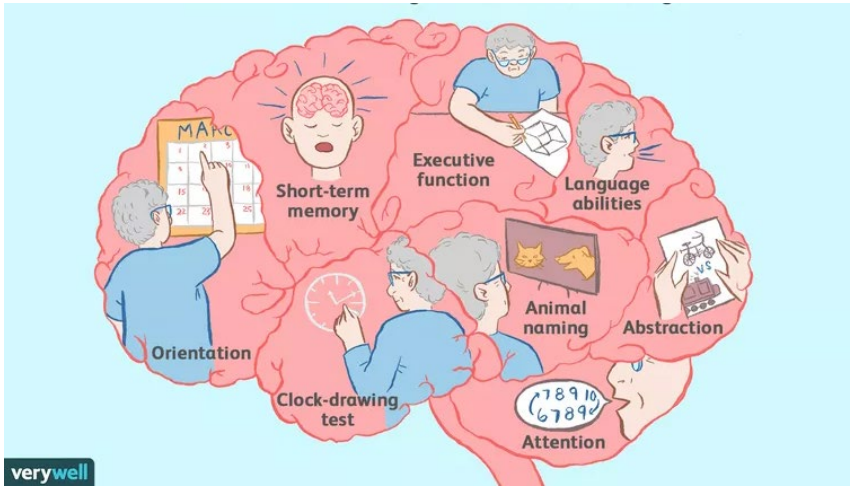


https://alisostudy.ucla.edu/study-overview/study-approach/metabolomics-analysis/

Cognitive Assessment

SCREENING TOOL

- Used for early detection of mild cognitive impairment



Lung Function Testing (Spirometry)

SCREENING

- Assesses how well an individual's lungs function by measuring airflow out of the lungs. Used to measure effects from inhaled toxins.

Results of Assessments

RESULTS GIVEN THE SAME DAY

- Anthropometric Measures
- Vital Signs
- Spirometry
- Cognitive Assessment

LAB (BLOOD) RESULTS

- Sent via Secure File Transfer email from ACstudy@mednet.UCLA.edu

UCLA Aliso Canyon Disaster Health Research Study

Participant Name: _____ Date: _____

DOB: _____

Thank you for participating in the Aliso Canyon Disaster Health Research Study. Below are results of the data collected today. You may take this to your Primary Care Provider (PCP) for discussion and evaluation if treatment is needed.

Measurements		
Height		inches
Weight		pounds
Body Mass Index (BMI)		
Waist Circumference		cm
Hip Circumference		cm
Waist/Hip ratio		
Body Roundness Index (BRI)		
Vital Signs		
Blood pressure		mmHg
Temperature		°F
Pulse		BPM
SaO2		%
Spirometry (ATS/ERS Standards)		
FVC		% Predicted
FEV1		% Predicted
FEV1/FVC		% Predicted
FEF25-75%		% Predicted
Cognitive Assessment		
Total Score		Points of 30
Memory Index Score (MIS)		Points of 15
Blood draw		*Completed: Y N*
Urine sample		*Completed: Y N*

Your blood results will be sent to you via email from ACstudy@mednet.ucla.edu

10960 Wilshire Boulevard Suite 1550 Los Angeles, CA 90024
alisostudy.ucla.edu · alisostudy@ucla.edu

Q & A

Natural Gas Monitoring

Presentation: To present results of the natural gas sampling for unburned natural gas that enters into people's homes

- Study Rationale:
  - To understand the likely composition of gas going into people's homes in the affected community and comparison communities to inform exposure models, and
  - To conduct simulation analyses of potential indoor benzene concentrations if a home has a leaking natural gas appliance

UCLA Aliso Canyon Disaster Health Research Study

PSE Bringing science to energy policy

Aliso Canyon Natural Gas Composition Study

November 18, 2025
Community Meeting #6, Porter Ranch, CA
Eric Lebel, PhD
Senior Scientist, PSE Healthy Energy

About PSE

PSE Healthy Energy is a nonprofit energy science and policy research institute headquartered in Oakland, California. Our mission is to generate science-based energy and climate solutions that protect public health and the environment.

Dr. Tamara Sparks

Dr. Yannai Kashtan

Dr. Drew Michanowicz

Nicole Lucha

Gan Huang

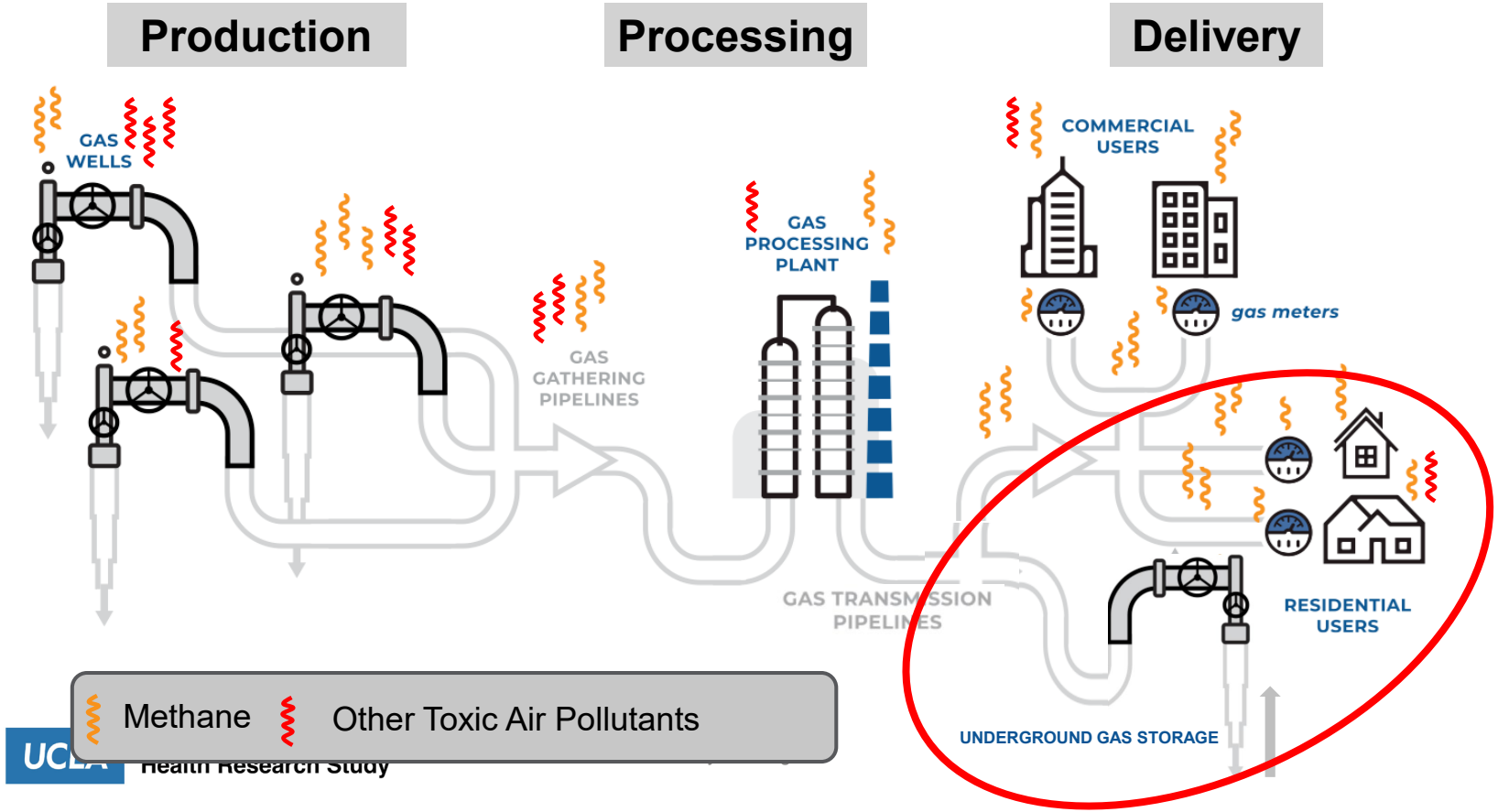
Study Design

Study Motivation

1. Uncertainty of what health pollutants in natural gas the impacted communities were exposed to during the blowout.

2. Currently, gas utility companies are not required to report benzene and other toxic chemicals that are in natural gas delivered to customers.

Sampling Natural Gas Delivered to Customers Tells Us What Chemicals Are In The Gas System



Three Primary Study Goals

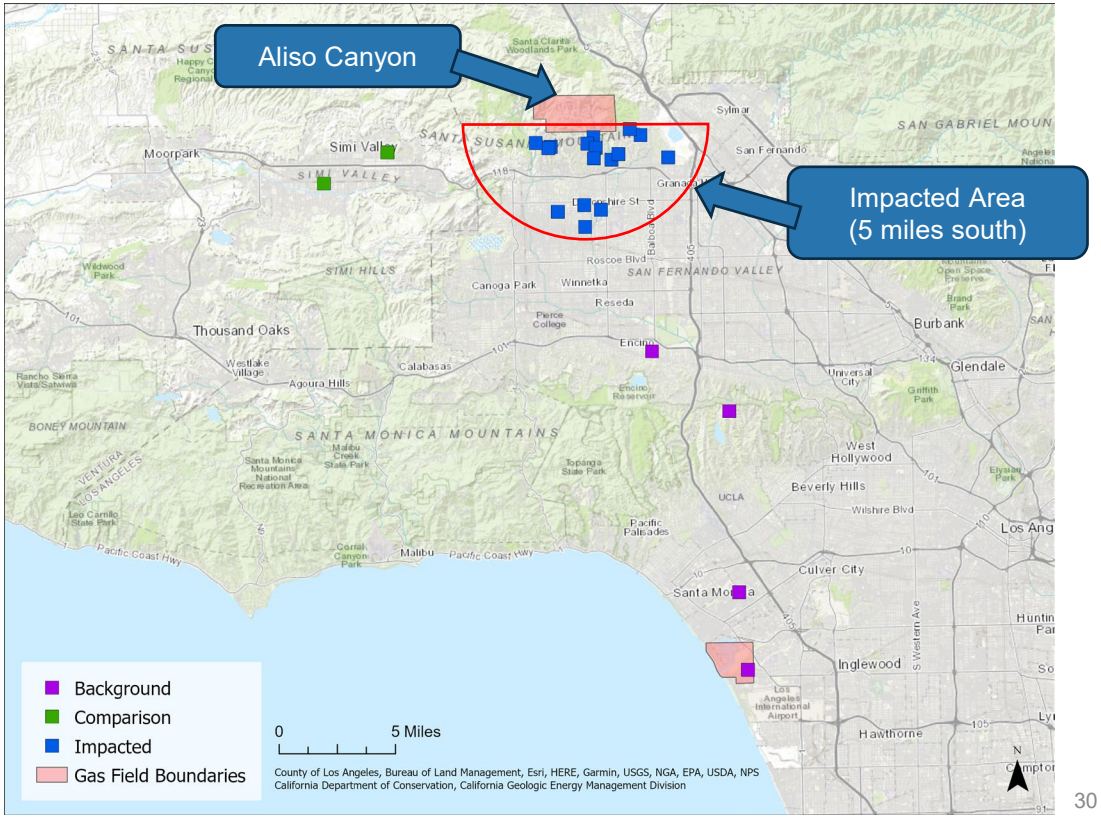
1. **Characterize present-day natural gas composition**
   - Focus on benzene (the most toxic compound observed)
   - Compare impacted communities vs. comparison communities
   - Compare to our similar 2020 study to assess any changes over time

2. **Estimate benzene exposures if there was indoor natural gas leaks**
   - Use models to estimate exposures based on measured pollution in unburned gas, indoor leak rates, and housing parameters

3. **Use our our gas composition data to model outdoor exposure during the blowout (future work)**

We Sampled In Impacted Communities, Comparison Communities, And Regional Background Areas

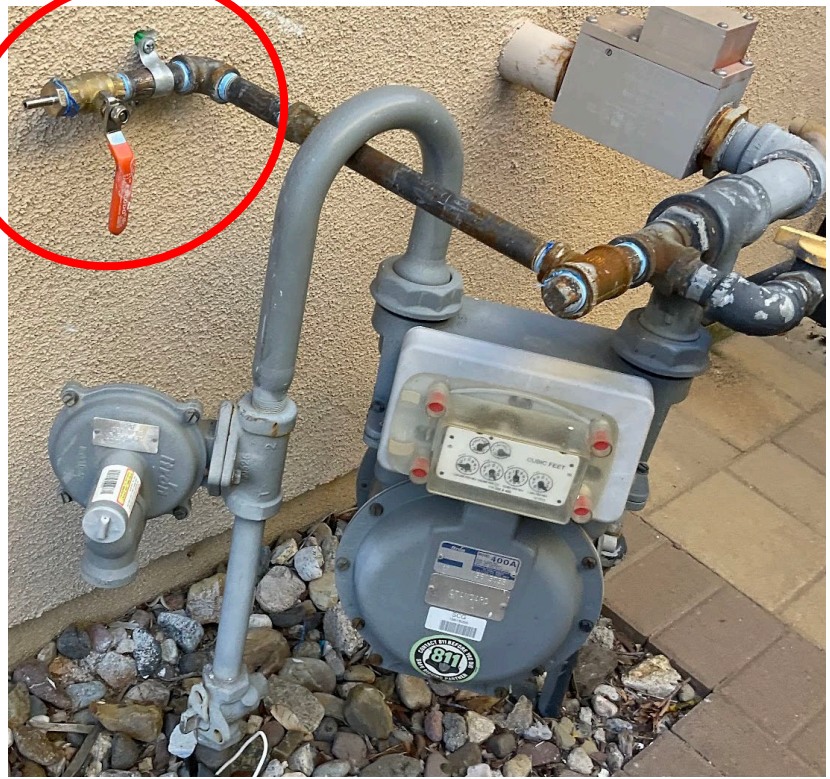
- **Impacted Communities:** within 5 miles of Aliso Canyon Gas facility well SS-25
- **Comparison Communities:** Simi Valley
- **Regional Backgrounds:** Los Angeles metro area, including two other gas facilities



Samples Collected Every Two Months For a Year; 128 Total Samples

Date	Impacted Communities	Comparison & Regional Background	Total
June 2024	16	5	**21**
August 2024	16	6	**22**
October 2024	16	6	**22**
December 2024	16	6	**22**
February 2025	16	5	**21**
April 2025	15	5	**20**
Total	**95**	**33**	**128**

Samples Were Collected Directly From The Residential Natural Gas Supply

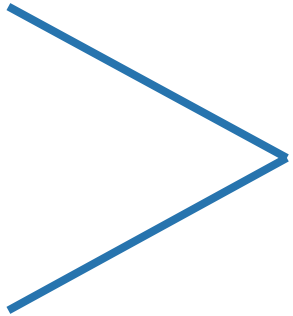


Results

50 Chemicals in Natural Gas Were Screened; Focus on Prevalent And Toxic Compounds

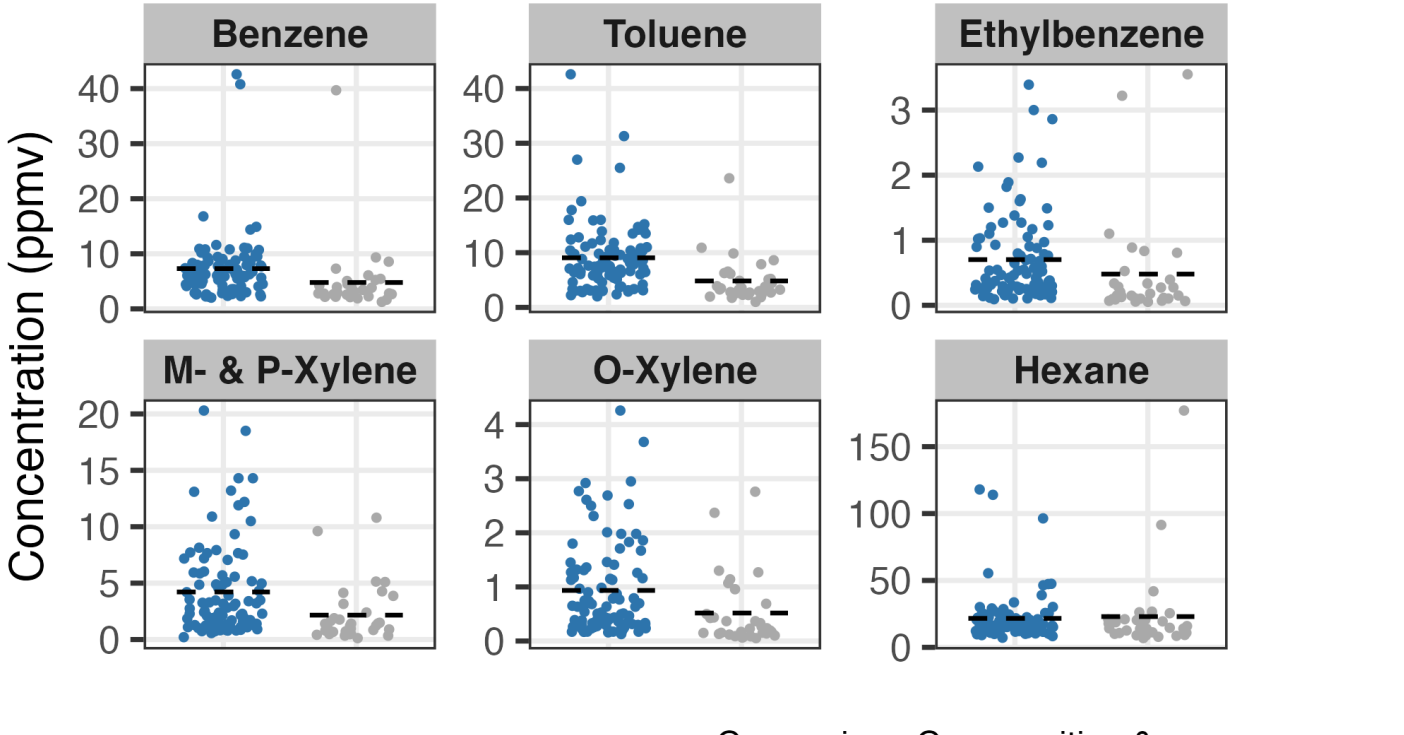
- **Benzene**
  - Known carcinogen, can cause leukemia and other blood disorders.
  - The World Health Organization indicates that no level of benzene exposure is safe.

- **Toluene**
- **Ethylbenzene**
- **Xylenes**
- **Hexane**

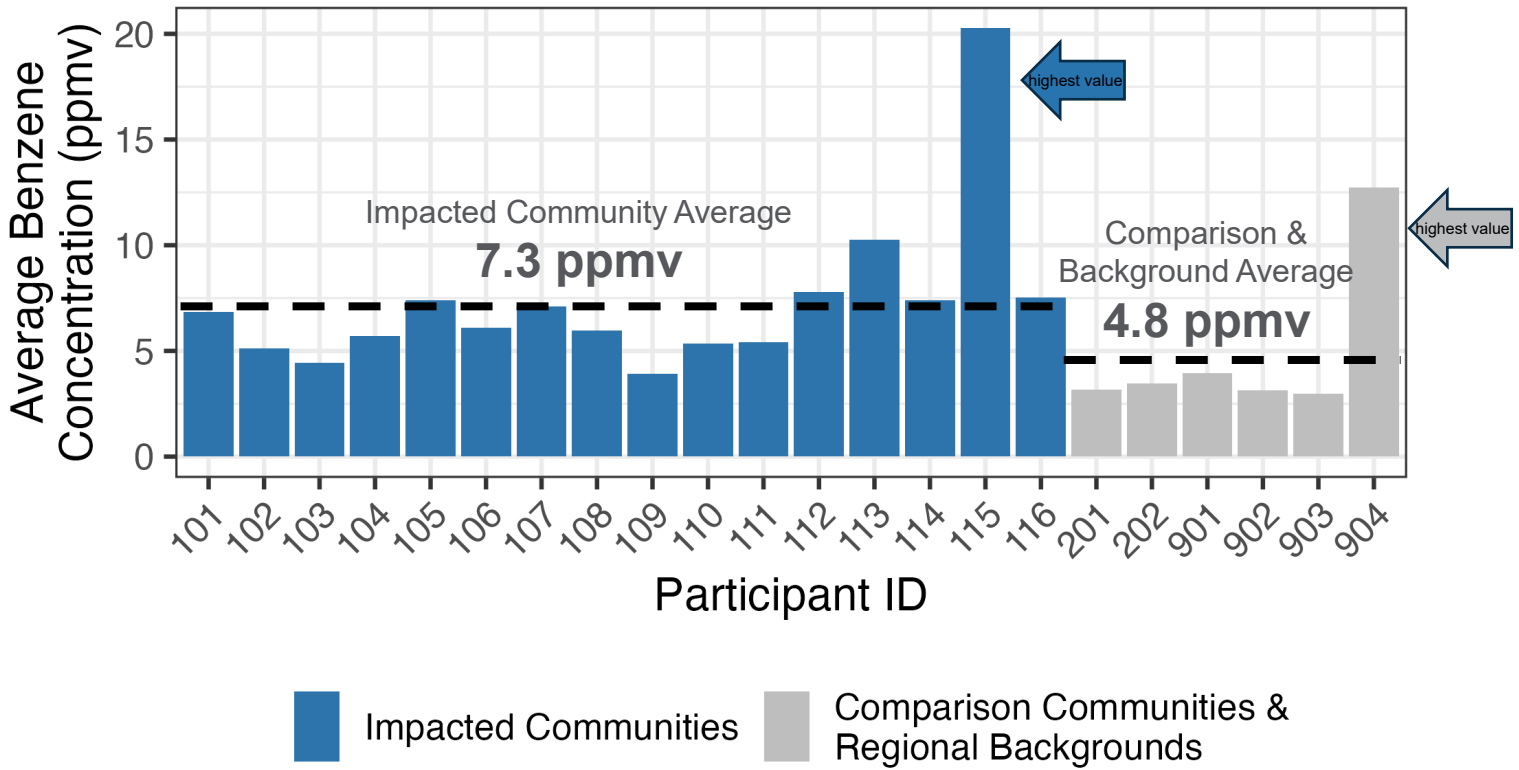


Variety of negative health impacts like dizziness, nausea, headaches

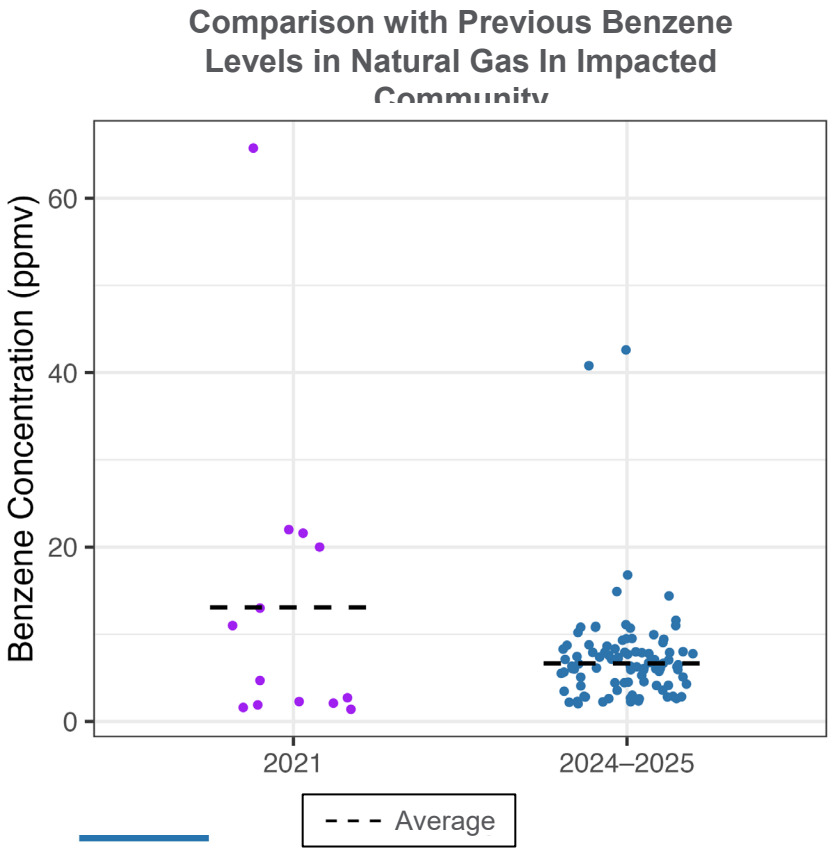
Benzene Detected in All Natural Gas Samples; Other Chemicals Detected in >99% of Samples

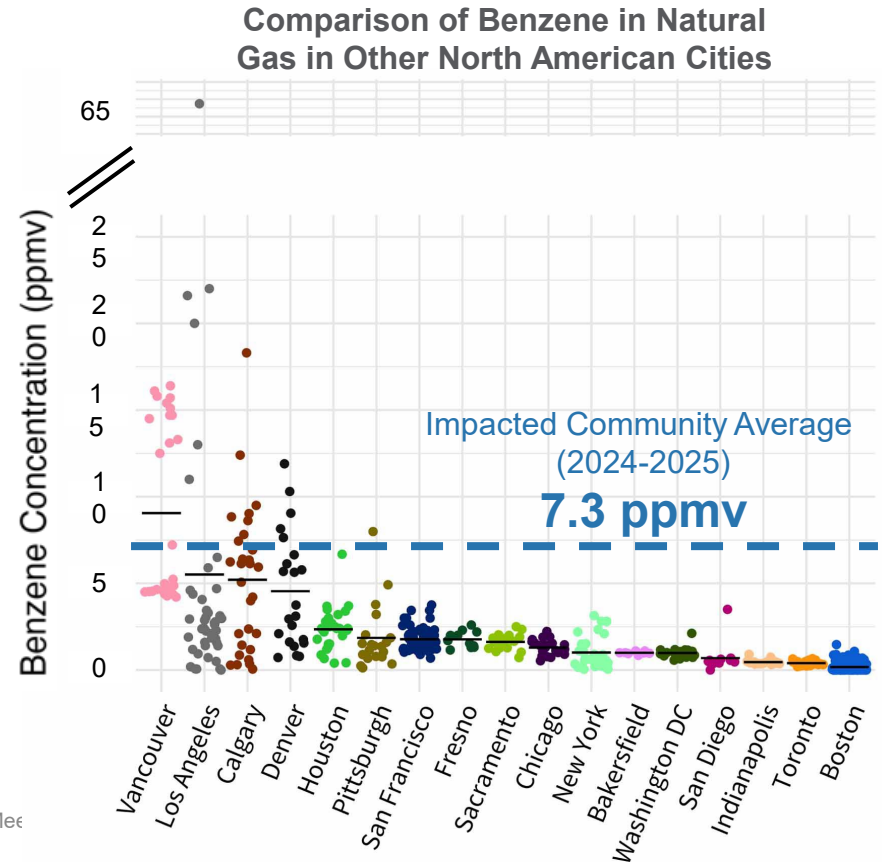


Benzene in Natural gas is Higher in Impacted Communities vs. Comparison Groups

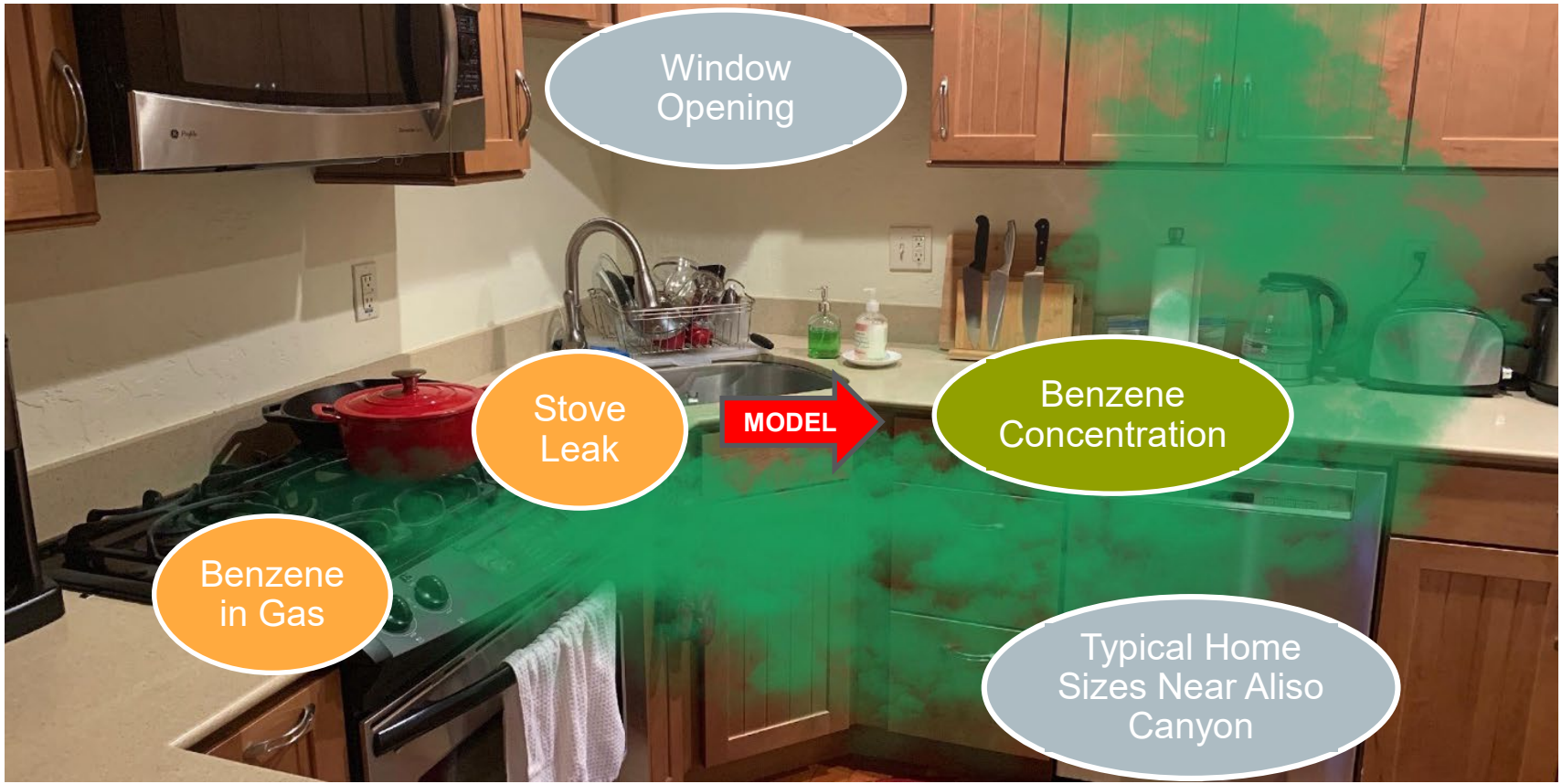


Benzene In Natural Gas Collected Today Is Similar To Samples Collected In 2021 In Impacted Community

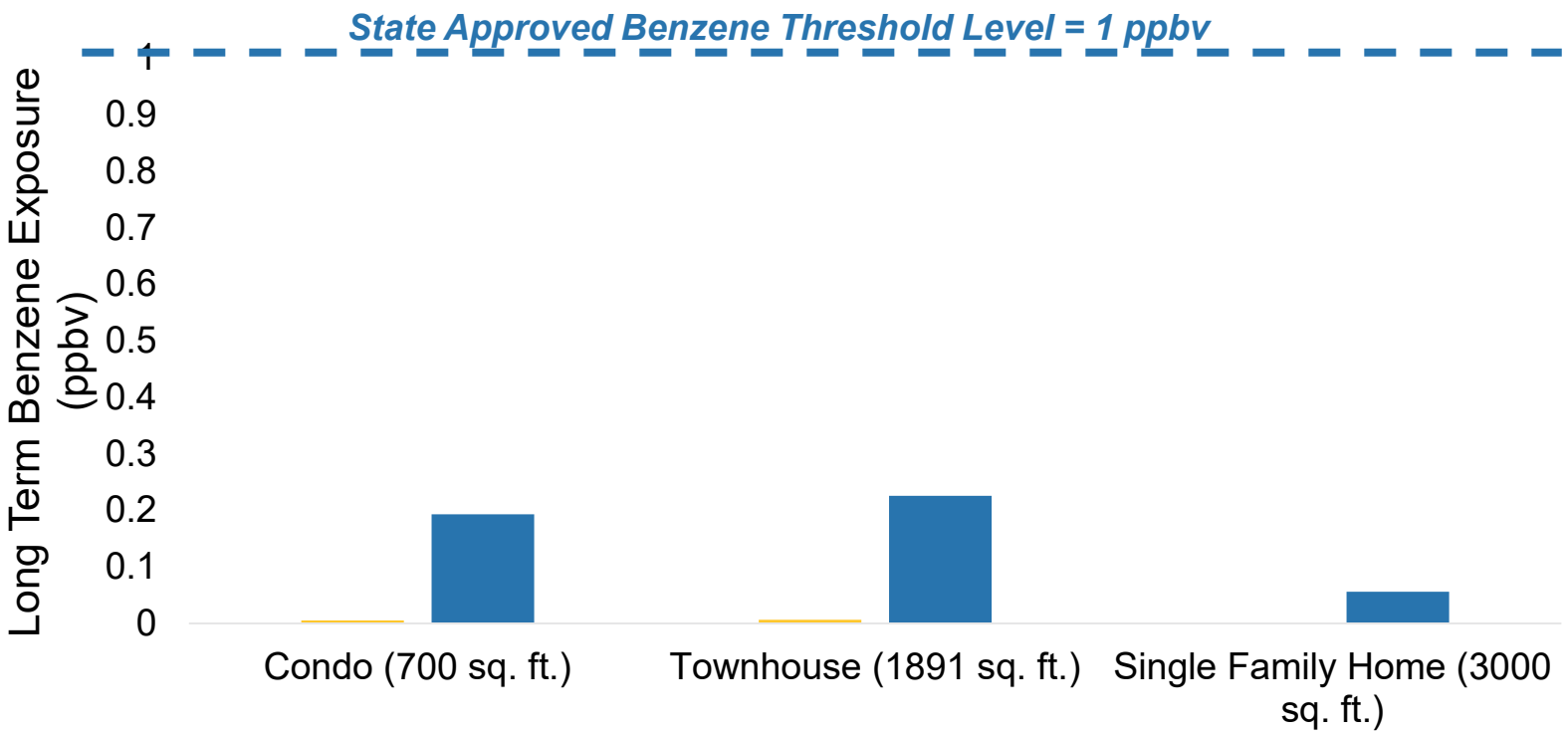




Modeling Can Be Used To Estimate Indoor Benzene Exposure From Gas Leaks



Modeled Indoor Benzene Levels from Gas Leaks Suggest Low Exposures in Impacted Community



Overall Conclusions

- Natural gas delivered to residential customers routinely contains benzene and other toxic compounds.
- These compounds are higher in gas delivered to impacted communities vs. comparison areas.
- Compounds observed today are similar to gas samples collected in 2020-2021.
- Levels of Benzene in natural gas are similar to other western North American cities.
- Modeled benzene exposures from probable indoor gas stove leaks are low, well below health benchmarks.

Thank You

With gratitude to all our participants and collaborators at UCLA

PSE Bringing science to energy policy

www.psehealthyenergy.org

Q & A

Indoor and Outdoor Air Sampling

Presentation: To show results from the indoor-outdoor air pollution monitoring study conducted in 40 homes in the affected community and comparison communities

- Study Rationale:
  - To understand if exposures in the comparison community are different than in comparison communities, and
  - To determine whether any observed levels are above health-protective standards

UCLA

Aliso Canyon Disaster Health Research Study

Indoor and Outdoor Air Sampling

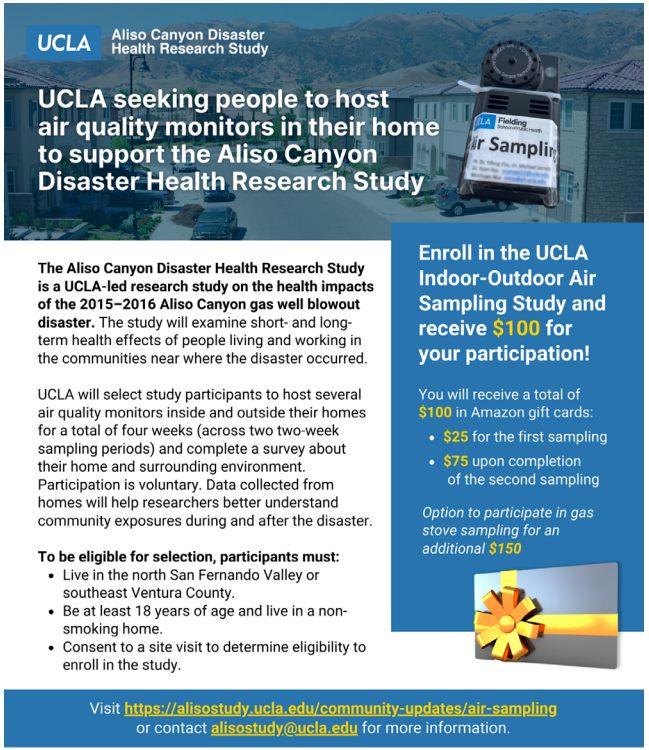
Yuan Yao, Muchuan Niu, David Park, Sienna Marley, Sydney Monte-Sano, Qiao Yu, Bella Chen, Christina Batteate, Diane Garcia-Gonzales, Michael Jerrett, and **Yifang Zhu**

UCLA Fielding School of Public Health

November 18, 2025

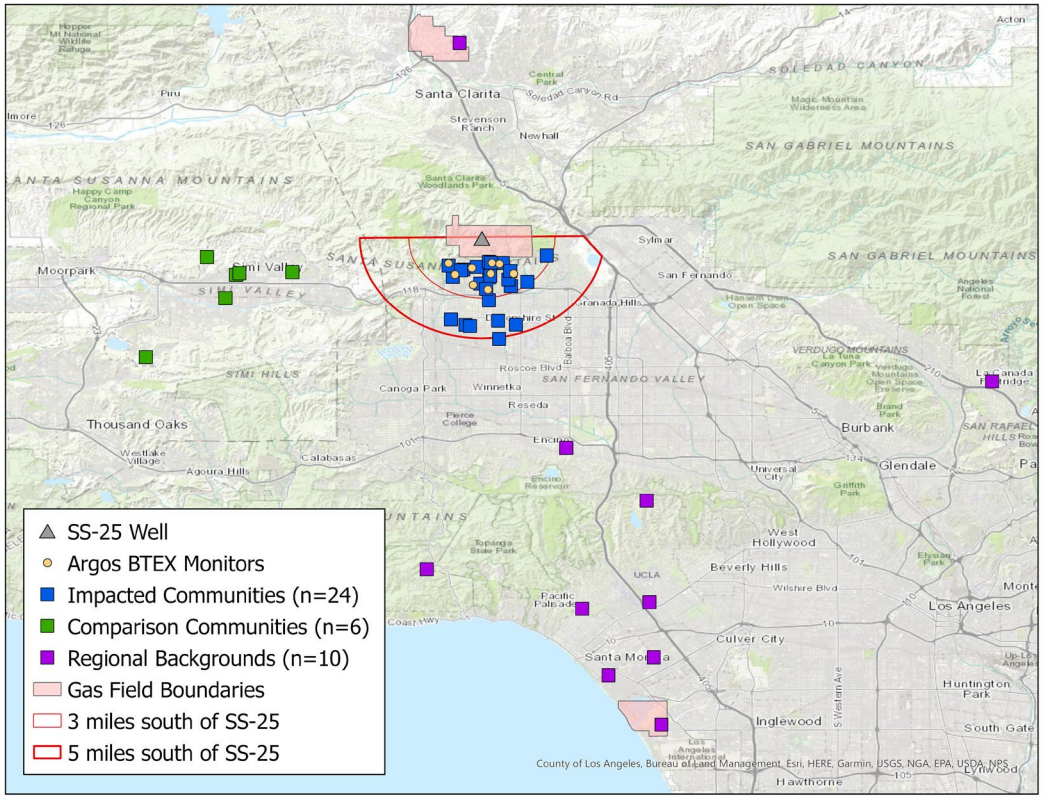
This study aims to evaluate current air pollutant levels

- Measure particulate matter and air toxics both indoors and outdoors across two sampling periods.
- Compare the measured concentrations with health-based guidelines from the federal and California state agencies.
- Compare the findings with measurements conducted by the South Coast Air Quality Management District (SCAQMD) in the Los Angeles metropolitan area.



We sampled in impacted communities, comparison communities, and regional background areas (n = 40)

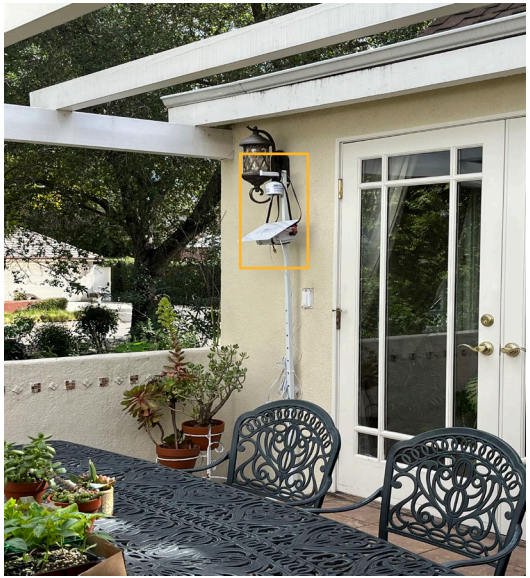
- **Impacted Communities:** within 5-miles south of Aliso Canyon Gas facility well SS-25
- **Comparison Communities:** Simi Valley
- **Regional Backgrounds:** Los Angeles metro area, including two other gas facilities



We conducted two-week integrated air sampling

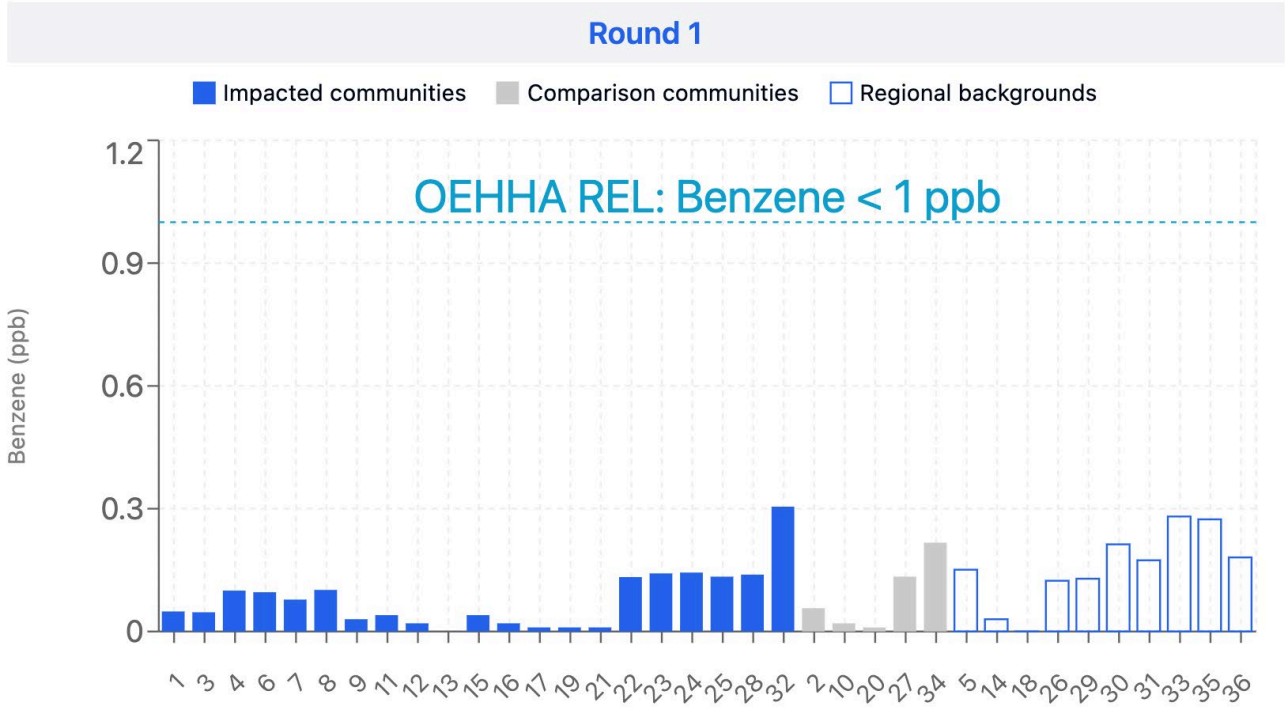
- Round 1: February 2024 - June 2024
- Round 2: October 2024 - May 2025

Indoor



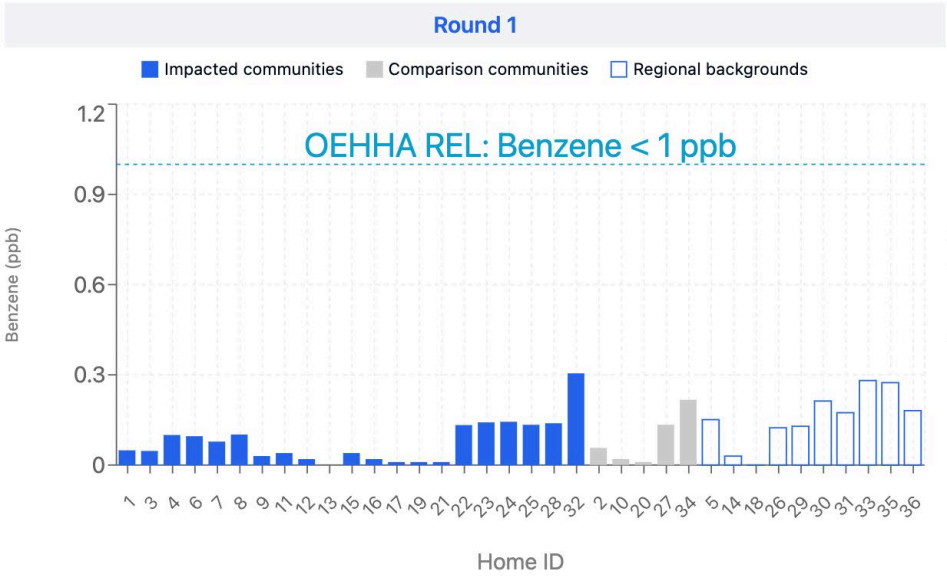
Outdoor

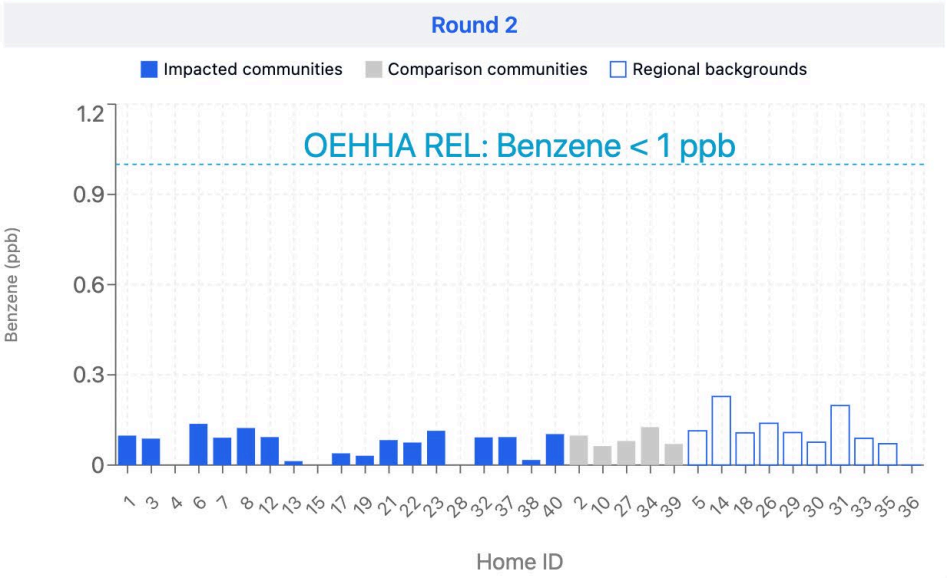
Outdoor benzene levels are within California state guidelines



California Office of Environmental Health Hazard Assessment (OEHHA) Reference Exposure Level (REL) reference: Benzene levels should not exceed 1 ppb (parts per billion) for chronic exposure/8-hour repeated exposure, or 8 ppb for acute exposure, based on OEHHA guidelines.

Outdoor benzene levels are within California state guidelines





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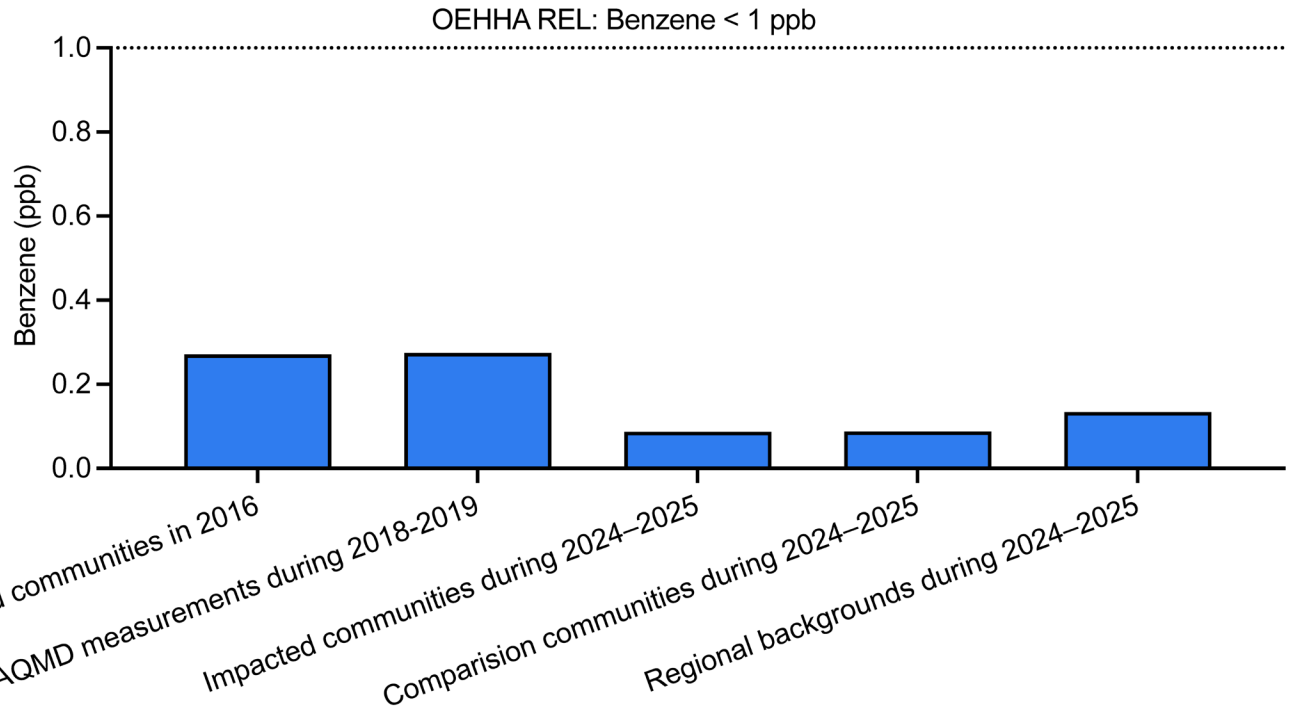
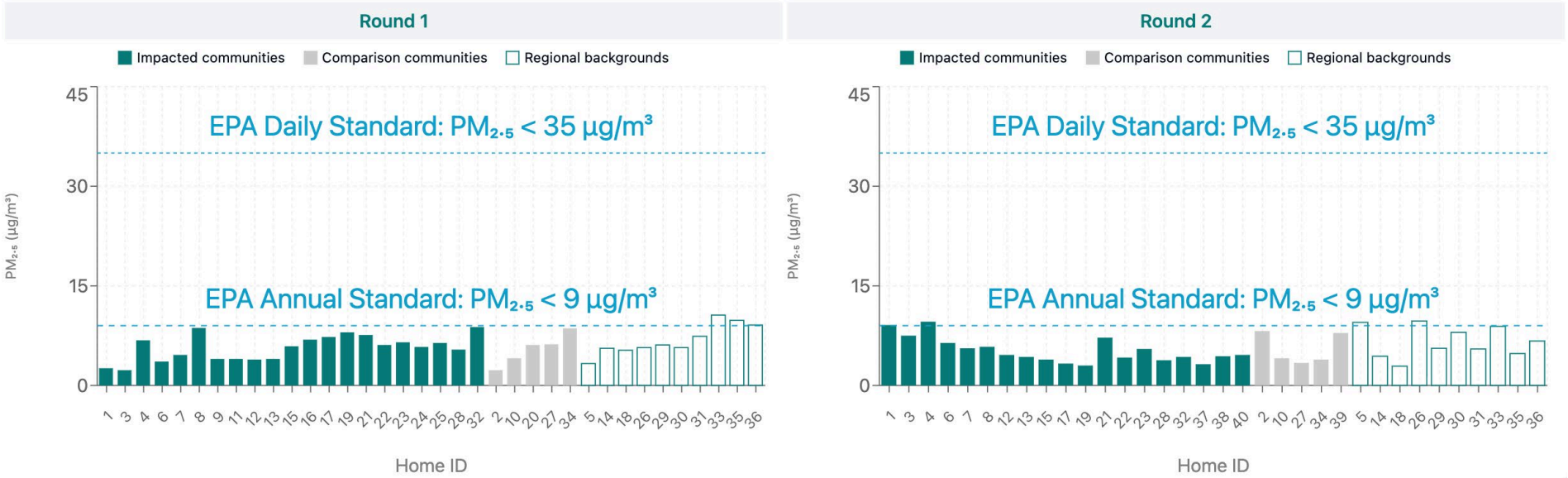


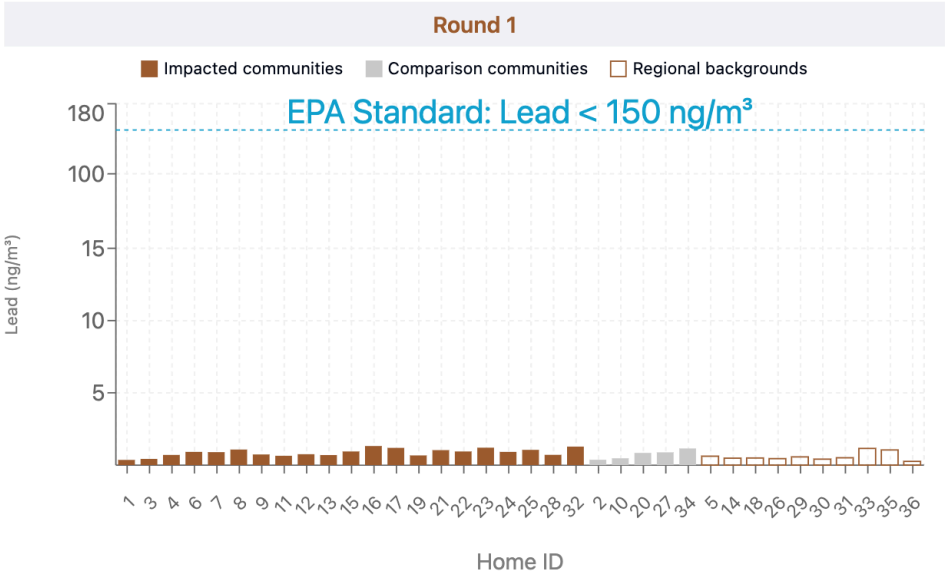
Note: SCAQMD measurements from 2018–2019 were collected at 10 monitoring stations across the Los Angeles metropolitan area as part of MATES V (Multiple Air Toxics Exposure Study).

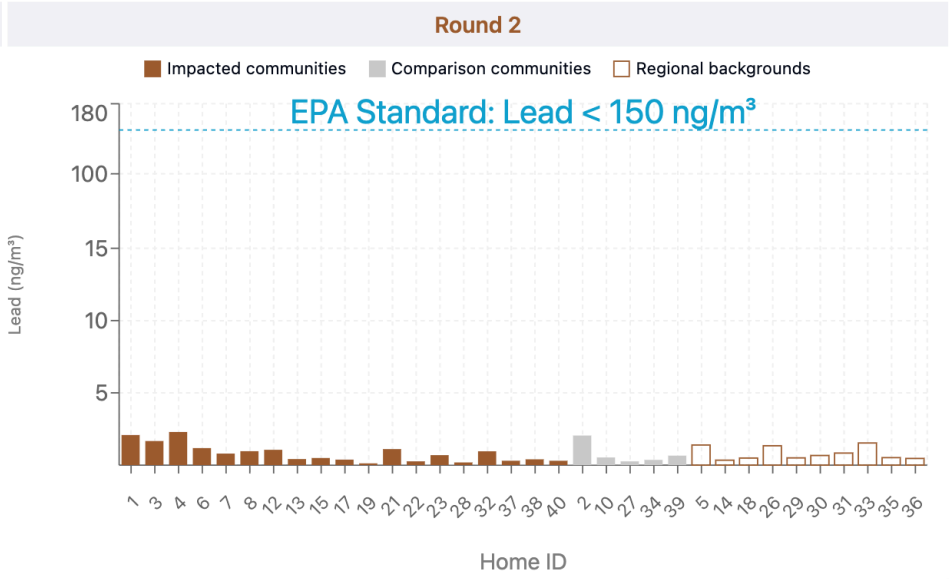
Outdoor $PM_{2.5}$ levels are within U.S. EPA standards



U.S. EPA (Environmental Protection Agency) standard reference: Daily average $PM_{2.5}$ should not exceed 35 µg/m³ and annual average should not exceed 9 µg/m³ based on National Ambient Air Quality Standards.

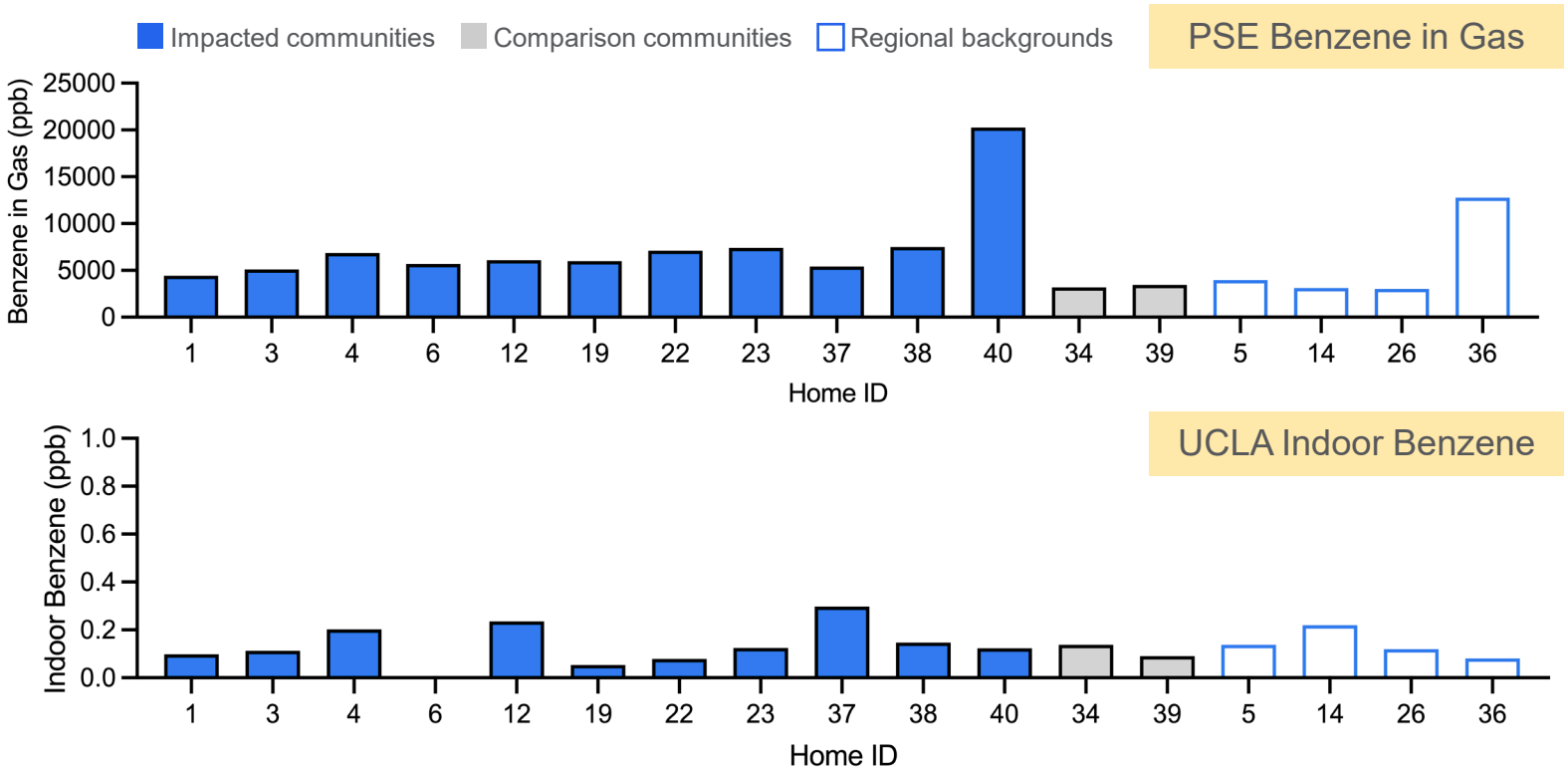
Outdoor lead levels are within U.S. EPA standards





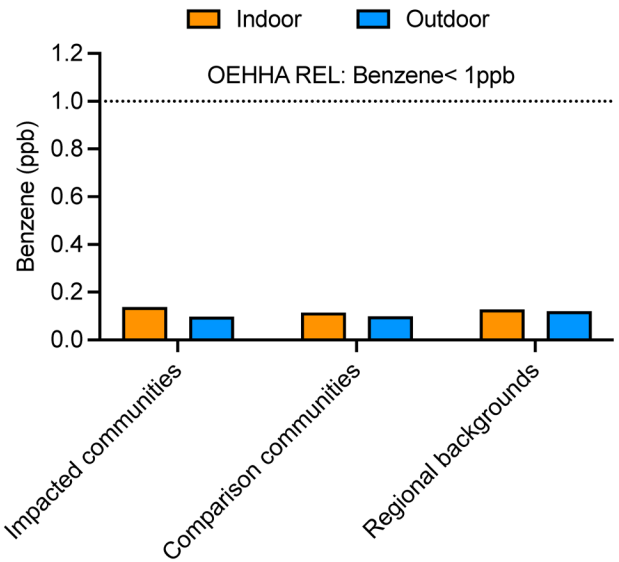
U.S. EPA (Environmental Protection Agency) standard reference: Lead levels should not exceed 150 ng/m³ based on U.S. EPA National Ambient Air Quality Standards (3-month rolling average).

Despite higher benzene levels in gas, indoor concentrations were not higher

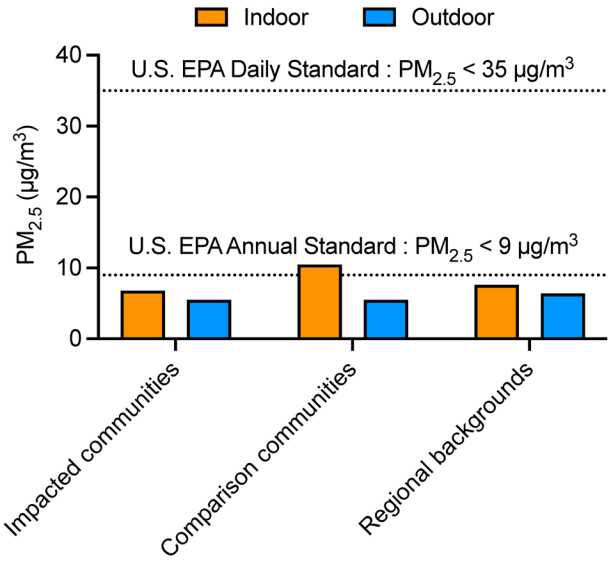


Indoor and outdoor air pollutant levels are comparable

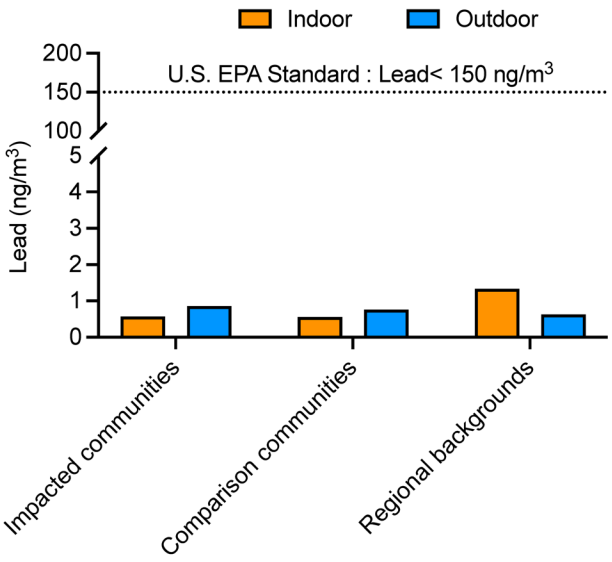
Benzene



$PM_{2.5}$



Lead



No statistically significant differences in indoor or outdoor benzene, $PM_{2.5}$, or lead levels were observed across impacted communities, comparison communities, and regional backgrounds

Overall Conclusions

- Benzene concentrations were low, with all locations showing levels below 1 ppb OEHHA reference level
- $PM_{2.5}$ measurements across all areas remained well below EPA daily standard of 35 µg/m³
- Lead levels were also generally low, with all locations showing levels well below 150 ng/m³

Overall Conclusions

- Benzene and metals concentrations were within the typical range of levels reported by SCAQMD in the Los Angeles metropolitan area
- Indoor concentrations were slightly higher than outdoor levels for $PM_{2.5}$ and benzene, likely due to indoor sources such as gas appliances and cooking
- No differences were observed in most pollutant levels between the impacted communities and the comparison communities or regional background sites

Thank You

UCLA Aliso Canyon Disaster Health Research Study

Aliso Canyon Disaster Health Research Study
Indoor and Outdoor Air Quality Report

Thank you for participating in the Aliso Canyon Disaster Health Research Study. This comprehensive air quality assessment was conducted to investigate potential ongoing health impacts in communities near the Aliso Canyon natural gas storage facility.

As part of this longitudinal study, we collected air samples from your home and sent them to specialized laboratories at UC Davis and the Wisconsin State Laboratory of Hygiene to test for a range of air pollutants. We are pleased to now share your individual results.

In this summary, we focus on three key pollutants: $PM_{2.5}$, benzene, and lead. These are important indicators of air quality and have established health guidelines from agencies such as the U.S. Environmental Protection Agency (EPA) and California's Office of Environmental Health Hazard Assessment (OEHHA). You can compare your results with those guidelines, as well as with results from other homes sampled during the same period.

For your reference, here are the two sampling periods:

- Round 1: February 2024 - June 2024
- Round 2: October 2024 - May 2025

Our study design includes three distinct monitoring areas:

- **Impacted Communities:** within 5-miles south of Aliso Canyon Gas facility well SS-25
- **Comparison Communities:** Simi Valley
- **Regional Backgrounds:** Los Angeles metro area

If you have any questions about your results or would like to access the full raw data, please don't hesitate to contact Dr. Yuan Yao (yuanyao22@ucla.edu).

Thank you again for your contribution to this important public health research.

Overall Conclusions

- Most $PM_{2.5}$ measurements across all areas remained well below EPA daily standard of 35 µg/m³
- Benzene concentrations were generally low, with all locations showing levels below 1 ppb OEHHA reference level
- Lead levels were also genreally low, with all locations showing levels below 150 ng/m³
- Indoor concentrations were generally higher than outdoor levels for $PM_{2.5}$, likely due to indoor sources
- No statistically significant difference was observed in most pollutant levels between impacted communities and the comparison or regional background sites
- While the measured air pollutant levels were below current reference or regulatory standards, this does not always guarantee zero risk to health

Your home ID is All Homes

Indoor and Outdoor Air Quality Report for Community:
https://alisostudy.ucla.edu/resources/

Q & A

Evaluation

https://tinyurl.com/yfhaskjx

Study Updates

- Published studies:
  - Birth outcomes analysis peer-reviewed and published in *Science Advances.*
  - Characterizing the gas blowout using satellite images in *Environmental Research Communications.*
  - Focus groups and mental health study published in *Social Science & Medicine.*

- Studies to be submitted:
  - Changes in emergency department visits as an indicator of health impacts
  - Exposure risk assessment methodology.

Study Updates (continued)

- Resident Health Survey is underway.
- Clinical Assessments have begun. Additional information the study website.
- Procuring additional years of data for analysis of State cancer registry data.
- Ongoing analysis of California Health Interview Survey (CHIS), healthcare utilization, cancer, and exposure data.
- Preparing for State of California Biobank shipping of blood spots for the metabalomics analysis.
- Cataloged data sources compiled for the risk assessment and posted data inventory on the website.
- Meet regularly with Scientific Oversight Committee (SOC) who provide guidance and will independently evaluate our 3-year report to assess whether the Health Study is on track to achieving its goals.

Thank You