UCLA

Aliso Canyon Disaster
Health Research Study

Community Meeting #4

Introductions

Agenda

- Welcome
- Preliminary Results
  - Focus Groups on Mental Health Effects of the Disaster
  - Characterizing the Gas Blowout Using Satellite Images
- Study Updates
- Risk Assessment Workshop

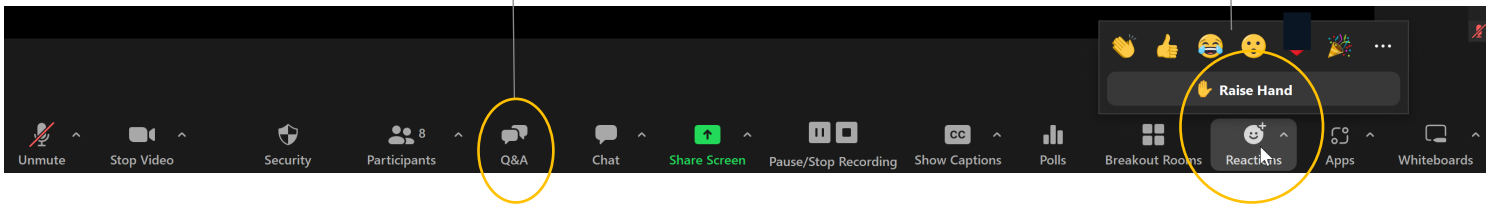
Zoom Meeting Discussion Tools

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**

UCLA

Aliso Canyon Disaster
Health Research Study

Focus Groups on Mental Health Effects from the Disaster

Team: Kathleen Lynch, Tamra Loeb, Charles Gravereaux, Sydney Monte-Sano, Anh Hoang, Christina Batteate, David Abramson, David Eisenman

Objective

The purpose of the focus groups was to investigate the impact of the Aliso Canyon Disaster on mental health and well-being, **in residents' own words**, to inform the development of a resident health survey.

- Groups took place in Spring 2024

Preliminary Results: Short-term Mental Health Impacts

Focus group participants experienced the following mental health symptoms at the time of the event (October 2015- February 2016):

- Emotional Distress
- Anxiety
- Fear
- Anger

"I was highly emotional. I would cry often. And yeah, it was, you know, and as a parent, you know, completely, you know, stressed and guilt and constantly wondering if I'm, you know, damaging and hurting and killing my kid slowly by staying there and, you know, all of that."

Preliminary Results: Long-term Mental Health Impacts

Conditions:

- Post-Traumatic Stress Disorder
- Anxiety
- Chronic Stress
- Depression

Symptoms:

- Hopelessness
- Guilt
- Loss of Control
- Persistent Anger

Social Impacts:

- Isolation, impaired relationships
- Loss of trust

"And [my] mental health is a disaster—I have never had that kind of trauma and stress ever in my life, and that's actually still there […] I've worked on it a lot, but it's just the trauma triggers, like even if I see 'Aliso Canyon,' it's just like, ugh, those memories come up. I try not to think about it, but it totally blew up, completely changed my life. Physically and mentally."

Major Theme: Anxiety about the Future

Across groups, participants described high levels of **anxiety** about future **physical health** symptoms.

- Participants described **constant worry** over
  1) Whether they (or their loved ones) might experience new physical symptoms or diagnoses (e.g., neurological disorders, respiratory conditions, cancers)
  2) Whether these symptoms can be attributed to the Aliso Canyon disaster

"I'm just thinking about the fact we may not realize health effects until much later. So, it's just been something I've just been consistently kind of worrying about on and off, as I've grown older […] it does get scary hearing all these things happening or seeing just changes and thinking, ***is this new thing happening to me because of this [exposure]****?"*

Major Theme: Feeling Invisible

Groups in each age range described persistent anger and frustration at a perceived lack of corporate accountability and government response, **feeling abandoned** by local political systems.

- These feelings of invisibility **lower trust and confidence** that residents will be told the truth about their exposure, or that future leaks can be prevented.

"I am completely jaded with a complete destruction of faith in government regulators and it's horrible. It's immoral what has happened here if people really took the time to understand what's going on"

"I developed… anger, because this was not a natural disaster. It was a manmade disaster, it was preventable. Knowing that they went without telling us where we could've gotten out earlier, plays a big role in the trauma and the anger. The mental health part."

Next steps

- We refined the resident health survey based on these themes
  - Added items that assess Mental Health Conditions, Symptoms, Well-being, Health Anxiety, Institutional Trust, Sense of Community
- Disseminate survey to systematically assess resident self-reported health and well-being.

Thank you! Questions?

Characterizing the blowout using satellite images

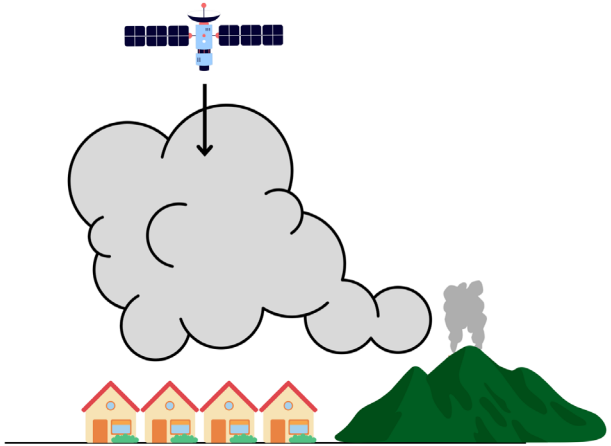
Team: Daniel Cusworth, Aron Walker, Sydney Monte-Sano, Miriam Marlier

Introduction

- **How far did the methane plume extend downwind following the Aliso Canyon Blowout Disaster?**
  - Methane was correlated with health-influencing air toxics during blowout.

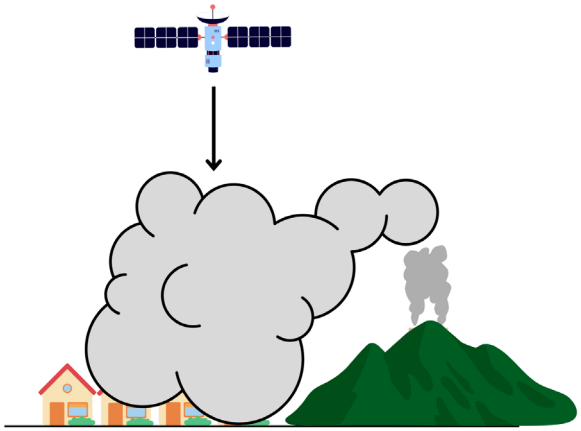
- **Can publicly available satellite and airborne remote sensing provide additional independent observations of the event?**
  - Remote sensing can be used with atmospheric modeling data to constrain the impact zone.
  - Our time series of remote sensing observations show a methane plume extending 3-18km downwind.
    - This varies by time since the blowout, meteorology, and instrument sensitivity.

Remote Sensing (using satellite images) provides a Two-Dimensional View of Methane Plume



Surface **IS NOT** affected

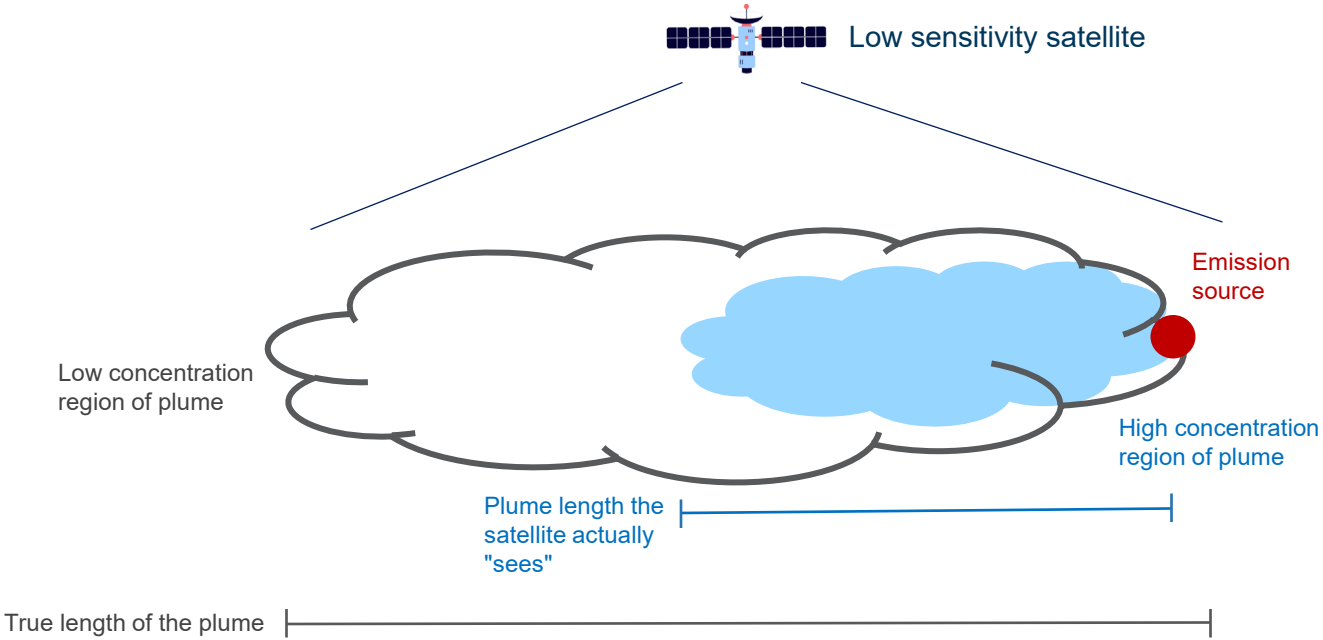
OR



Surface **IS** affected

Key takeaway: Remote sensing shows where enhanced methane concentrations are located but does not show if methane is at the surface or higher in the atmosphere.

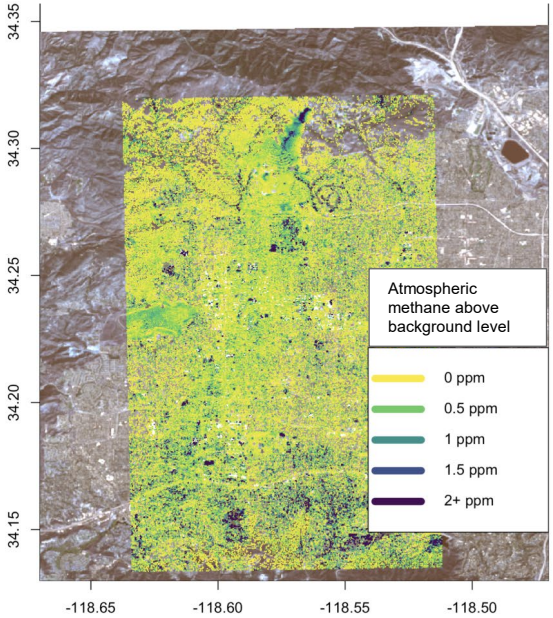
Plume visibility depends on sensitivity of satellite



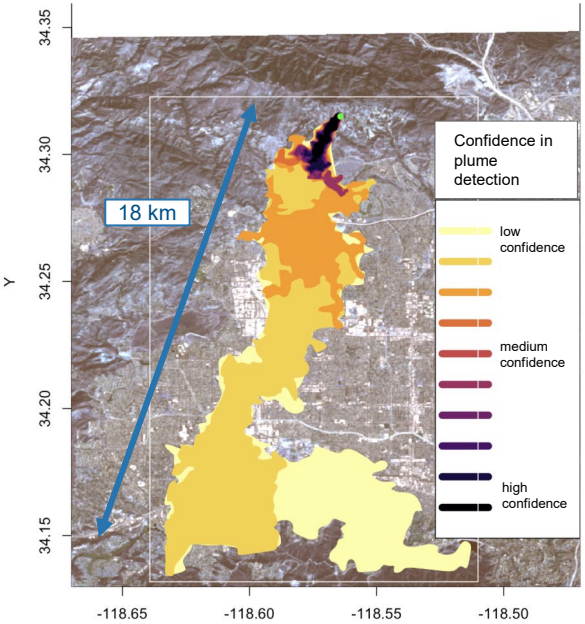
Key takeaway: During the event, the satellites that imaged Aliso Canyon varied in their sensitivity.

10/26/15: Landsat satellite detection

Above Background Methane in Entire Atmosphere



Probable Methane Plume



During the disaster, there was more methane in the atmosphere, somewhere between the ground and space. Left image shows the increase in atmospheric methane above the background level. Right image shows the probable plume.

Takeaway:

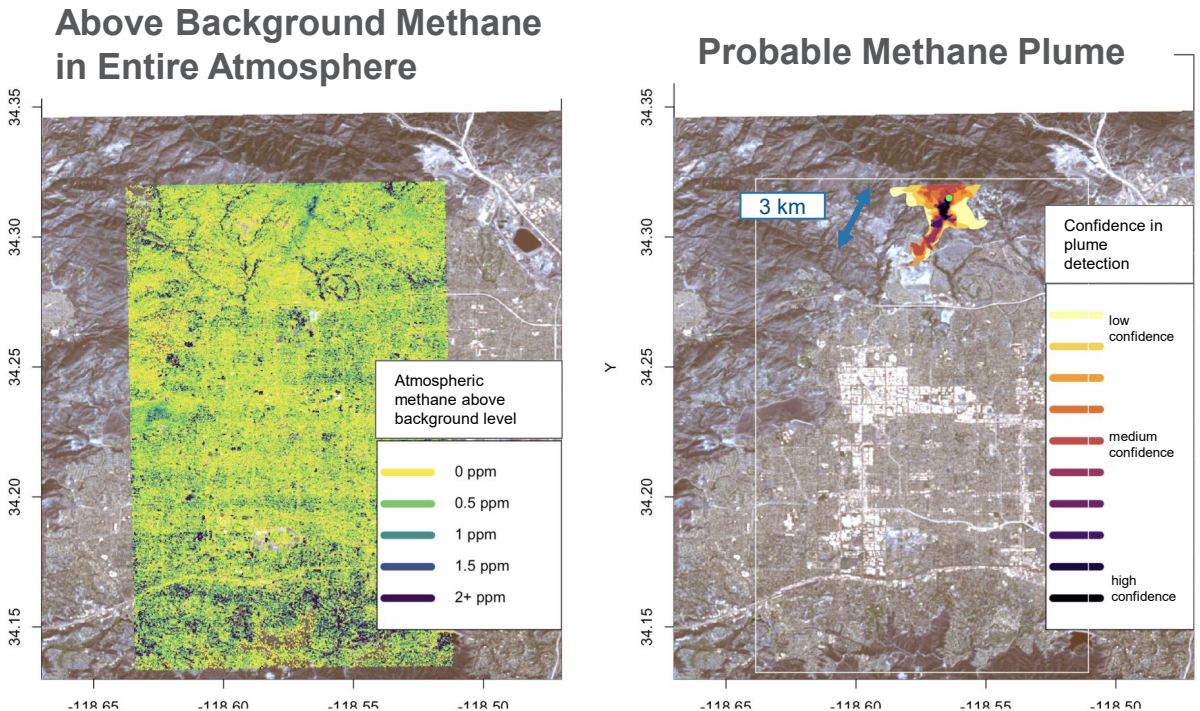
Landsat has lowest sensitivity to methane (CH_4) and indicates an 18 km plume 3 days after blowout.

This is the earliest remote sensing observation available after the blowout.

"Lowest sensitivity" means that Landsat is the least sensitive of available remote sensing datasets, and can only detect column methane 200% above background.

** This slide was reformatted for clarity based on feedback at the community meeting.*

11/11/15: Sentinel-2 satellite detection



During the disaster, there was more methane in the atmosphere, somewhere between the ground and space. Left image shows the increase in atmospheric methane above the background level. Right image shows the probable plume.

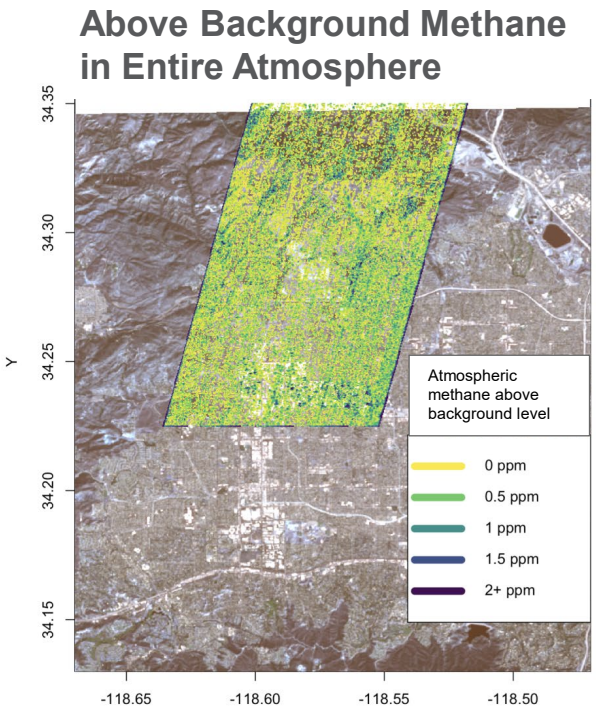
Takeaway:

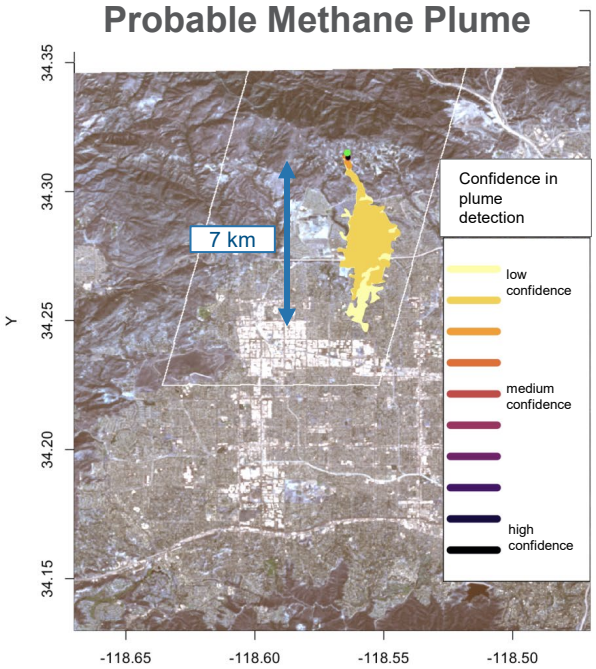
Sentinel-2 has low sensitivity to methane and indicates a 3 km plume 2.5 weeks after blowout.

Sentinel-2 shows similar sensitivity to Landsat.

** This slide was reformatted for clarity based on feedback at the community meeting.*

12/24/15: Hyperion satellite detection





Takeaway:

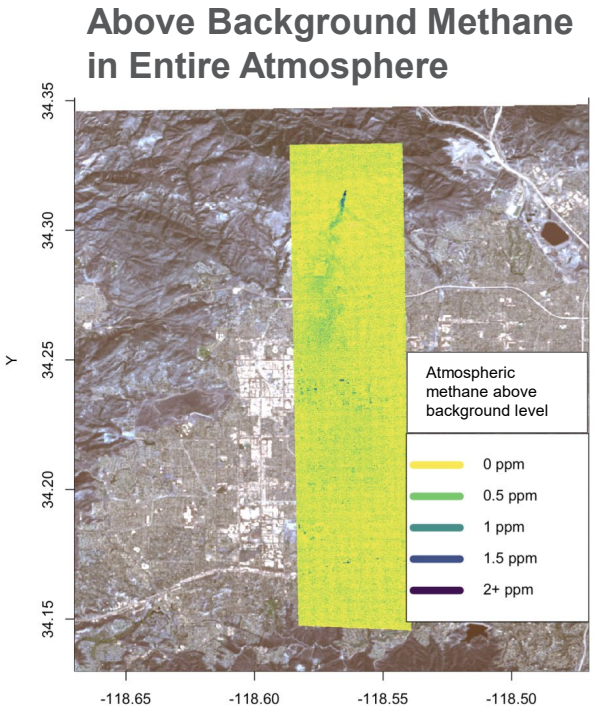
Hyperion is moderately sensitive to methane and indicates a 7 km plume 2 months after the blowout.

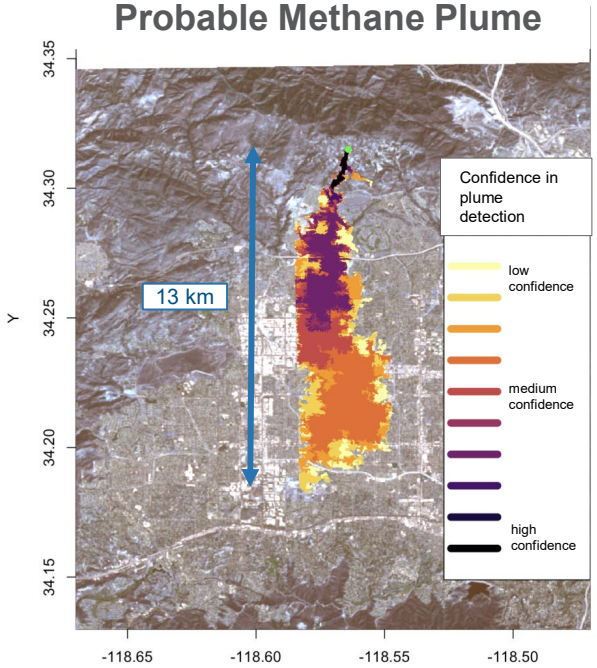
Hyperion is sensitive to column CH_4 30% above background levels.

During the disaster, there was more methane in the atmosphere, somewhere between the ground and space. Left image shows the increase in atmospheric methane above the background level. Right image shows the probable plume.

** This slide was reformatted for clarity based on feedback at the community meeting.*

1/12/16: AVIRIS aircraft detection





Takeaway:

AVIRIS is most sensitive to methane and indicates a 13 km plume almost 2 months after the blowout.

AVIRIS is sensitive to column CH_4 10% above background levels.

During the disaster, there was more methane in the atmosphere, somewhere between the ground and space. Left image shows the increase in atmospheric methane above the background level. Right image shows the probable plume.

** This slide was reformatted for clarity based on feedback at the community meeting.*

What Does the Remote Sensing Data Show?

- We estimated downwind methane concentrations based on 24 cloud-free remote sensing observations taken from October 2015 to February 2016.
  - This includes the earliest remote sensing observation collected three days after the blowout.

Key takeaways:

- Depending on the time since the blowout, instrument sensitivity, and meteorological factors, the methane plume extended 3 to 18 kilometers.
- These results improve our understanding of the spatial extent of elevated methane concentrations in the atmosphere during the event.
- They can serve as an indicator of potential exposure to air toxics, but the specific relationships between methane and air toxics is uncertain.

Next steps

- Draft manuscript (target: late December)
- Target journal: *Environmental Research Letters*

- Future work: To connect satellite observations to surface concentrations, we will compare satellite observations with atmospheric modeling and ground station datasets.

Thank you! Questions?

Study Updates

Study updates and data procurement

- New exposure data (and confidential files);
- Cancer registry acquired data from state of California;
- Healthcare utilization data from state and UCLA Health system;
- California biobank blood samples being pulled for metabolomics analysis;
- Indoor/Outdoor air monitoring and residential natural gas sampling underway.

- **Many study activities and simultaneous analyses are ongoing** and we will update you on their progress in future meetings.

Resident Health Survey and Clinical Assessments

Survey Purpose + Method

Purpose of the Resident Health Survey

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

Participants Take Survey Online

- 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 will also take Clinical Assessment (400 from affected area, 200 from comparison area).

Recruitment Process

- Mail initial invitation letters to selected potential participants.
- Recruitment letter includes direct web survey access, QR code, support line, and other contact options.
- Follow up with two reminder mailings, two weeks apart.
- Potential community in-person recruitment (e.g., set-up a table to recruit at community centers) will be conducted as needed.

Compensation: Participants can choose survey only or both survey and clinical assessment

- **Survey incentive:** $35 Amazon gift card
- **Clinical Assessment with blood draw incentive:** $70 Amazon gift card

Clinical Health Assessments

Logistics

- Resident Health Survey has a link to the consent form for persons interested.
  - Of those who consent, a sample will be contacted for telephone screening and scheduling of the health assessment research visit.
- Clinical research sites are located in Porter Ranch and Simi Valley areas
  - Varied monthly schedules of weekend, weekdays; ~1 to 1.5 hours per visit

Health Assessments

- Involve physical measures, blood draw, spirometry, cognitive testing
- For information visit: https://alisostudy.ucla.edu/study-overview/study-approach/clnical-assessments/

UCLA

Aliso Canyon Disaster Health Research Study

Engaging Residents to Identify Health Issues through Community Centered Risk-Assessment

Thomas E. McKone, PhD
Diane A. Garcia-Gonzales, PhD
Michael Jerrett, PhD

Risk Assessment Expectations

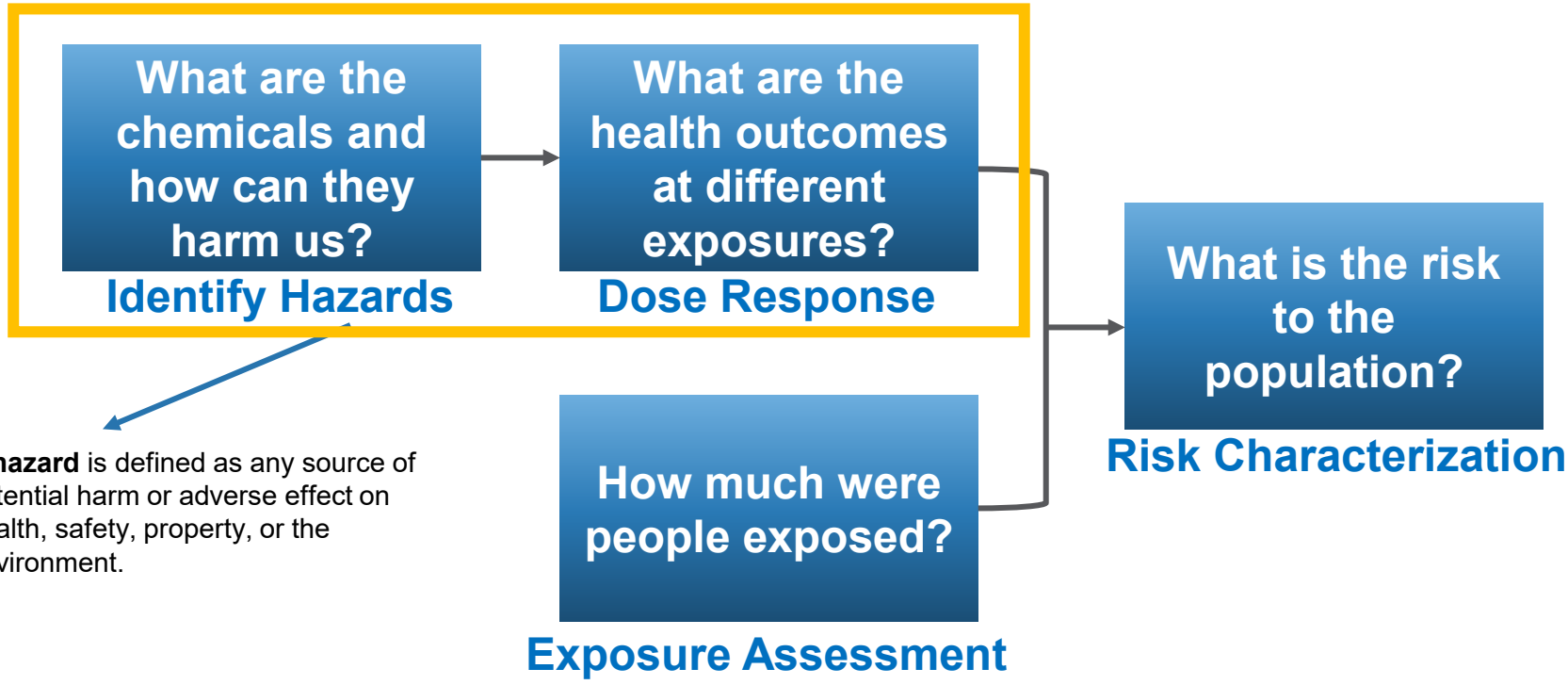
Characterize the likelihood of health issues.

Helps agencies identify actions to limit future exposures.

Helps inform/plan for future disasters.

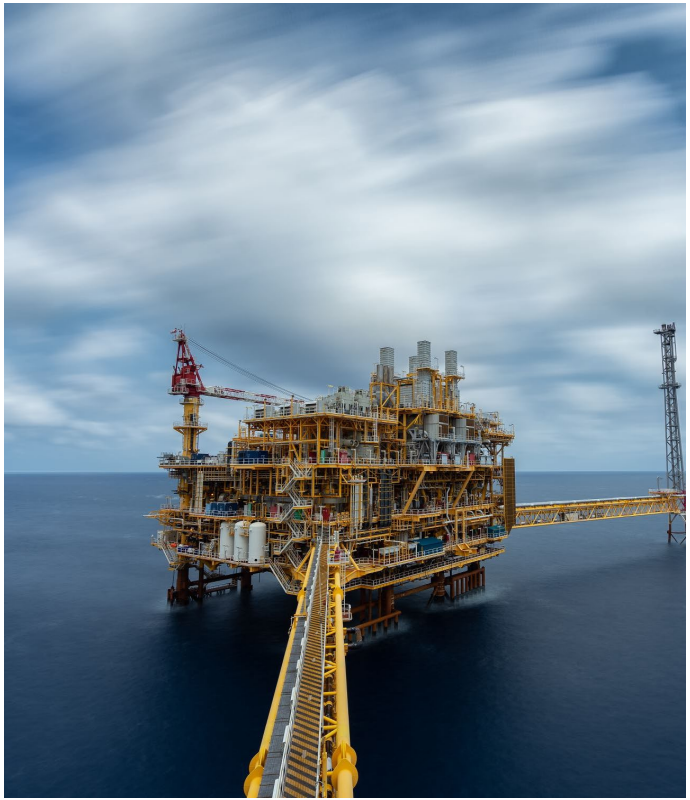
Not a predictive nor diagnostic tool!

About the Risk Assessment Process



A **hazard** is defined as any source of potential harm or adverse effect on health, safety, property, or the environment.

Risk Assessment Example:
BP Deepwater Horizon Oil Spill (2010)



- **Identify Hazard**: What chemicals were released to air/water?
- **Dose-response:** Links between exposure and harm to health.
- **Exposure Assessment**: How and how much were people and ecosystems exposed?
- **Risk Characterization**: Combine the likelihood of exposure with the severity of outcomes to understand population risks.

Risk Informed Actions: Guide safety improvements, regulatory changes, and better management practices.

Standards & Adjustments in Risk Assessments

Hazard Identification

- Potential for harm, not likelihood of harm

Dose Response

- Toxic thresholds
- Reviewing regulatory exposure limits

Exposure Assessment

- Relocation Status
- Outdoor Activities
- Housing Characteristics

Risk Characterization

- Age
- Gender
- Health Status

Informed by community knowledge. **This is where you come in.**

Working Assumptions

Relocation Status

- No relocation for conservative estimates

Outdoor Activities

- Average time spent at home, work, school, etc. (Lu, 2021)

Housing Characteristics

- Random sampling of ~30 different communities within target area
- Ventilation and indoor behaviors based on Southern California-specific studies

Age & Gender

- Collected from American Community Survey

Health Status

- Including adjustments for children and elderly

Community Input: Any modifications or suggestions for listed model inputs?

Exposure Assessment Adjustments for the Aliso Area: Elderly & Children

- Increased susceptibility due to weakened immune systems, smaller statures, breathing rates, etc.

- No standardized protocols for adjusting for older populations

- Specific guidelines for children available from the Agency for Toxic Substances and Disease Registry (ATSDR) and the US Environmental Protection Agency (US EPA)

Hazard Identification: Identification of Potential Exposures from Available Literature and Existing Datasets

Root Cause Analysis of the Uncontrolled Hydrocarbon Release from Aliso Canyon SS-25

Report from Blade Energy Partners, 2019

What You Should Know about the Aliso Canyon Blowout Disaster

Dr. Nordella, 2019

Toxic Air Contaminant and Greenhouse Gas Measurements near Oil and Gas Operations and Proximate Communities

CARB, 2022

Summary of compounds and COPC by compound category that are associated with Well SS-25 Gas Leak and Well-Control Activities

CARB, 2022

Long-Term Viability of Underground Natural Gas Storage in California

CCST, 2018

Natural Gas Odorants: A Scoping Review of Health Effects

Michanowicz et al., 2023

Relevant Sources of Hazard & Risk

Additive or Synergistic

Baseline: ambient background exposures

Facility: release of various chemicals into the air during the disaster event

Residential Exposures (Indoor): includes air quality of nearby homes

Hazard Identification: Data Sources

- 600+ *Publicly available* documents (e.g. datasets, lab reports, peer reviewed publications, etc.)
  - Zotero Library Link: https://www.zotero.org/groups/5004679/aliso_health_study/library
- 700+ *Confidential* documents
- Emerging Datasets: remote sensing imagery, resident health survey, modeling, health data, air monitoring, etc.

Community Input: Are there any priority inventories or datasets that you would like us to review?

Hazard Identification: Notable Group List

HAPs

- Arsenic
- Cadmium
- Hydrogen Sulfide
- Methyl Mercaptan
- Sulfur Dioxide
- 1,3-butadiene
- Acetaldehyde
- Acrolein
- Benzene
- Chloromethane
- Ethylbenzene
- Formaldehyde
- Dichloromethane
- Naphthalene
- Styrene
- Tert-Butyl Mercaptan
- Toluene
- Trichloroethylene
- Xylene
- 1,2,4 Trimethyl benzene

Metals

- Manganese
- Arsenic
- Cadmium
- Lead 210

NORMs

- Uranium 238
- Polonium 210
- Lead 210

PM

- Particulate matter (ultrafine)
- Particulate matter (PM2.5)
- Particulate matter (PM10)

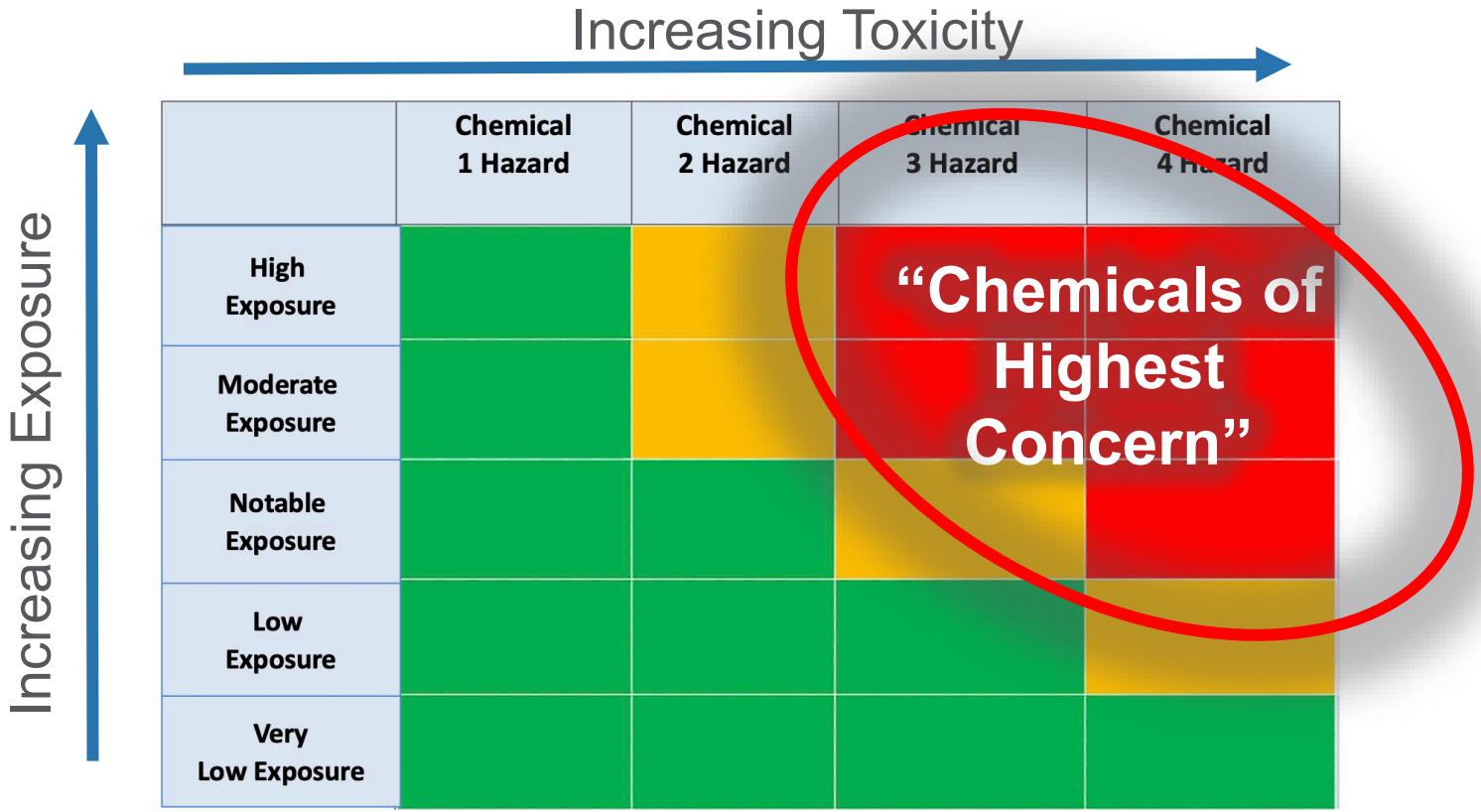
VOCs

- 1,3-butadiene
- Acetaldehyde
- Acrolein
- Benzene
- Chloromethane
- Ethylbenzene
- Formaldehyde
- Dichloromethane
- Naphthalene
- Styrene
- Tert-Butyl Mercaptan
- Toluene
- Trichloroethylene
- Xylene
- 1,2,4 Trimethyl benzene
- Acetone
- Methanol
- n-Hexane
- Tetrahydrofuran
- Tetrahydrothiophene
- Thiophene

Community Input: Please forward any additional chemicals of concern for consideration in the Risk Assessment.

NOTE: Chemicals listed here **DO NOT** indicate exposure, they are included here as a step along the Risk Assessment process.

Risk: Chemicals of Highest Concern



Next Steps

Finalize Hazard Identification & Dose Response

- Review progress with community and receive community input

Exposure Assessment

- Identify sources of data for relocation and other data
- Better characterize community, their activities, and residential environments (before and after event)

Risk Characterization

- Identify added risks based on age, gender, health status, etc.

Interim Report Due: Mid 2025

Looking forward to your feedback!

- Any modifications or suggestions for listed model inputs?
- Are there any priority inventories or datasets that you would like us to review?
- Please share any additional chemicals of concern for consideration in the Risk Assessment.

Contact us with feedback via email at: alisostudy@ucla.edu

Working Assumptions

Relocation Status

- No relocation for conservative estimates

Outdoor Activities

- Average time outdoors (~13%) from Klepeis et al. 2001 national survey

Housing Characteristics

- Random sampling of ~30 different communities within target area
- Ventilation and indoor behaviors based on Southern California-specific studies

Age & Gender

- Collected from American Community Survey

Health Status

- Including adjustments for children and elderly

Community Input:
Any modifications or suggestions for listed model inputs?

Hazard Identification: Data Sources

- 600+ *Publicly available* documents (e.g. datasets, lab reports, peer reviewed publications, etc.)
  - Zotero Library Link: https://www.zotero.org/groups/5004679/aliso_health_study/library
- 700+ *Confidential* documents
- Emerging Datasets: remote sensing imagery, resident health survey, modeling, health data, air monitoring, etc.

Community Input: Are there any priority inventories or datasets that you would like us to review?

Hazard Identification: Notable Group List

HAPs

- Arsenic
- Cadmium
- Hydrogen Sulfide
- Methyl Mercaptan
- Sulfur Dioxide
- 1,3-butadiene
- Acetaldehyde
- Acrolein
- Benzene
- Chloromethane
- Ethylbenzene
- Formaldehyde
- Dichloromethane
- Naphthalene
- Styrene
- Tert-Butyl Mercaptan
- Toluene
- Trichloroethylene
- Xylene
- 1,2,4 Trimethyl benzene

Metals

- Manganese
- Arsenic
- Cadmium
- Lead 210

NORMs

- Uranium 238
- Polonium 210
- Lead 210

PM

- Particulate matter (ultrafine)
- Particulate matter (PM2.5)
- Particulate matter (PM10)

VOCs

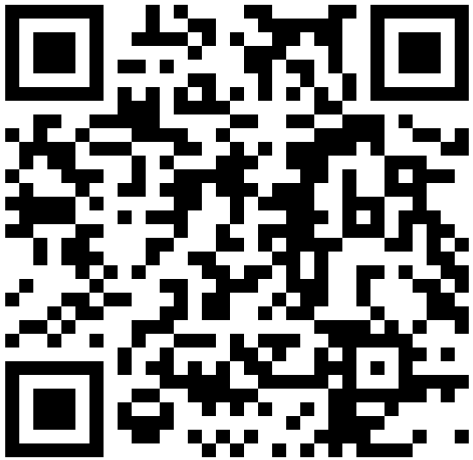
- 1,3-butadiene
- Acetaldehyde
- Acrolein
- Benzene
- Chloromethane
- Ethylbenzene
- Formaldehyde
- Dichloromethane
- Naphthalene
- Styrene
- Tert-Butyl Mercaptan
- Toluene
- Trichloroethylene
- Xylene
- 1,2,4 Trimethyl benzene
- Acetone
- Methanol
- n-Hexane
- Tetrahydrofuran
- Tetrahydrothiophene
- Thiophene

Community Input: Please share any additional chemicals of concern for consideration in the Risk Assessment.

NOTE: Chemicals listed here **DO NOT** indicate exposure, they are included here as a step along the Risk Assessment process.

Closing Evaluation

https://ucla.in/3UPIjW1



Community Engagement

- Website: https://alisostudy.ucla.edu/
- Facebook: https://www.facebook.com/p/aliso-canyon-disaster-health-research-study-61550564015502
- Nextdoor: https://nextdoor.com/pages/aliso-canyon-disaster-health-research-study-los-angeles-ca/
- Emails sign-up: https://lp.constantcontactpages.com/su/cewb1xe/alisostudy

Thank You