LOCAL COMMUNITY EMISSIONS REDUCTION PLAN
Lost Hills, Kern, CA

March 2026

DRAFT

Walking path to Lost Hills Park

Source: Clean Water Fund

California Climate Investments

Comite Lost Hills En Accion

Clean Water Fund

CCAC Central California Asthma Collaborative

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Acronyms

BUILD – Building Initiative for Low Emissions Development
CAG – Community Air Grant
CAPP – Community Air Protection Program
CARB – California Air Resources Board
CCAC – Central California Asthma Collaborative
CCEJN – Central California Environmental Justice Network
CCL – California Climate Investments
CLHEA – Comité Lost Hills En Acción
CPUC – California Public Utilities Commission
CSGT – Community Solar Green Tariff
CWF – Clean Water Fund
DAC – Disadvantaged Communities
DPR – Department of Pesticide Regulation
FLIR camera – Forward-Looking Infrared Thermal camera
LCERP – Local Community Emission Reduction Plan
LCSC – Local Community Steering Committee
LHUD – Lost Hills Utilities District
LHUSD – Lost Hills Unified School District
NAAQS – National Ambient Air Quality Standards
NOx – Oxides of Nitrogen
OEHHA – California Office of Environmental Health Hazard Assessment
PGE – Pacific Gas and Electric Co.
PM 2.5 – Particular Matter less than or equal to 2.5microns in diameter
PM10 – Particulate matter with a diameter of 10 microns or smaller
PV – photovoltaic
SNAPS – Study of Neighborhood Air near Petroleum Sources
SOMAH – Solar on Multifamily Affordable Housing
TAC – Toxic Air Contaminant
TECH – Technology and Equipment for Clean Heating
VAD – San Joaquin Valley Air Pollution Control District

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1. Executive Summary

Over a period of 18 months, the Lost Hills Community Steering Committee (LCSC) held approximately 30 meetings to develop this Local Community Emissions Reduction Plan (LCERP). The LCSC has worked in collaboration with the CARB, the Valley Air District (VAD), residents, local businesses, and local government. The Plan includes technical information provided by CARB and input from communities on local impacts and selection of strategies for reducing local emissions that are best suited to Lost Hills.

- Chapter 1 of the plan provides an overview of the AB 617 program and process.
- Chapter 2 provides information about formation and operation of the LCSC and how it communicated with fellow residents.
- Chapter 3 provides an in-depth community profile, description of current and past monitoring efforts and summarizes the technical assessment developed by CARB.
- Chapter 4 provides a suite of emission reduction strategies identified by the LCSC as suitable for Lost Hills.
- Chapter 5 provides an overview of next steps for plan implementation.
- Additional information, including the LCSC community charter, the SNAPS air monitoring report and the CARB Technical Assessment are provided as appendices.

ES.1 Overview of AB 617 and LCERP

The California Air Resources Board (CARB) administers AB (Assembly Bill) 617 through its Community Air Protection Program (CAPP) and is tasked with ensuring the benefits of AB 617 are made available to all eligible communities in the state, especially those who live in the areas of California most severely impacted by air pollution. To meet its obligation, CARB created the Community Air Grants Program (Air Grants Program), which has a goal of providing support for community-based organizations to participate in the AB 617 process, and to build capacity to become active partners with the government to identify, evaluate, and reduce air pollution and exposure to harmful emissions in their communities. In 2024, a Community Air Grant was awarded to Clean Water Fund (CWF) to work with the community of Lost Hills to develop a Local Community Emissions Reduction Plan (LCERP).

Lost Hills is a small, predominantly Hispanic community in western Kern County. Over 97% of its approximately 2,370 residents identify as Hispanic or Latino. The community faces disproportionately high levels of exposure to toxic air pollution from multiple pollution sources. Data collected between 2015–2019 shows consistently harmful levels of ozone and fine particulate matter (PM2.5). Data collection did not include source detection. With an economy heavily reliant on oil, gas and agriculture, Lost Hills experiences both economic dependence on polluting industries and environmental harm. The Community Air Grants Program provides a critical opportunity to empower communities to engage in solutions that protect public health and advance environmental justice.

Plan development included daily monitoring of community air quality through the Central California Asthma Collaborative's (CCAC) SJVAir.com, a monitoring and mapping tool developed by CCAC. Notifications and alerts from VAD were also used to track air events. In addition, the Central California Environmental Justice Network (CCEJN) was contracted to conduct tours using a FLIR camera to detect emissions, and train community members on the use of Summa Canisters to collect, store and transport air samples for laboratory analysis.

LCSC members were trained to report incidents through the KEEN IVAN Network (kernreport.org) and through the VAD.

This plan is focused on reducing individual criteria air pollutant and toxic air contaminant emissions to address the impacts of community exposure to multiple pollutants. While every community faces distinct health-based challenges, CARB guidance states that broad health-based air quality objectives provide a consistent foundation for determining the appropriate levels of emissions reductions for CERPs and LCERPS statewide. This LCERP includes a technical analysis prepared by CARB (Appendix B) describing the sources of pollution affecting the community, the location of sensitive receptors within the community and an assessment of the most prevalent and concerning contaminants affecting the community. These are the pollutants targeted by the LCSC in its development of the plan.

ES.2 Community Partnerships and Engagement

The Lost Hills Local Community Steering Committee (LCSC) is an advisory body guiding the development of the Local Community Emission Reduction Plan (L-CERP). The Committee works in partnership with the Central California Asthma Collaborative (CCAC), the Central California Environmental Justice Network (CCEJN), the California Air Resources Board (CARB), Clean Water Fund (CWF), and community leaders to ensure that community priorities are integrated into local and state air quality planning efforts.

The LCSC and its supporting members have been an integral part of sustaining the committee and engaging the public to be an inclusive part of the planning process. LCSC members and CWF have conducted door-to-door outreach and approached community members at church, school and community events. They have met with board members of the Lost Hills Utilities District (LHUD), Lost Hills Unified School District (LHUSD) and Lost Hills Community Advisory Board (CAB) to extend an invitation to participate and answer questions about the process and goals of the LCERP. A standing call list of about 25 community members is contacted prior to each meeting. Prior to each LCERP meeting the agenda has been posted on the Comité Lost Hills En Acción (CLHEA) Facebook page and in key community locations. In addition, a website was established (www.comitelosthills.org) to post agendas, meeting minutes and documents. Outreach efforts prioritized engaging residents from historically underrepresented groups, including farmworkers, Spanish-speaking households, and families living near major pollution sources and holding meetings at accessible times and locations.

The Community Kickoff in August 2024 was attended by 10 community members as well as staff from CARB and VAD. The kickoff provided space for regulatory bodies to showcase their role and defined the roles of the community organizations and facilitators. Community members were able to identify some of their interests in developing the Plan and provided feedback to CARB and VAD about some of the challenges of reporting issues, particularly for monolingual Spanish speakers. Those attending comprised the eventual Steering Committee membership.

From its initial meeting, the Local Community Steering Committee (LCSC) began learning about the purpose and process of this project and discussing emission concerns in their community. The LCSC identified several stationary and mobile pollution sources:

- **Mobile Sources:** State Route 46 runs through the center of the community and has recently been expanded into a 4-lane highway. Interstate 5 brings significant traffic to the community.
- **Stationary Sources:** The Lost Hills Oil Field, one of the largest in the state, lies directly west of Lost Hills and is owned by California Resources Corporation, Aera and Chevron. There were

also concerns about agricultural work in the area, including pesticide application, agricultural burning and the Wonderful Company nut processing plant.

Residents also wished to measure and identify the source of high Acrolein levels identified in the 2024 SNAPS report.

In discussing solutions, the LCSC expressed a need for more or better incentives and enforcement in residential wood and waste burning, replacement of high emitting items in the home and more environmental greening, as well as vegetative protections for schools and homes. Community members also expressed a desire for more localized emissions reduction and incentivization through electrification of vehicles, school buses, charging stations and other emission producing products.

The LCSC's first action was to develop a charter to guide governance decisions and the operation of the Committee. That charter can be found in Appendix A. As part of charter development, the LCSC identified its objectives for the LCERP. The first objective of the LCSC is to identify and prioritize air pollution sources that most significantly impact the health and well-being of Lost Hills residents and the surrounding region. This includes evaluating pollution sources within community boundaries as well as those located at reasonable distances outside the community that contribute to cumulative exposure. The second objective of the LCSC is to explore and recommend feasible emission reduction strategies and air quality improvement measures that reflect both technical data and lived community experience.

ES.3 Understanding the Community

Concurrent with the development of the community charter, the LCSC began to discuss the plan's boundaries. In addition to the community of Lost Hills, LCSC members were adamant that communities outside the strict community boundaries be included, including the trailer park north of Lost Hills, Blackwell Corner to the west, and the small community along Lerdo Highway to the South. The LCSC also wanted to ensure that major pollution sources were included within the boundaries to the extent possible.

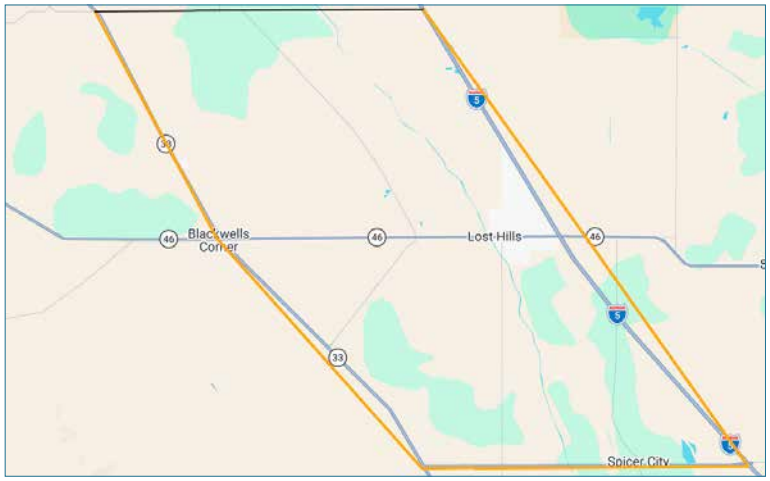

Figure 1: Google Map Image of LCSC-established Lost Hills Community Map Boundary. Google My Maps, 2026.

Lost Hills Community Profile. The Lost Hills community is located in Western Kern County. Its 2 largest industries are corporate agriculture and large-scale oil and gas operations. The community includes one public park and 2 schools. Cal EnviroScreen 4.0 ranks the community as one of the most overburdened by pollution and other data indicates severe socioeconomic vulnerability. Overall, the data shows that Lost Hills is one of California's most environmentally and socioeconomically burdened communities, highlighting significant environmental justice concerns. The community is surrounded by heavy industry, bisected by a major state route and bounded to the east by Interstate 5. Other pollution sources bordering the community include a hazardous waste facility, gas plant and a nut processing facility.

CARB has developed a technical assessment of the community, identifying sensitive receptors in the community and providing a loading estimate of the major pollutants impacting the community and also

identifying sources for those emissions. That technical report can be found in Appendix B of this report.

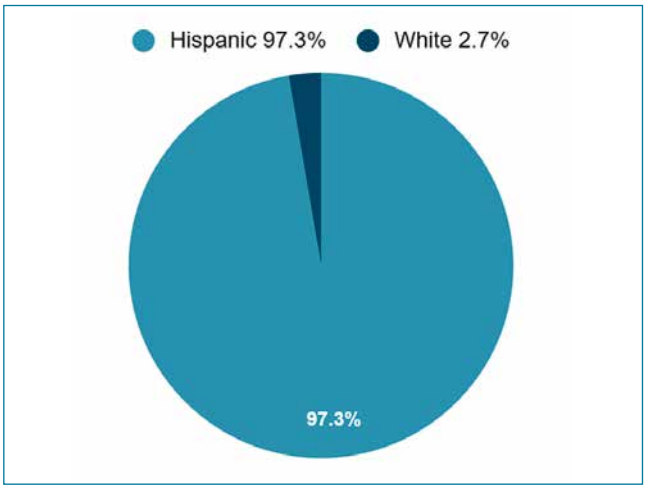

Figure 2: Population Demographics of Lost Hills, CA.

Monitoring. Lost Hills has been part of several short-term monitoring efforts over the past 12 years beginning with a 2015 study published by CWF and Earthworks. The first Community Air Grant awarded to Lost Hills created a community monitoring plan that included continuous reporting to a website maintained by the technical consultant, Blue Tomorrow. In 2018, Lost Hills was chosen as the first community in California to host a SNAPS survey, a high-level mobile and stationary air monitoring project conducted by CARB. The SNAPS report on its Lost Hills monitoring was completed in October 2025 and included a second round of monitoring in early 2025 to investigate a troubling finding of elevated levels of acrolein, a biocide that can be used in both the agricultural and oil and gas industries. That report can be found in Appendix B. Investigations of acrolein in the community were continued by Aclima Inc. in 2025. Aclima was contracted by CARB to conduct is Statewide Mobile Monitoring Initiative (SMMI).

With the publication of the SNAPS study, the Aclima mobile monitoring study, and monitoring equipment installed by CCAC and CCEJN, the community of Lost Hills is finally able to receive consistent ongoing results about the community's air quality. The community is particularly interested in the source of high acrolein levels detected during the initial SNAPS monitoring effort, as well as the frequency, duration and source of VOC spikes that have been detected during prior monitoring efforts.

ES.4 Community Strategies

The Lost Hills LCSC members participated in a facilitated exercise to identify and prioritize their air pollution sources of concern. Participants were asked to share their thoughts regarding air pollution sources which they believed impacted their community the most, or was of most concern to the individual or entity they represented.

To address multiple and cumulative pollution sources, the LCERP has prioritized community-driven strategies that reduce exposure at the source while providing immediate health protections. Examples of proposed solutions include installing vegetative barriers to reduce pesticide drift and roadway emissions, strengthening pesticide safety practices, and developing alternative truck routes to divert heavy-duty vehicles away from residential areas. Investments in electric vehicle infrastructure aim to reduce transportation-related emissions, while air filtration programs and wood stove replacement initiatives will help lower indoor air pollution. Dust mitigation measures will target emissions from agricultural operations, roadways, and open land to reduce particulate matter exposure.

Stationary sources of pollution remain a critical focus of the plan. Major facilities such as The Wonderful Company, Chevron, Aera Energy, and California Resources Corporation (CRC) contribute to localized emissions and require targeted monitoring and mitigation. The LCERP emphasizes accountability and collaboration with these operators to reduce emissions that impact surrounding communities.

Policy recommendations supporting the plan include enforceable dust reduction measures, land-use and emissions standards for warehouses, and stronger regulation of methane emissions. The use of advanced

technologies, such as camera-based methane detection systems, is recommended to improve transparency, monitoring, and rapid response to leaks from oil and gas infrastructure.

Implementation of the LCERP will be supported through available funding and technical resources, including the Carl Moyer Program, Agricultural Innovation Zones, and incentives for sustainable agricultural practices. Additional opportunities exist through Greenhouse Gas Reduction Fund (GGRF) investments to advance clean transportation, clean energy, and emissions reduction projects. Together, these strategies form a comprehensive approach to reducing emissions, improving air quality, and advancing environmental justice for the community.

ES.5 Next Steps

Now that the LCSC has identified its priorities for reducing local emissions, implementation of the plan will proceed. Identified next steps are to:

- identify strategies that can be implemented as part of the CAG 5 grant for Lost Hills;
- work with state and local agencies to identify resources to implement the plan;
- identify needed resources and/or policy changes that can advance strategies that currently lack resources or data;
- overcome barriers to accessing resources;
- continue monitoring to build a record of air quality data and trends; and
- identify strategies in response to Aclima monitoring results, which may provide greater information on pollution sources within the community, particularly the source of elevated acrolein levels.

The award of a CAG 5 allows some recommendations to be implemented immediately. For example, CWF is partnering with Cal State Fresno to design and execute a community health assessment in Lost Hills in the spring of 2026. The grant also provides funding to empower community members to travel to visit decision-makers and make their case for resources or policy changes.

Finally, the development of metrics will occur with the implementation of individual strategies.

2. Introduction

The California Air Resources Board (CARB or Board) established the Community Air Protection Program (Program) in July 2017 to implement Assembly Bill 617 (AB 617). The purpose of the Program is to reduce exposure to, and emissions of, criteria air pollutants and toxic air contaminants and maximize health benefits and environmental equity goals in communities affected by a high cumulative exposure burden. In 2023, CARB updated its statewide strategy, also known as Blueprint 2.0, for the Program to improve local air quality through collaboration with residents. A key goal of Blueprint 2.0 is to use Community Air Grants to build community capacity and support the development of Local Community Emissions Reduction Plans (L-CERPs). These L-CERPs are developed and implemented by community-based organizations or California Native American Tribes and are designed to reduce air pollution in specific areas. To support each L-CERP project, CARB will provide technical assistance through a dedicated CARB liaison, develop community profiles, and provide information, and opportunities throughout the course of the project.

For the Lost Hills Community, the Central California Asthma Collaborative (CCAC) and Clean Water Fund (CWF) did not follow the traditional Community Steering Committee (CSC) charter model followed by the selected

AB 617 communities. All residents were allowed to attend and participate in the development of the Local Community Emission Reduction Plans (L-CERP). Residents participate in the L-CERP process from the Lost Hills area and community.

2.1 Creation of Lost Hills Local Community Emissions Reduction Plan

2.1.1. Overview of AB 617 and its Application to Lost Hills

The California Air Resources Board (CARB) administers Assembly Bill 617 (AB 617) through the Community Air Protection Program to reduce air pollution in communities most burdened by poor air quality. Central to this effort is the Community Air Grants Program, which provides technical assistance and funding to community-based organizations so they can meaningfully participate in AB 617 planning and implementation. The program is designed to build local capacity and foster partnerships between communities, state agencies, and local governments to identify, evaluate, and reduce harmful air pollution.

Lost Hills, a small, predominantly Hispanic community in Kern County, exemplifies the need for this support. Home to approximately 2,370 residents—over 97% of whom identify as Hispanic or Latino—Lost Hills faces disproportionately high exposure to air pollution. Local oil and gas operations contribute significant levels of volatile organic compounds (VOCs), compounding the Central Valley's longstanding air quality challenges. Data from 2015–2019 show consistently harmful levels of ozone and fine particulate matter (PM2.5) at monitoring sites in Kern County, correlating with an increase in unhealthy air days and elevated health risks.

With an economy heavily reliant on oil, gas, and agriculture, Lost Hills experiences both economic dependence on polluting industries and cumulative environmental harm. The Community Air Grants Program plays a critical role in empowering communities like Lost Hills to engage in solutions that protect public health and advance environmental justice.

2.1.2. Community Air Monitoring

The community air monitoring plan for this project included daily monitoring of community air quality through CCAC's SJVAir.com monitoring mapping tool developed by CCAC, and via notifications and alerts from the Valley Air District. Additionally, two monitoring tours with CCEJN using FLIR Cameras were conducted, during which several incidents were identified and reported to the Valley Air District as well as the KEEN/IVAN Network (a monitoring and reporting website managed by CCEJN). Summa canisters (vessels designed to collect, store, and transport air samples for laboratory analysis of volatile organic compounds (VOCs)) were also used in the monitoring efforts. Results are pending.

As part of this monitoring effort LCSC members were trained in how to make reports through the KEEN IVAN Network with CCEJN and through the Valley Air District. Finally, they were trained by CCEJN in how to collect Grab samples using the Summa canisters.

2.1.3. Community Emission Reduction Plan

The Lost Hills Local Community Steering Committee (LCSC) has developed this Local Community Emissions Reduction Plan (LCERP) in collaboration with CARB, VAD, residents, local business, and local government representatives in the affected community. The plan is intended to reduce localized pollution and associated health impacts in the Lost Hills community. Local Steering Committee input and other comments received from the public in the community have provided critical information for identifying community-specific measures and addressing community concerns. This LCERP provides a description of the Lost Hills AB 617 Community, including geographical boundaries and socioeconomic factors impacting community residents.

A technical analysis prepared by CARB (Appendix B) describes the sources of pollution affecting the community, as well as the location of sensitive receptors within the community. Sources of pollution that are of particular concern to community members are highlighted, and possible strategies for reducing pollution impacts from these sources are evaluated. The strategies that were ultimately selected by the LCSC for implementation in the community include incentive funding measures, public engagement strategies, enforcement strategies, regulatory strategies, and strategies that will be completed in partnership with other agencies and local organizations. Finally, next steps for plan implementation are described (Chapter 5).

2.2 Health-Based Air Quality Objectives

CERPs and LCERPS implemented under AB 617 are designed to reduce emissions of pollutants that have been shown to have adverse impacts on public health, including fine particulate matter and toxic air contaminants. As specified in CARB's Community Air Protection Program Blueprint (Appendix C: Criteria for Community Emissions Reduction Programs), this plan focused on reducing individual criteria air pollutant and toxic air contaminant emissions to address the impacts of community exposure to multiple pollutants. While every community faces distinct health-based challenges, CARB guidance states that broad health-based air quality objectives provide a consistent foundation for determining the appropriate levels of emissions reductions for CERPs and LCERPS statewide.

Air Quality Index (AQI): Basics for Ozone and Particle Pollution

The U.S. Environmental Protection Agency (EPA) and the State of California have established ambient air quality standards, which set health-protective levels for the following criteria pollutants: ozone, particulate matter with a diameter of 10 microns or smaller (PM10), particulate matter with a diameter of 2.5 microns or

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
GREEN	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
YELLOW	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
ORANGE	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
RED	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
PURPLE	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
MAROON	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Figure 3: The U.S. Air Quality Index (AQI) is EPA's tool for communicating about outdoor air quality and health. The AQI includes six color-coded categories, each corresponding to a range of index values. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 or below represents good air quality, while an AQI value over 300 represents hazardous air quality. Air Quality Index (AQI) Basics. AirNow. 2026.

smaller (PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. California also has standards for sulfates, vinyl chloride, and hydrogen sulfide. Due to the region's topography and meteorology, the Valley is classified as in Serious nonattainment for the federal PM2.5 standards, and Extreme nonattainment for federal ozone standards.

Particulate Matter: Particulate matter is a mixture of solid particles and liquid droplets in the air. PM can be emitted directly into the atmosphere (primary PM), or can form as secondary particulates in the atmosphere through the photochemical reactions of precursors (when precursors are energized by sunlight). Thus, PM is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. PM10 is particulate matter that is 10 microns or less in diameter, and the PM2.5 subset includes smaller particles that are 2.5 microns or less in diameter. Any particles 10 microns or less are considered respirable, meaning they can be inhaled into the body through the mouth or nose. PM10 can generally pass through the nose and throat and enter the lungs. PM2.5, which is the portion of PM10 that is less than 2.5 microns in size, when inhaled, can move deep into the gas exchange tissues of the lungs, where it can be absorbed into the bloodstream and carried to other parts of the body. The potential health impacts of particle pollution are linked to the size of the particles, with the smaller particles having larger impacts. Numerous studies link PM2.5 to a variety of health problems, including aggravated asthma, increased respiratory symptoms (irritation of the airways, coughing, difficulty breathing), decreased lung function in children, development of chronic bronchitis, irregular heartbeat, non-fatal heart attacks, increased respiratory and cardiovascular hospitalizations, lung cancer, and premature death. Children, older adults, and individuals with heart or lung diseases are the most likely to be affected by PM2.5.

Many studies have quantified and documented the health benefits of attaining the U.S. Environmental Protection Agency (EPA) air quality standards for PM. The Valley Air Basin is in attainment of the federal standards for PM10, but is currently classified as Serious nonattainment for the federal PM2.5 standards. The District, in partnership with CARB, developed the 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards, which was approved by EPA on June 30, 2020, and detailed strategies to move the region towards attainment of the federal PM2.5 standards. More information is available at: http://valleyair.org/pmplans.

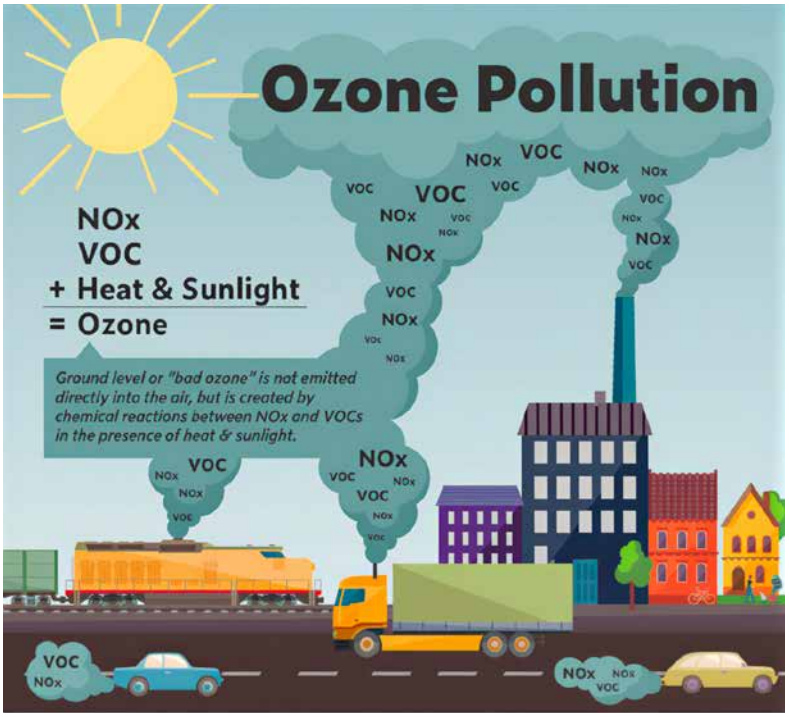

Figure 4: San Joaquin Valley Air Pollution Control District. Industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors and chemical solvents are major sources of oxides of nitrogen (NOx) and volatile organic compounds (VOC).

Ozone: Ozone is a naturally occurring and manmade regional air pollutant that is formed through chemical reactions in the atmosphere between oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOCs). CARB Office of Community Air Protection guidance states that, because ozone formation is driven by regional rather than localized source contributions, ozone should be addressed in regional air

quality improvement efforts through the State Implementation Plan. However, the community expressed concern about ozone levels and urged that they be included in the LCERP. Therefore, ozone and related precursors will be monitored and taken into account as a part of LCERP development and implementation.

The District's current plan for attainment of health-based ozone standards throughout the San Joaquin Valley Air Basin can be found here: http://valleyair.org/Air_Quality_Plans/Ozone_Plans.htm

Toxic air contaminants: Toxic air contaminants (TACs) also contribute to a community's cumulative exposure burden. TACs such as Formaldehyde, BTEX (Benzene, Toluene, Ethylbenzene, Xylene) and Black Carbon increase the risk of acute and chronic health impacts as well as cancer. Diesel particulate matter is a large concern in areas with high exposure to diesel engine emissions, such as the community of Lost Hills. Other toxic air contaminants can contribute to localized health risks, including metals; air toxics related to fossil fuel production, such as benzene and toluene; and compounds associated with combustion, including polycyclic aromatic hydrocarbons and dioxins. The California Office of Environmental Health Hazard Assessment (OEHHA) establishes threshold concentrations for toxic air contaminants at which exposure is not expected to trigger non-cancer health effects. Reducing emissions in the community will be based on identifying technologies and practices that offer the maximum level of toxic air contaminant emissions reductions achievable to address both types of health effects.

With the support of community members, this LCERP will build upon regional efforts to improve air quality throughout the Valley Air Basin. The Lost Hills LCERP focuses on reducing emissions of and exposure to PM2.5, ozone, and toxic air contaminants from localized sources that contribute to cumulative exposure burdens within the community.

3. Community Partnerships and Public Engagement

LCSC members have been an integral part of the community engagement process. Committee members conducted person-to-person recruitment efforts with former committee members, fellow church members, neighbors and fellow parents. Outreach efforts were prioritized to engage residents from historically underrepresented groups, such as farmworkers, Spanish-speaking households, and homes near major pollution sources. Monthly meetings were held at accessible locations and times, with bilingual materials and interpretation services provided, as well as virtual attendance options.

CWF met with board members of the Lost Hills Utilities District (LHUD), Lost Hills Unified School District (LHUSD) and Lost Hills Community Advisory Board (CAB) to invite participation and answer questions about the process and goals of the LCERP. In addition, CWF canvassed the entire community, making approximately 350 contacts from Blackwell Corner to the trailer park and down all Lost Hills streets from King to Universal. Residents were provided with meeting agendas and flyers, as well as the most recent newsletter.

Outreach efforts provided multiple community insights, from reports of odors and health effects to concerns about the role of regulators in protecting the community. CWF staff provided instruction on how to report incidents. Residents shared a common desire for this project to succeed to provide their children and family members with a healthier environment.

While in-person attendance did not increase, 25 residents expressed interest in the process and were kept informed on a monthly basis about the planning effort. It is important to note that the increased ICE presence in Kern County in January 2025 severely impacted both in-person meeting attendance and people's willingness to open doors and have a conversation.

3.1 Community Kickoff Meeting

The Community Kickoff was held at the Lost Hills Community Center in Lost Hills Park. Ten community members received an AB 617 overview presentation from CARB which included CARB Tools currently available for residents, such as reporting tools and compliance efforts.

Residents shared their familiarity with AB 617 and some monitoring and reporting tools available to them both from a regulatory perspective and in the community space. They also sought a better understanding of the Valley Air District's (VAD) reporting program and asked about tools that are specifically best suited for their community. The kickoff provided space for regulatory bodies to showcase their role and defined the roles of the community organizations and facilitators. CARB staff suggested that they could bring examples of tools to a future meeting so the community can decide what works best for them.

The community emphasized that they were interested in ways to monitor and report odor incidents; currently when they report odors, the smell dissipates before an inspector can arrive to investigate. Residents promised to follow up with staff at CARB to be informed about tools currently in use to detect and report odors.

VAD staff emphasized that their telephone line for reporting is available 24/7, to which community members responded that they've often found the voicemail for the Spanish-language number to be full, particularly during the 2023 Wonderful Co. mulch fire. The community reports that the Spanish language complaint line has been operational in subsequent calls.

Lost Hills Residents, and Comité Lost Hills En Acción, attending SNAPS Results Presentation in 2024. Source: Clean Water Fund.

Gustavo Aguirre From the Central California Asthma Collaborative (CCAC) and Jesus Alonso from Clean Water Fund (CWF) provided an overview of this project which identified how the Boundaries, Community Profile and Charter will be developed.

3.2 Local Community Steering Committee (LCSC)

The Lost Hills Local Community Steering Committee (LCSC) is a resident-centered body composed of local community members, representatives of community-based organizations, local business owners, and other stakeholders who reflect the cultural, linguistic, and socioeconomic diversity of Lost Hills. The LCSC was intentionally structured to ensure that those most impacted by air pollution have a meaningful voice in decision-making processes. This was a central point of the kick-off meeting.

3.3 Local Community Steering Committee (LCSC) Charter

The Lost Hills Local Community Steering Committee Charter was developed by residents over its first six meetings. Through extensive discussions, residents were able to determine the objectives, roles and responsibilities, participation requirements, membership, decision-making, and meeting structure. The full Charter can be found in Appendix A of this Plan.

3.3.1. Committee Objectives

The Lost Hills Local Community Steering Committee (LCSC) is an advisory body guiding the development of the Community Air Monitoring Plan (Monitoring Plan) and the Local Community Emission Reduction Plan (L-CERP). The Committee works in partnership with the Central California Asthma Collaborative (CCAC), the Central California Environmental Justice Network (CCEJN), the California Air Resources Board (CARB), and Clean Water Fund (CWF), and community leaders to ensuring that community priorities are integrated into local and state air quality planning efforts.

The first objective of the LCSC is to identify and prioritize air pollution sources that most significantly impact the health and well-being of Lost Hills residents and the surrounding region. This includes evaluating pollution sources within community boundaries as well as those located at reasonable distances outside the community that contribute to cumulative exposure.

The second objective of the LCSC is to explore and recommend feasible emission reduction strategies and air quality improvement measures that reflect both technical data and lived community experience.

As part of this process, the LSCS will develop partnerships with stakeholders and other community related groups and programs.

To ensure meaningful participation and reduce barriers to engagement, the LCSC established a formal Charter outlining inclusive governance practices. Meetings are conducted in both virtual and in-person formats to maximize accessibility, and all meetings are publicly open. Recognizing the linguistic needs of the community, meetings are held primarily in Spanish, with real-time English interpretation provided to ensure full participation for all attendees. Meeting schedules, locations, agendas, and discussion topics are publicly shared in advance through multiple communication channels to support transparency and informed participation.

3.4 Lost Hills Community Webpage

The Community webpage for this project can be accessed with the following link: https://comitelosthills.org. The webpage is regularly updated for community members and includes information about upcoming meetings, meeting materials (flyers, agendas, presentations, handouts), resources, and maps.

4. Understanding the Community

4.1 Community Boundary

After developing an understanding of the ambient air quality, sources of pollution, and lived experience, Lost Hills residents began developing the Lost Hills Community Boundary. This began with mapping exercises and discussions at the LCSC meetings and included developing a summary of the work current community leaders had already accomplished in Lost Hills. Each community member identified key areas they wanted included and drew out their ideal Boundary. After several discussions and comparing maps, a master draft map was created. Residents were adamant about including the smaller nearby communities. This included the trailer park North of Lost Hills, Blackwell Corner to the west, and the community along the Lerdo Hwy to the South. Additionally, they wanted to include industries with a history in the community, which is why they made sure the boundary also included The Wonderful Co., the Lost Hills Oilfields, and the Business sector along Highway 5.

Initially, residents wanted to include the new Carbon Capture Project, Terra Vault, being developed South-West of the community; however, since the project was still in its initial stages of development, it was decided to

exclude the site but keep an eye on data from the project. The LCSC remains concerned with the lack of sufficient emergency protocols, protections and lack of supportive data to justify its construction. After several meetings of thorough discussion, residents finalized the Community Boundary in November 2024.

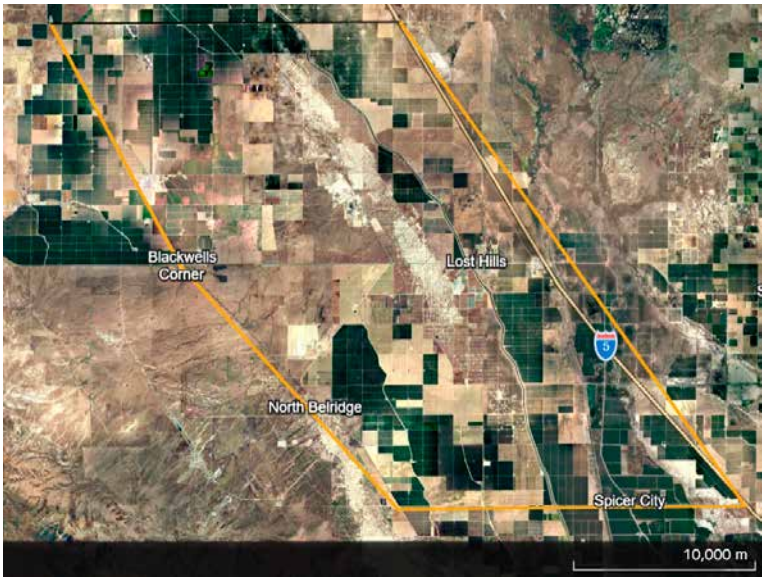

Figure 5: Google Earth visualization of LCSC-established Lost Hills Community Map Boundary. Google Earth, 2026.

4.2 LCERP: Lost Hills Community Profile

Lost Hills, a small, predominantly Hispanic community in Kern County, exemplifies the need for this support. Home to approximately 2,370 residents—over 97% of whom identify as Hispanic or Latino—Lost Hills faces disproportionately high exposure to air pollution. Local oil and gas operations contribute significant levels of volatile organic compounds (VOCs), compounding the Central Valley's longstanding air quality challenges. Data from 2015–2019 show consistently harmful levels of ozone and fine particulate matter (PM2.5) at monitoring sites in Kern County, correlating with an increase in unhealthy air days and elevated health risks. The two largest industries in Lost Hills are corporate agriculture and large-scale oil and gas production. The Lost Hills Community includes one public park and 2 school districts (Lost Hills Unified School District and the Wonderful Prep Academy).

Lost Hills (Census Tract 6029004500) ranks among the most overburdened communities in California according to CalEnviroScreen 4.0, with an overall percentile score of 86, meaning it experiences greater combined environmental and social stress than 86% of census tracts statewide. The community faces especially high pollution burdens, ranking in the 91st percentile, driven by extreme drinking water contamination (99th percentile), pesticide exposure (86th percentile), groundwater threats (96th percentile), and solid waste impacts (96th percentile). Socioeconomic vulnerability is also severe, with Lost Hills ranking at or near the highest levels in California for linguistic isolation (100th percentile), educational disadvantage (99th percentile), and poverty (96th percentile). While some indicators such as traffic and diesel particulate matter rank lower, these do not offset the cumulative impacts of environmental hazards and social disadvantage. Overall, the data show that Lost Hills is one of California's most environmentally and socioeconomically burdened communities, highlighting significant environmental justice concerns.

Entrance to Lost Hills Park in Lost Hills. Source: Clean Water Fund.

Features of interest in this community are the two school districts, The Lost Hills Unified School District and The Wonderful Preparatory Academy, which both provide schooling from K-9, after which students attend Wasco High School. There is one community park, Lost Hill Park, with various activities for children and seniors. The community also has a US Post Office and the Lost Hills Utilities District, which provides water and sewer services to the community.

Category of Industry/Employment	# of People Employed
Oil and Gas; Agriculture, Forestry, Fishing & Hunting	387
Retail Trade	93
Accommodation & Food Services	53

Figure 6: Number of People Employed by Industry in Lost Hills, California

Lost Hill is a rural community surrounded by heavy industrial oil and gas extraction. The Lost Hills oilfield is one of the largest oil fields in the state and is operated by Chevron, Aera Energy, and California Resources Corporation, among others. Lost Hills is also surrounded by industrial monocrop agriculture, mainly operated by The Wonderful Company, a large-scale tree nut company. Lost Hills is divided by two major roadways, Interstate 5 and State Route 46. These major roadways are concentrated with heavy on-road traffic notorious for heavy diesel pollution. Other major pollution sources bordering the Lost Hills community include a hazardous waste facility, gas plant and a nut processing facility.

Service groups and non-profit organizations working in the community include the Center for Race Poverty and Environment, Central California Environmental Justice Network, Clean Water Action/Clean Water Fund, Central California Asthma Collaborative, United Farmworkers, Community Advisory Board, Lost Hills Family Resources Center and Comité Lost Hills En Acción.

4.3 Technical Assessment to Understand Community Pollution Impacts

A thorough Technical Assessment of local community pollution was developed and presented by CARB and provides a background on the community. The Technical Assessment identifies sensitive receptors in Lost Hills, as well as key pollution sources *(Figure 7)*. CARB also developed an emissions inventory estimate to quantify mobile, stationary and areawide pollutants in the community, using existing data sources from CARB's California Emissions Inventory Data Analysis and Reporting Systems (CEIDARS). The inventory focuses on criteria pollutants and toxic contaminants. In order to compare the values, the analysis uses cancer-weighted

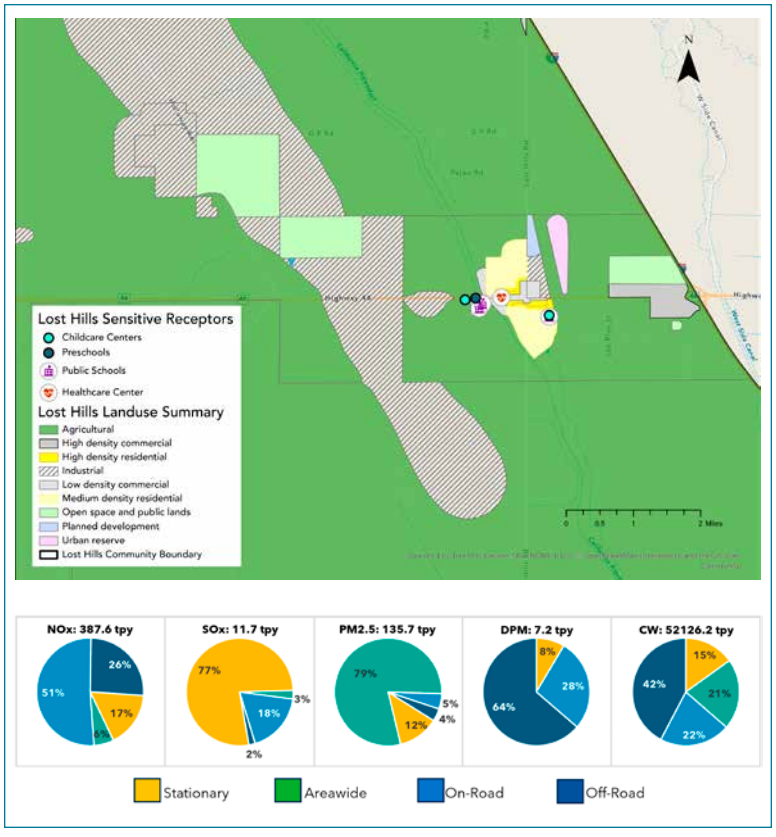

Figure 7: Source contribution of criteria and toxic emissions within Lost Hills (2023 Estimated Emissions in tons per year, tpy) CARB Technical Assessment 2025

emissions. This does not indicate the level of harm, but is a tool used for screening and prioritization, to see which chemicals should be subjected to a more detailed health assessment.

The report also provides an estimate of the top mobile, stationary and regional sources for the top pollutants. For Lost Hills the top mobile sources are heavy-duty trucks, farm equipment and off-road equipment. The top stationary sources are food and agricultural processing, oil and gas production, coatings and related process solvents, and landfills. The top regional pollution sources are managed burning and disposal, farming operations and fugitive windblown dust. The full technical report can be found in Appendix B.

4.4 Past and current monitoring efforts

Lost Hills has a decade long history of community members taking active and meaningful efforts to address the air quality issues impacting their community.

4.4.1 In 2015 Clean Water Fund and Earthworks published Californians at Risk: An Analysis of Health Threats From Oil and Gas Pollution in Two Communities, in order to understand the health and environmental impacts of adjacent oil and gas production on the communities of Lost Hills in Kern County and Upper Ojai in Ventura County. Working in collaboration with residents of each community, the study found several health harming emissions associated with oil and gas production, along with a great number of community residents suffering from health effects associated with those contaminants. One outcome of this study was the 2016 formation of Comité Lost Hills En Acción (CLHEA), which was formed by Lost Hills residents for Lost Hills Residents to address the environmental and health issues impacting their community through organizing and advocacy.

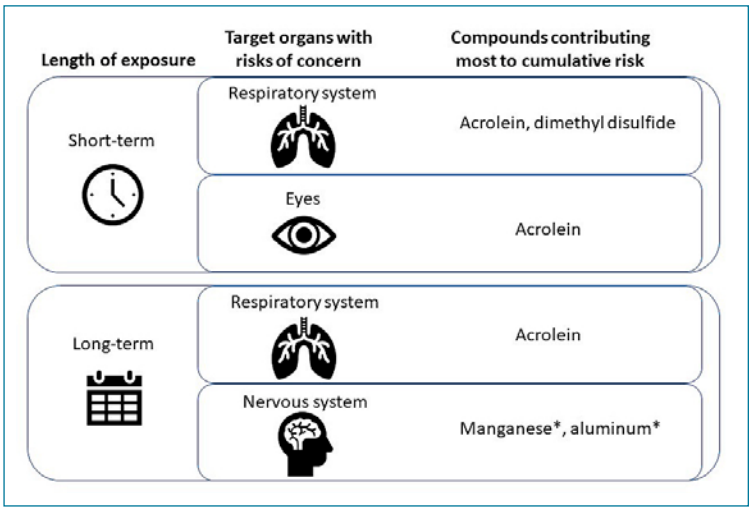

Figure 8: Summary of cumulative exposures and non-cancer risk results in Lost Hills, California. SNAPS report, 2025

4.4.2 The establishment of CLHEA and its partnership with Clean Water Fund allowed Lost Hills to win its first Community Air Grant, allowing the community to develop and deploy a community air monitoring plan and system. The community, working with technical experts from Blue Tomorrow, developed a Community Air Monitoring Plan (CAMP) to be implemented by Blue Tomorrow. Community members identified key locations for placement of community air monitors, including sensitive receptors near or at the elementary schools. Data collected was provided in real time to residents via a website and at community meetings. Using this data residents were able to increase their knowledge and awareness of the local air quality and adjust their days to reduce

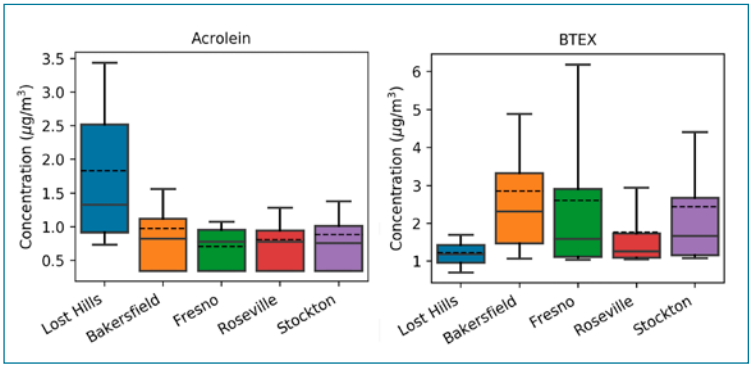

Figure 9: Concentrations of Acrolein and BTEX in Lost Hills, California from 2019 to 2020. Additional monitoring data taken from other monitoring sites in the Central Valley from 2016 to 2019. SNAPS report, 2025

exposure. The data was provided to IQ Air at the conclusion of the project.

4.4.3 SNAPS (the Study of Neighborhood Air near Petroleum Sources) is a high level mobile and stationary air monitoring project conducted by CARB. After a carefully vetted process, Lost Hills was chosen as the first community in California to host this project in 2019. The monitoring effort used several high-tech air monitoring tools that included the speciation of air samples and the constant and consistent monitoring of several contaminants associated with oil and gas emissions. In 2024, The data was published in a draft report which was finalized in October 2025. Both the draft and final reports can be found on the CARB website.

SNAPS monitoring Kick-off in Lost Hills with Residents provided by CARB. Source: Aclima Community Air Monitoring Plan

SNAPS monitoring results showed high levels of Acrolein. Acrolein was found nearly 2 times higher than in Bakersfield, Fresno, Roseville and Stockton. In Lost Hills Acrolein was found at levels that can cause short-term impacts on the eyes and respiratory system and long-term impacts on the nervous and respiratory systems. Acrolein can come from many sources including combustion processes (e.g., automobile and diesel exhaust), agriculture, photochemical reactions in the atmosphere, plants, and oil field operations. All of these precursors are found in Lost Hills.

OEHHA is now developing a Risk Assessment for Acrolein as a carcinogen, and information from that assessment will be incorporated into the SNAPS report.

4.4.4. Aclima Inc. has been contracted by CARB to continue Acrolein monitoring as part of its Statewide Mobile Monitoring Initiative (SMMI) in AB 617 Consistently Nominated Communities (CNCs). This project measures various Toxic Air Contaminants (TACs) that impact health. Community members participated in meetings to determine which areas of concern should be monitored by this project. The final report will be released no later than May 2026.

4.4.5. As part of the current Community Air Grant (CAG 4) to develop a Local Community Emissions Reduction Plan (LCERP), the LCSC has expanded their understanding of the ambient air quality in Lost Hills through training provided by local community organizations (Central California Asthma Collaborative, Central California Environmental Justice Network) and agencies (Valley Air District (VAD) and CARB). These organizations were also funded to conduct air monitoring in Lost Hills.

The community air monitoring plan for this project included daily monitoring of community air quality through CCAC's SJVAir.com and via notifications and alerts from the Valley Air District. Additionally, 2 monitoring tours with CCEJN using FLIR Cameras in which several incidents were identified and reported to the Valley Air District and the KEEN/ IVAN Network (kernreport.org). Summa canisters were also used in the monitoring efforts.

As part of this monitoring effort the LCSC members were trained in how to make reports through the KEEN IVAN Network with CCEJN and through the Valley Air District. In addition, CCEJN provided training in the

collection of grab samples.

CCEJN conducted its first FLIR monitoring tour in January of 2025.

Results of FLIR monitoring

Tour 1 – January 2025

Description: On January 28th, 2025, CCEJN and CWF staff inspected an oil storage tank located off of Paso Robles Highway near Lost Hills. This inspection was triggered by a report of a super emitter event posted on the Environmental Protection Agency's Super Emitter program. Super emitter events are classified as a release of methane at a rate of 100 kilograms or more per hour.

The inspection team utilized an Aeris Pico methane monitor and a FLIR camera to inspect the tank. From this inspection, no visible emissions or levels of methane higher than background levels were detected.

Tour 2 – September 2025

Description: On September 26th, 2025, CCEJN and CWF inspected the Lost Hills area and heavy oil production areas in west Kern. On Paso Robles highway (State Route 46), a mile and a half west of Lost Hills, a methane reading of 15 parts per million was detected by an Aeris Pico methane monitor. This is 7 times higher than the background reading of methane in the atmosphere. Regulators were contacted, but were unable to identify the origin of the fugitive emission of methane.

During this inspection CCEJN staff reported three oil wells with liquid leaks. One well had a pool of water and oil with a dimension of about 10 feet by 15 feet. The spills were reported by CCEJN staff and cleanup was conducted by the company.

Unburnt gases were also identified at steam generators near the area. CCEJN Staff reported the findings, but VAD regulators were unable to confirm the exceedance.

Finally, a leak from a tank farm was detected with an Aeris Pico methane monitor. A concentration of 77 parts per million was detected. This is 30 times the background level of methane in the atmosphere. Regulators were unable to identify a leak at the tank farm.

Figure 10: FLIR monitoring outlined route in yellow, January 2025, CCEJN.

The latter two incidents illustrate a concern expressed by the community members; the time between their reporting of a problem and VAD's investigation usually means that the problem has dissipated before inspectors arrive.

5. Strategies to Reduce the Cumulative Exposure Burden in Lost Hills

The Community Emissions Reduction Plan (CERP) for the region is grounded in longstanding environmental justice concerns driven by a combination of agricultural, industrial, and transportation-related pollution sources. Residents face disproportionate exposure to pesticides, emissions from State Route 65, heavy truck traffic, agricultural burning (now banned), dust from farming and unpaved roads, and emissions from wood-burning stoves. Additional risks stem from agricultural processing facility expansion, water contamination, and exposure to toxic air contaminants such as acrolein. These cumulative burdens have contributed to persistent air quality and public health challenges, particularly for vulnerable populations.

To address these concerns, the LCERP prioritizes community-driven strategies that reduce exposure at the source while providing immediate health protections. Proposed solutions include installing vegetative barriers to reduce pesticide drift and roadway emissions, strengthening pesticide safety practices, and developing alternative truck routes to divert heavy-duty vehicles away from residential areas. Investments in electric vehicle infrastructure aim to reduce transportation-related emissions, while air filtration programs and wood stove replacement initiatives will help lower indoor air pollution. Dust mitigation measures will target emissions from agricultural operations, roadways, and open land to reduce particulate matter exposure.

Stationary sources of pollution remain a critical focus of the plan. Major facilities such as The Wonderful Company, Chevron, Aera Energy, and California Resources Corporation (CRC) contribute to localized emissions and require targeted monitoring and mitigation. The LCERP emphasizes accountability and collaboration with these operators to reduce emissions that impact surrounding communities.

Policy recommendations supporting the plan include enforceable dust reduction measures, land-use and emissions standards for warehouses, and stronger regulation of methane emissions. The use of advanced technologies, such as camera-based methane detection systems, is recommended to improve transparency, monitoring, and rapid response to leaks from oil and gas infrastructure.

Implementation of the LCERP will be supported through available funding and technical resources, including the Carl Moyer Program, Agricultural Innovation Zones, and incentives for sustainable agricultural practices. Additional opportunities exist through Greenhouse Gas Reduction Fund (GGRF) investments to advance clean transportation, clean energy, and emissions reduction projects. Together, these strategies form a comprehensive approach to reducing emissions, improving air quality, and advancing environmental justice for the community.

The Lost Hills LCSC members participated in a facilitated exercise to identify and prioritize their air pollution sources of concern. Participants were asked to share their thoughts regarding air pollution sources which they believed impacted their community the most, or was of most concern to the individual or entity they represented.

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Food Processing & Industrial Operations	The LCSC requests the Air District and CARB to provide a list of equipment and mobile sources of pollution that receive permits from the District, a schedule of inspections, and a list of violations. Additionally the LCSC requested an increase in inspections and enforcement on Stationary Sources within the community boundary.	• Valley Air District • California Air Resources Board	High
	The LCSC requests the CARB Mobile Roadside Source Inspection Team to conduct roadside inspections on the facility's local route and the locations where residents have noticed chronic idling.	• California Air Resources Board • Community Groups and Allies	Medium
Fugitive Dust	The LCSC is calling on the Air District to reduce fugitive dust emissions from agricultural operations through increased disclosure and access to incentives.	• Valley Air District • California Air Resources Board • Agricultural Commissioner	Medium
	LCSC is calling on the Air District to replace four pistachio or almond harvesters in Lost Hills with cleaner (zero- or near-zero-emission) technology and for more funding to be offered for electric vehicle technologies.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Heavy-Duty Program Agricultural Tractors http://valleyair.org/grants/documents/tractor/Guidelines.pdf	Medium
	The LCSC requests that Kern County fund more sidewalks and street paving projects to reduce dust from traffic on unpaved areas.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors	High
	The LCSC is calling on the Air District to reduce particulate matter exposure in the community by developing a Vegetative Barrier Plan.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors	Medium
	LCSC will develop an Urban Greening Plan in partnership with governing agencies .	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors	Medium
	Wood Burning Alternative e LCSC requests the Air District to organize a workshop in Lost Hills to educate the local farming community on open burning regulations, the smoke management program, and incentives to reduce burning through other methods.	• Valley Air District • Kern Board of Supervisors • Community partners and allies	High
	The LCSC will advocate for the prioritization of Public Vehicle Replacement.	• Valley Air District • California Air Resources Board • Valley Can • Kern Board of Supervisors	Medium

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Fugitive Dust (cont.)	The LCSC requests that Kern County fund more sidewalks and street paving projects to reduce dust from traffic on unpaved areas.	• Valley Air District • CalTrans • Kern Board of Supervisors	High
	The LCSC is also requesting a workshop on the fugitive dust rule and its application in agricultural and construction operations and dust control strategies.	• Valley Air District • Agricultural Commissioner	High
Heavy-duty Mobile Sources (Diesel)	The LCSC calls for increased disclosure and funding for zero- and near-zero emission technologies. The Air District should encourage small and large business owners in Lost Hills to participate and promote all-electric, zero-emission technology.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors • The Heavy-Duty Truck Replacement Program: http://valleyair.org/grants/truckreplacement.htm. • Volkswagen Mitigation Trust: http://vwbusmoney.valleyair.org/ • Program for Heavy-Duty Alternative Fuel Infrastructure: https://www.valleyair.org/grants/Clean-Vehicle-Fueling-InfrastructureProgram.htm	High
Diesel emissions from trucks, buses, and other vehicles	The LCSC will be working to address the health and safety impacts of diesel pollution in Lost Hills, California.	• Valley Air District • CalTrans • The Heavy-Duty Truck Replacement Program: http://valleyair.org/grants/truckreplacement.htm. • Volkswagen Mitigation Trust: http://vwbusmoney.valleyair.org/ • Program for Heavy-Duty Alternative Fuel Infrastructure: https://www.valleyair.org/grants/Clean-Vehicle-Fueling-InfrastructureProgram.htm	Medium
	The LCSC request the prioritization of Lost Hills School Districts for Electric bus replacement funding	• Valley Air District • Lost Hills School Districts • Kern High School District	High
	The LCSC aims to understand existing rules, incentives, and enforcement strategies for trucks, buses, and other highway vehicles.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors	Medium

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Diesel emissions from trucks, buses, & other vehicles (cont.)	The LCSC plans to develop a list of eligible vehicles and set targets for incentive programs.	• Valley Air District • Valley Can	Medium
	The LCSC calls on CARB and Kern County to join efforts to place no idling signs and conduct inspections in the areas where chronic idling is occurring.	• Valley Air District • California Air Resources Board • CalTrans • Kern Board of Supervisors	High
	The LCSC will also organize actions to enforce roadside regulations, raise awareness about diesel pollution, and study truck routes near residential areas.	• Valley Air District	High
Off-Highway Diesel Emissions	The LCSC requests that the Air District notify them whenever stationery sources apply for permits to build or modify their operations.	• Valley Air District	Medium
	The LCSC is interested in learning more about resources and opportunities to upgrade small sources such as water pump motors, etc.	• Valley Air District	Medium
	Many operations use diesel generators for emergencies to keep their operations running, these could be replaced by solar microgrids and batteries. The LCSC requests a list of permits for diesel generators in the community.	• Valley Air District	High
Toxic Emissions	The LCSC requests the Air District to make Public Records Requests more accessible to the community and train residents on how to submit PRR so they can understand what types of operations are permitted in their community.	• Valley Air District • Community Partners	Medium
	The LCSC will develop a strategy plan to educate community members and youth on ambient air quality and related resources.	• Valley Air District • California Air Resources Board • Community Partners and Allies	High
	The LCSC requests the Air District to organize a workshop to educate the local community on open burning regulations, the smoke management program, and incentives to reduce burning through other methods . This would include education on Illegal wood burning, residential burning and burning of residential waste	• Valley Air District	High
Pesticides	Resident Participation in the Development of the State's Pre-Pesticide Notification System by providing feedback on the pilot conducted in Kern County and recommendations for improvement.	• Valley Air District • Department of Pesticide Regulation	High

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Pesticides (cont.)	The LCSC requests the Department of Pesticide Regulation (DPR) to develop a robust State Pesticide Notification System Outreach Strategy.	• Department of Pesticide Regulation	High
	The LCSC requests DPR to implement in Lost Hills at least one pilot project based on the strategies included in the California Roadmap for Integrated Pest Management that will help local farmers reduce the use of pesticides.	• Department of Pesticide Regulation	High
	The LCSC requests DPR and the County Agricultural Commissioner to establish safety zones around the local schools.	• Department of Pesticide Regulation	High
	LCSC will continue partnership efforts with research institutions to investigate and document the Health Impacts of Pesticides.	• Department of Pesticide Regulation	High
	Identification of funding and technical experts to implement these strategies	• Department of Pesticide Regulation	High
	The LCSC requests DPR and the County Agricultural Commissioner to improve compliance with existing regulations and laws.	• Department of Pesticide Regulation	High
	The LCSC requests DPR and the County Ag Commissioner to organize workshops to educate residents about how to live safely near fields where and when pesticides are applied including a communication and outreach plan to reach community members where they are at. Outreach should include the following venues: schools, clubs, small businesses, chambers, public spaces, and places of worship.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors • Department of Pesticide Regulation	High
Reduction of Oil and Gas production emissions	The LCSC calls for increased disclosure and funding for zero- and near-zero emission technologies around oil and gas production operations to reduce NOx and PM2.5 emissions.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors • Department of Pesticide Regulation	Medium
	The LCSC requests local pollution control agencies to require oilfield steam generators to have continuous emissions monitoring systems installed, and to establish limits for aldehyde emissions.	• Valley Air District • California Air Resources Board • California Office of Environmental Health Hazard Assessment	Medium

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Reduction of Oil and Gas production emissions (cont.)	The LCSC requests the installation of Emission monitoring systems on natural gas flares and that VAD conduct more unnoticed inspections to identify emissions spikes that affect the community.	• Valley Air District	Medium
	The LCSC requests that vapor recovery be required in oilfield tanks and that a process for prompt remediation of leaks be developed.	• Valley Air District	Medium
	The LSCS requests that air monitors be installed along the eastern edge of the Lost Hills oil fields.	• TBD	Medium
Burning and Wildfire exposure reduction	LCSC requests the Air District to organize a workshop for Lost Hills to educate the local farming community on open burning regulations, the smoke management program, and incentives to redce burning through other methods.	• Valley Air District • Agricultural Commissioner • Kern Board of Supervisors	Medium
	The LCSC requests that the "Clean Air Rooms" program to provide free residential air filtration units be opened to residents and that a community outreach campaign be developed through schools and in-person enrollment events.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • Community Partners and Allies	High
Climate and Energy Resilience	Electrify homes by switching to high-efficiency appliances, reducing the use of fossil fuels such as natural gas and propane combined with installing solar panels with batteries.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • California Public Utilities Commission • Pacific Gas and Electric Company • GRID Alternatives • SOMAH Nonprofit Administrative Partnership (SNAP)	High
	Seek funding for financial incentives for the installation of solar photovoltaic (PV) systems, or for preferred rates for green energy in the community.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • California Public Utilities Commission • Pacific Gas and Electric Company • GRID Alternatives • SOMAH Nonprofit Administrative Partnership (SNAP)	High

Source of Contamination	**Proposed Strategy**	**Available resources**	**Community priority** *(High or Medium)*
Climate and Energy Resilience (cont.)	Increase the number and availability of zero-emission electric vehicles for low-income families and provide public charging infrastructure.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • California Public Utilities Commission • Pacific Gas and Electric Company • GRID Alternatives • SOMAH Nonprofit Administrative Partnership (SNAP)	High
	The LCSC will develop a low cost zero emission Car Share program	• Valley Air District • California Air Resources Board • Kern Board of Supervisors	High
	Install public EV charging infrastructures to help our community support EV use.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • Community Partners and Allies • California Public Utilities Commission • Pacific Gas and Electric Company • GRID Alternatives • SOMAH Nonprofit Administrative Partnership (SNAP)	High
	The LCSC will create a plan for Educational/ Mechanical training on electric vehicles. This strategy is to provide incentive funding to develop and advance the education of personnel on the mechanics, safe operation and maintenance of alternative fuel vehicles and infrastructure.	• Valley Air District • California Air Resources Board • Kern Board of Supervisors • Community College District • Kern Community Colleges District	Medium
	The LCSC will create a plan to reduce the impact of air pollution on children at schools and daycare facilities by upgrading the Air Filtration system and reducing particulate matter.	• Valley Air District • Community Partners and Allies • Lost Hills School Districts	High
	The LCSC will work to create a plan for a climate resilience hub where families can seek shelter, services, and safety during extreme weather events and emergencies.	• Valley Air District • California Air Resources Board • Agricultural Commissioner • Kern Board of Supervisors • Department of Pesticide Regulation • Community Partners and Allies	High

6. Next Steps & Recommendations

Now that community members have identified their priorities for reducing local emissions, the next steps for the LSCS are to:

1. Identify strategies that can be implemented as part of the CAG 5 grant for Lost Hills, such as continued monitoring to identify air quality spikes and development of a community health assessment.
2. Work with state and local agencies to identify programs and funding sources to implement priorities. The LSCS will work to identify resources to implement identified priority strategies.
3. Identify needed resources and/or policy changes that can advance strategies that currently lack resources or data; develop concrete steps to move these strategies forward.
4. Identify barriers to timely implementation of high priority strategies and develop solutions and partnerships that can move these strategies forward.
5. Continue monitoring to build a record of air quality data and trends. The LCSC will continue to work with CCAC and CCEJN to ensure consistent air quality monitoring in Lost Hills.
6. Use Aclima mobile monitoring results to confirm information about key pollution sources within the community, particularly the source or sources of elevated acrolein levels. Follow up with identified sources on potential mitigation or remediation steps.
7. Conduct a community health assessment to identify community health impacts and concerns. This has been funded as part of the CAG 5 grant and will be undertaken in spring 2026, with results available in late summer/early fall.
8. Develop closer relationships between community members and decision-makers. As part of the CAG 5 grants, community members will be funded to attend meetings and meet with decision-makers both locally and in Sacramento.
9. Establish working relationships with VAD and other regulatory and funding agencies in order to highlight community concerns and reach agreement on how those concerns might be addressed.

Appendix A

Lost Hills Community Steering Committee Charter

1. Committee Objectives

The Lost Hills Community Steering Committee is a special committee responsible for advising the development of the Community Air Monitoring Plan (Monitoring Plan) and the Local Community Emission Reduction Program (L-CERP) in partnership with CCAC, CWAF, the California Air Resources Board, and CCAC. Committee objectives include identifying areas of concern regarding air pollution sources that impact the community, examining within the community boundaries and at reasonable distances outside of them, and exploring potential emission reductions and air quality improvements.

2. Roles and Responsibilities

Community Steering Committee Members

The Steering Committee will consist of community stakeholders, the majority of whom must be community residents. See Attachment A, AB 617 Community Steering Committee Selection Criteria, for more details on Steering Committee membership requirements.

Committee members will collaborate to address:

- Community issues and contributing sources to develop a shared understanding of the community's air pollution challenge;
- Who has the responsibility and authority to address these issues;
- Proposed strategies for community emissions reduction programs;
- Mechanisms for engaging with other agencies;
- Approaches for additional community outreach;
- Other topics of interest to the committee.

Member Participation

Steering committee members (or designated alternates) are expected to attend all committee meetings in their entirety throughout the year before the L-CERP adoption. If the primary member is unable to attend, the designated alternate on the steering committee roster may attend in their absence and deliberate on their behalf. The primary member is responsible for working with CWAF/CCAC to ensure that the alternate is kept informed of the committee's process.

To encourage active participation, if a primary member or their alternate has not attended three consecutive steering committee meetings, their membership may be revoked.

Facilitator

A professional and impartial facilitator will be used for moderating the steering committee meetings and helping the committee reach a consensus on issues. The L-CSC will be the body that selects the facilitator.

3. Standard Committee Meeting Procedures

Deliberation and Consensus

A professional and impartial facilitator will support the steering committee in overall organization, order, and focus of the meetings, resolve conflicts, and help reach consensus to ensure the goals and objectives of this

charter are met. Achieving full consensus of the steering committee may not always be possible. However, reasonable efforts will be made to capture all perspectives expressed in meeting minutes, committee documents, and related reports, including the final LCERP.

Open Meetings

All meetings are open to the general public and will provide a formal opportunity for community members to provide their perspectives on the development of the Monitoring Plan and LCERP. Stakeholder input is welcome and encouraged.

Meeting Schedule and Agendas

Upon consensus agreement of the committee, meeting schedules may be adjusted with adequate advance notice. Agendas and agenda topics will be informed by committee input, developed by CWAF and/or CCAC, and will include the time, date, duration, location, and topics to be discussed.

Subcommittees

Members who wish to be further involved may choose to participate in ad-hoc subcommittees when necessary, to discuss topics that can subsequently feed the full committee's discussions. Subcommittees will meet as needed and report back their findings and/or recommendations at the next full steering committee meeting.

4. Accessibility/Accommodation

Steering committee meetings and other events associated with the committee must be held at facilities that accommodate members covered by the Americans with Disabilities Act (ADA). Language interpretation services will be provided in Spanish at all meetings, and as needed in other languages with a minimum 48-hour advance request.

Attachment A: AB 617 Community Steering Committee Selection Criteria

The selection criteria for members of the Lost Hills Community Steering Committee are as follows:

- Community Representation: The majority of members must be residents of the Lost Hills community.
- Commitment to Air Quality Improvement: Members must have an interest and commitment to addressing local air pollution and environmental justice concerns.
- Diverse Stakeholder Participation: Membership will include representatives from different community sectors, including residents, business owners, educators, healthcare professionals, and local organizations.
- Regular Participation: Members must commit to attending scheduled meetings and actively participating in committee activities.
- Collaboration with CWAF/CCAC: Members will work alongside CWAF and CCAC to ensure community needs and concerns are effectively addressed.
- Disclosure of Conflicts of Interest: Members must disclose any potential conflicts of interest that may arise in their role within the committee.

These criteria aim to ensure a well-balanced and representative Steering Committee that effectively supports air quality improvement initiatives in the community.

Appendix B

California Air Resources Board
Community Air Protection Program

Lost Hills Local Community Emissions Reduction Plan Technical Report

Release Date: November 12, 2025

CALIFORNIA
AIR RESOURCES BOARD

Lost Hills Local Community Emissions Reduction Plan Technical Report

Contents

Lost Hills Local Community Emissions Reduction Plan Technical Report

Introduction

The California Air Resources Board (CARB or Board) established the Community Air Protection Program (*Program*) in July 2017 to implement Assembly Bill 617 (AB 617)[1]. The purpose of the Program is to reduce exposure to, and emissions of, criteria air pollutants and air toxic air contaminants and maximize health benefits and environmental equity goals in communities affected by a high cumulative exposure burden.

In 2023, CARB updated its statewide strategy, also known as *Blueprint 2.0*, for the Program to improve local air quality through collaboration with residents. A key goal of Blueprint 2.0 is to use Community Air Grants to build community capacity and support the development of Local Community Emissions Reduction Programs (L-CERPs). These L-CERPs are developed and implemented by community-based organizations or California Native American Tribes and are designed to reduce air pollution in specific areas. To support each L-CERP project, CARB will provide technical assistance through a dedicated CARB liaison, develop community profiles, and provide information, and opportunities throughout the course of the project.

Overview of Lost Hills

Lost Hills, California, is a small, rural community of 2,635 predominantly low-income, Spanish-speaking residents and faces a disproportionate burden of environmental pollution and socioeconomic hardship. The town is adjacent to, and downwind of, the Lost Hills Oilfield (sixth largest producer in California). It is located 42 miles west-northwest of Bakersfield. Lost Hills is an environmentally burdened, linguistically isolated, low-income community. According to CalEnviroScreen 4.0, Lost Hills is at 71st percentile for ozone exposure, the 52nd percentile for particulate matter less than 2.5 micron (PM2.5), and the 86th percentile for pesticides and the community is ranked at the 91st percentile for cumulative pollution burden. 98.7 percent of Lost Hills residents are Latino/a and the community ranks in the 96th percentile for poverty with 27 percent of its population living below the poverty line.[2]

There are a variety of pollution sources near the community, including *oil and gas facilities* from the Lost Hills Oil Field, agricultural activities, mobile sources from I-5 and SR 46, landfills, composting facilities, residential activities, local natural gas distribution and transmission pipelines in Lost Hills, and commercial services, such as gas stations and restaurants located east of the community.

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[1] Assembly Bill 617, Garcia, C., Chapter 136, Statutes of 2017, modified the California Health and Safety Code, amending § 40920.6, § 42400, and § 42402, and adding § 39607.1, § 40920.8, § 42411, § 42705.5, and § 44391.2.

[2] San Joaquin Valley APCD. October 19, 2022. Nomination letter for selection of Lost Hills as AB 617 community submitted to CARB.

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Need for L-CERP Support

The environmental stressors mentioned above, combined with the community's linguistic isolation and limited access to technical resources, underscore the need to develop and implement an L-CERP in Lost Hills. The L-CERP framework is uniquely suited to empower communities like Lost Hills to identify local air quality priorities, develop culturally relevant solutions, and build capacity for long-term environmental resilience. Through this grant, residents would gain the tools and support needed to advocate for cleaner air, healthier living conditions, and greater equity in environmental decision-making.

The linguistic isolation of Lost Hills, being primarily monolingual Spanish speakers, creates additional barriers to accessing public health information, participating in regulatory processes, and advocating for environmental justice. An L-CERP empowers the community to define its own air quality priorities, build local capacity, and implement culturally and linguistically appropriate solutions. Residents are provided with a platform to engage with air districts and state agencies in shaping policies that directly affect their health and environment.

Lost Hills illustrates the critical need and transformative potential that the L-CERP framework is designed to support. Partnering with communities that endure significant environmental burdens and possess resilient local insight can drive impactful change when provided with adequate resources and support.

Community Profile

Community Boundary

The Lost Hills Community Boundary is located within Kern County. It is a part of the San Joaquin Air Basin.

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Figure 1: Lost Hills Boundary

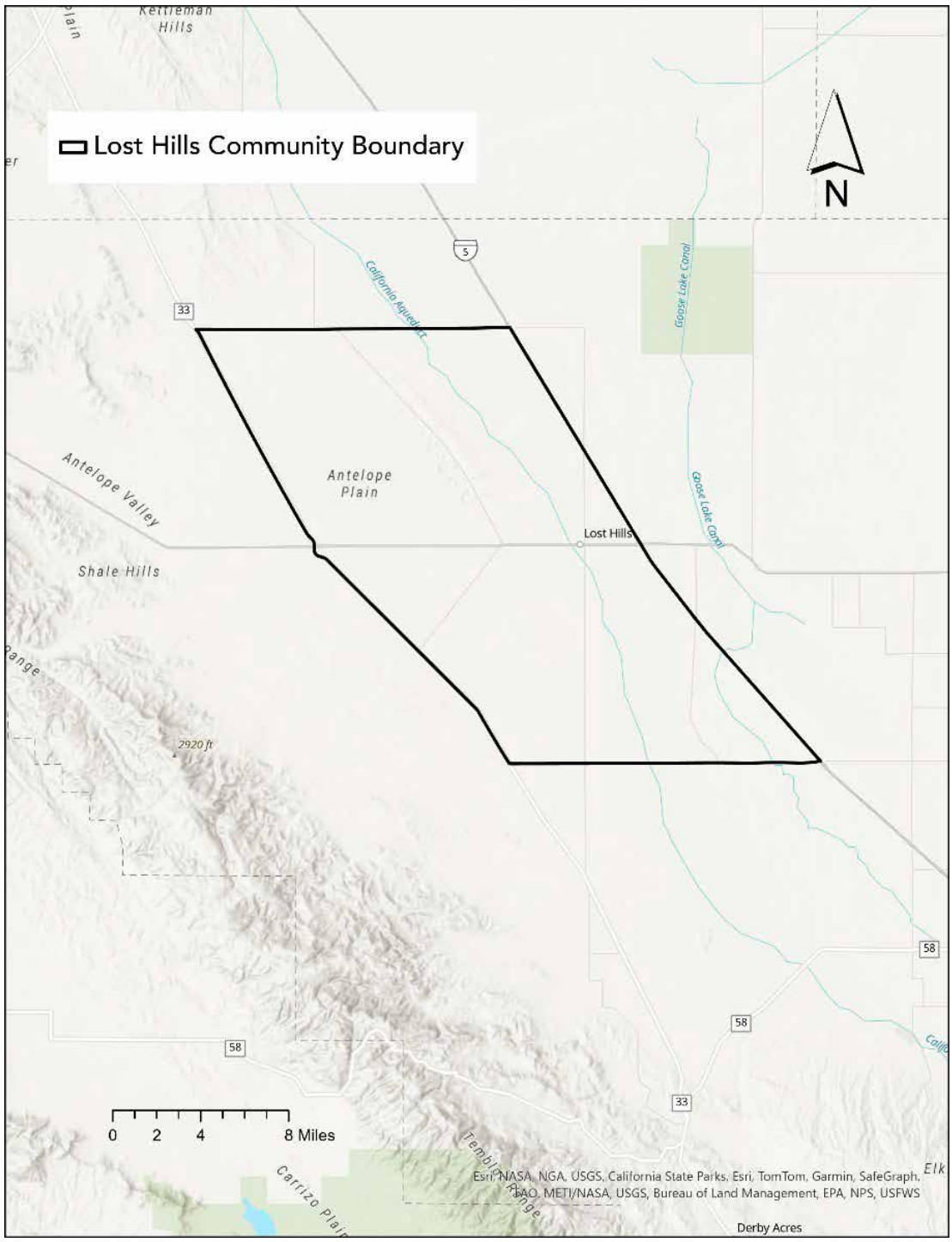

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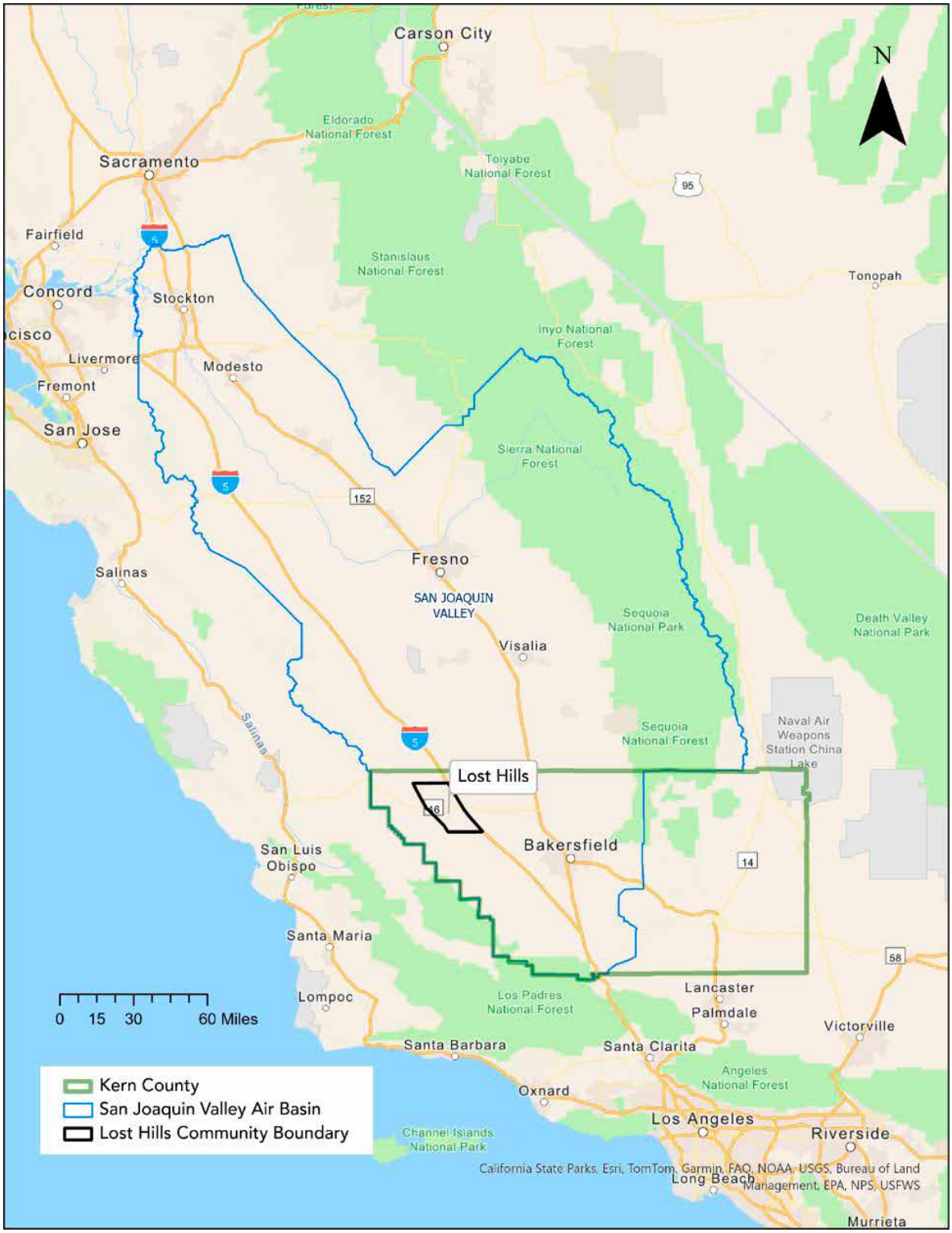
Figure 2: Lost Hills Boundary (Zoomed Out)



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Demographics

According to the U.S. Census Data[3], about 97 percent of workers are employed in private companies, with a heavy concentration of about 51 percent in agriculture, forestry, fishing and hunting, and mining industries in the Lost Hills area. This reflects the region's proximity to large-scale farming operations and its role in California's Central Valley agricultural economy. Majority of these workers, about 82 percent, reported driving alone as a means of transportation to work. These job patterns and self-reported driving habits underscore the community's economic dependence on industries that are themselves sources of environmental emissions, reinforcing the need for locally driven air quality solutions that protect both public health and economic stability.

Population Density

The community boundary falls within census tract 45 in Kern County. Census tract 45 has a population density of 4 per square mile. Figure 3 and Figure 4 provide population density and population by census tracts for the region. Figure 5 shows that the most populated area (sensitive receptors) is directly in front of the major industrial land use in the community (hashed area). Location coordinates of these sensitive receptors are available in Appendix C: Location of Sensitive Receptors.

[3] *ZCTA5 93249 - Census Bureau Profile*

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Figure 3: Population Density Map for Proposed Area

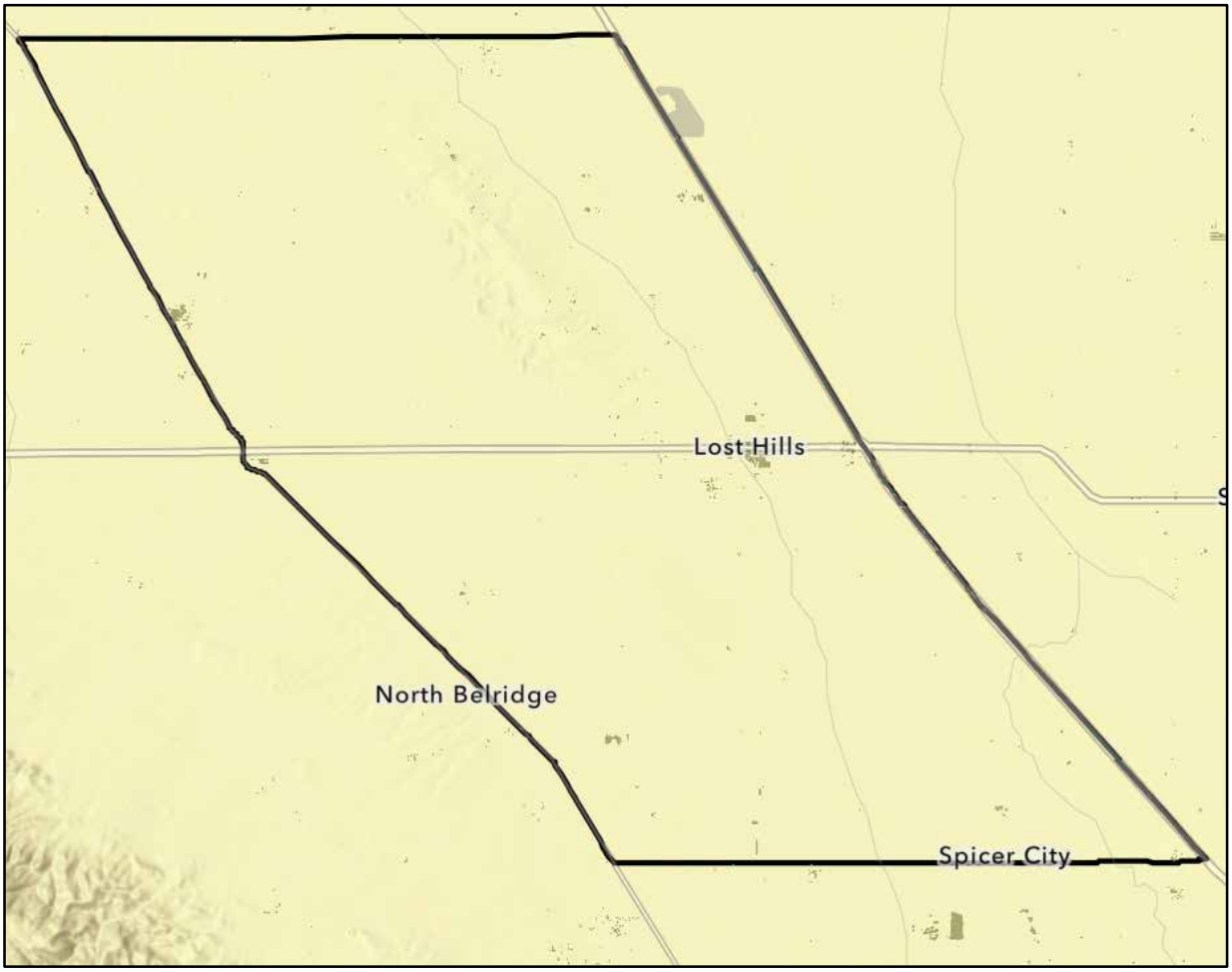

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Figure 4: Lost Hills Population Count

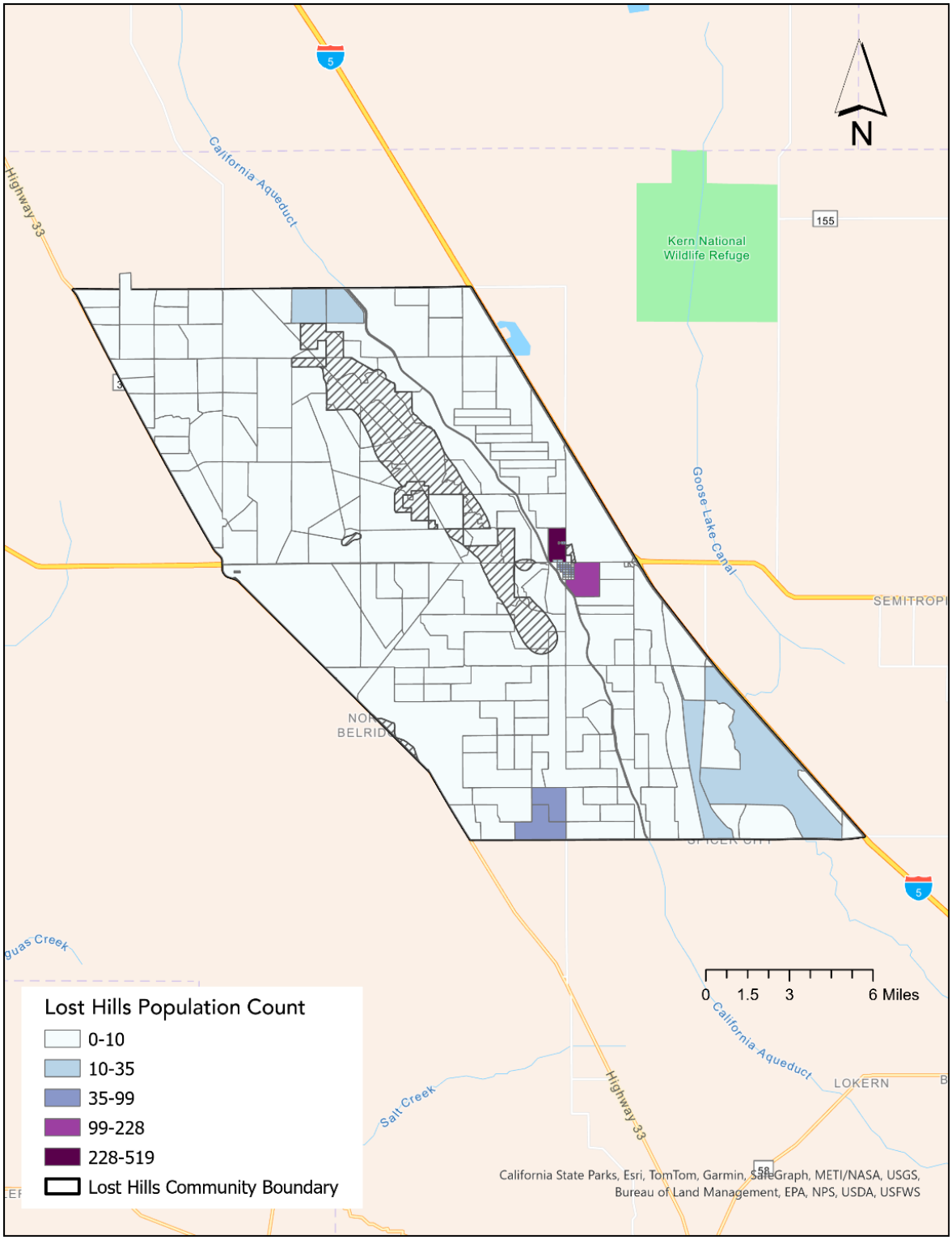

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Figure 5: Location of Sensitive Receptors

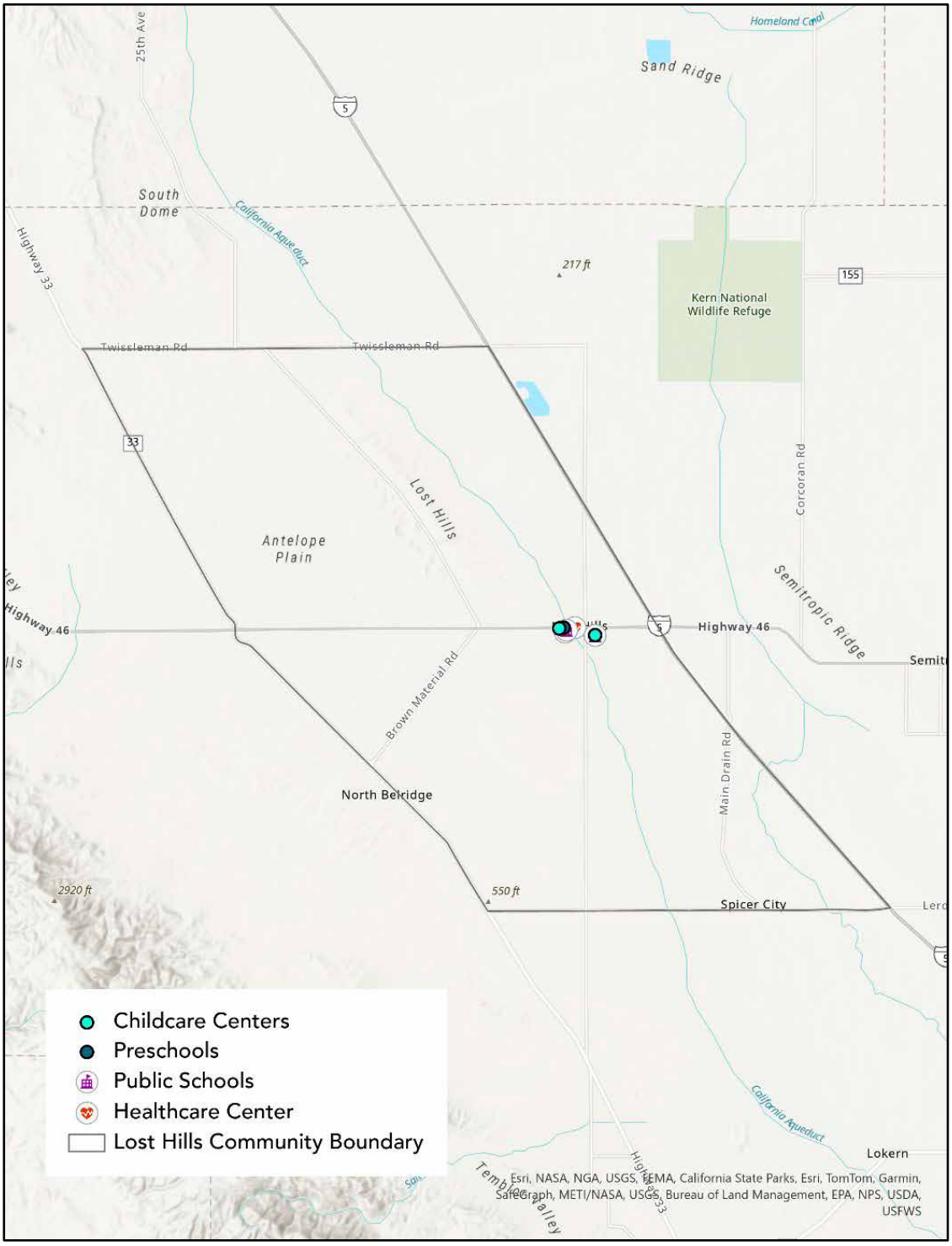

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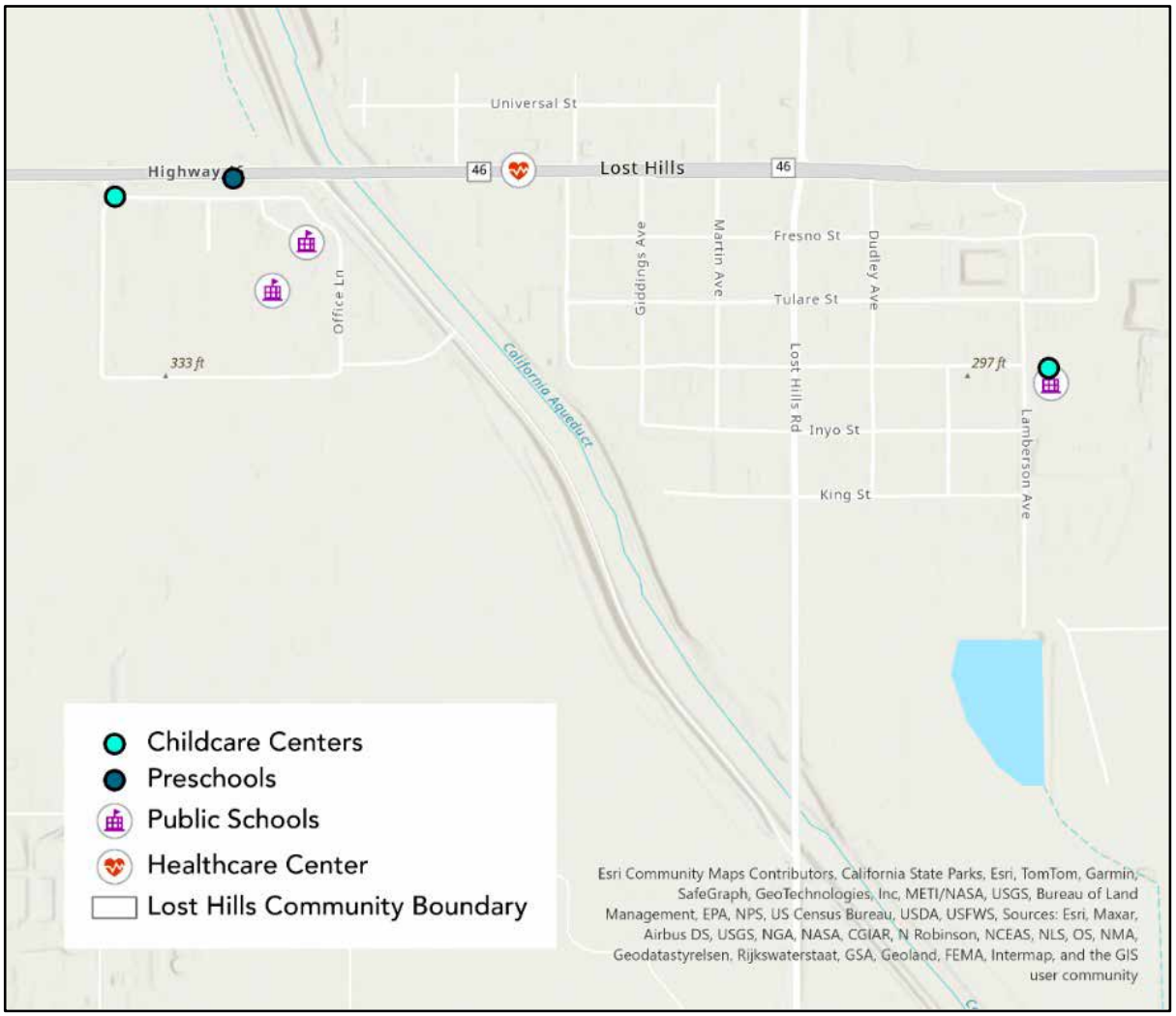
Figure 6: Location of Sensitive Receptors (Zoomed In)



Community Exposure

Land Use

Agriculture and industrial (mineral, petroleum, general industrial) which is directly in front of residential areas and the sensitive receptors of the community. Agriculture is the largest land use in this community.

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Figure 7 Land Use Map for the Lost Hill Community Boundary

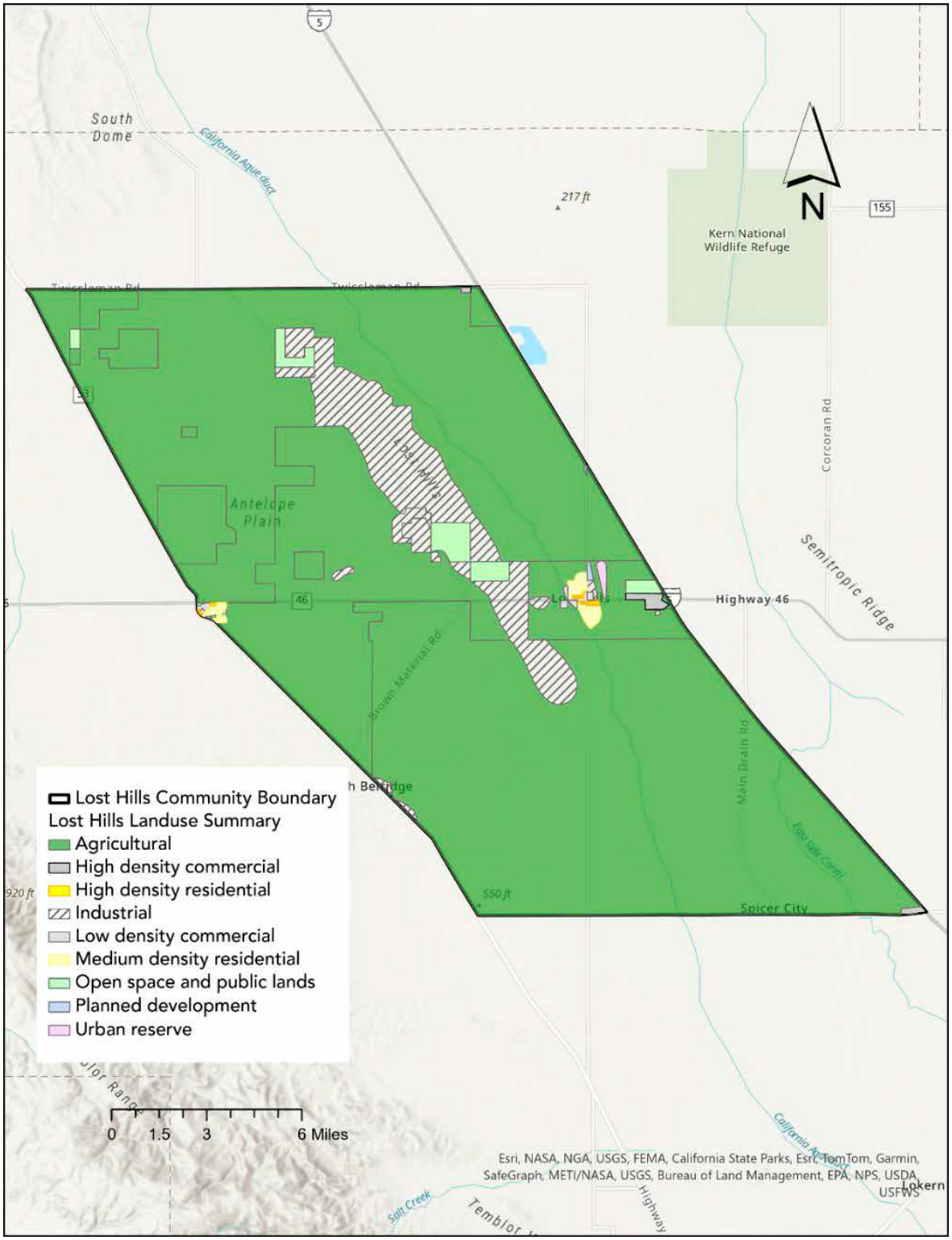

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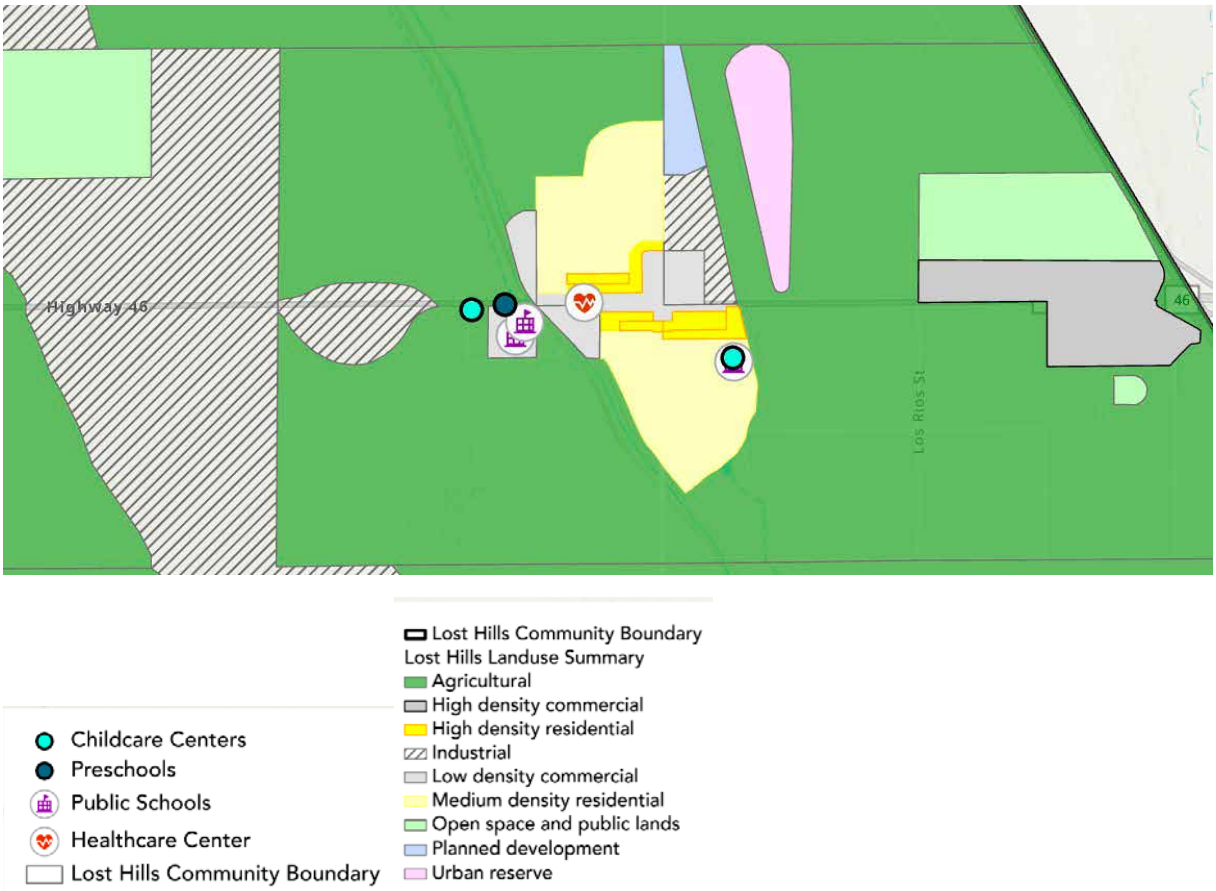
Figure 8 shows detailed view of industrial land use within and directly next to sensitive receptors and residential land use showing sensitive receptors like schools and childcare centers as well as where people live are largely surrounded by agricultural and industrial land use.

Figure 8: Detailed View of Sources and Sensitive Receptors



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Proximity of Oil and Gas Extraction to Sensitive Receptors

Many sensitive receptor locations, such as homes, day care centers, schools, and hospitals, are near California oil and gas production sites. Some residences in California are several feet from the boundary of a drilling site and as close as 60 feet from an active oil well. Well stimulation events in Los Angeles between 2013 and 2017 occurred as close as 12 feet from a residence, 342 feet from a preschool, 160 feet from a hospital, and 96 feet from a healthcare facility. An analysis of South Coast Air Quality Management District (SCAQMD) data found that 483 reported well stimulation activities which used air toxics occurred at sites within 1,500 feet of at least one hospital, preschool, or residence in Los Angeles County.

Figure 9: Lost Hills Oil Field[4]

Potential Sources

1. Mobile sources (I-5 and SR-46)
2. Lost Hills Oil Field
3. Local natural gas distribution lines
4. Agriculture, landfills, composting facilities
5. Other Regional Sources

Air Quality Assessment

Community Air Monitoring Efforts

Study of Neighborhood Air near Petroleum Sources (SNAPS)

CARB, in collaboration with the Office of Environmental Health Hazard Assessment (OEHHA), launched the Study of Neighborhood Air near Petroleum Sources (SNAPS) to assess air quality in communities near oil and gas production sites. The initiative aims to address public concerns by identifying pollutants, providing real-time air quality data, and guiding strategies to reduce exposure.

[4] SNAPS Lost Hills Draft Final Report. 2024. *https://ww2.arb.ca.gov/resources/documents/snaps-lost-hills-final-report-and-dataset*

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Lost Hills was the first community selected for monitoring due to its proximity to high-density oil and gas wells, strong community engagement, and lastly its disadvantaged status above 86th percentile in CalEnviroScreen 4.0. With input from residents and local organizations, CARB established a monitoring site at the Lost Hills Department of Water Resources substation. Both stationary and mobile air quality measurements were collected over nearly a year, from May 2019 to April 2020, marking the most extensive study of its kind in California. The summary report was released in 2024 can be found *here*.

Statewide Mobile Monitoring Initiative (SMMI)

SMMI uses mobile monitoring to collect data on pollutants and greenhouse gases, with a focus on improving public health in disadvantaged communities.

Aclima, Inc. was contracted to implement mobile monitoring in AB 617 Consistently Nominated Communities (CNCs), including Lost Hills, which have been identified for air protection but not yet selected for full program participation. This air monitoring plan outlines how mobile air monitoring will address pollution concerns raised by Lost Hills residents, guiding future actions and studies. Community input shaped the monitoring locations and objectives, and the project emphasizes transparent, accessible data sharing to support emissions reduction efforts.

Bridging SNAPS and SMMI

Together, the SNAPS and air monitoring initiatives, like SMMI, reflect a coordinated effort by the CARB to address air quality concerns in Lost Hills through both stationary and mobile monitoring. These complementary programs demonstrate a commitment to community-driven environmental action, combining long-term data collection near petroleum sources with flexible, resident-informed mobile assessments. By integrating scientific research with local engagement, these efforts aim to empower Lost Hills residents with accessible air quality data and support targeted strategies to reduce pollution and protect public health.

Air quality assessments in Lost Hills have been strengthened by the SNAPS and CAMP initiatives, which combine stationary and mobile monitoring to capture a detailed picture of local pollution. These programs prioritize community input, ensuring that monitoring efforts reflect resident concerns and target areas of greatest impact. By collecting data on pollutants and greenhouse gases and making it accessible to the public, SNAPS and SMMI empower Lost Hills to take informed action toward cleaner air and healthier living conditions.

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Emissions Inventory Estimates

An emissions inventory[5] estimate based on the proposed community boundary was developed by CARB to quantify emissions of mobile (on-road and off-road), stationary, and areawide sources in the community. The emissions inventory estimate is based on information within CARB's California Emissions Inventory Data Analysis and Reporting System (CEIDARS)[6]. Of the pollutants included within CEIDARS, the following summary tables focuses on the criteria pollutants[7] and toxic contaminants[8] that have the highest health impacts from exposure. The fully detailed emissions inventory estimate is provided in Appendix D in this document.

Criteria pollutants and toxic air contaminants differ in both their regulatory frameworks and health impacts. Criteria pollutants such as ozone, particulate matter (PM), nitrogen oxides (NO_x), and sulfur oxides (SO_x) are regulated under the federal Clean Air Act due to their widespread presence and well-documented health and environmental effects. In contrast, toxic emissions refer to a broad group of over 200 pollutants known or suspected to cause cancer or other serious health effects, often at much lower concentrations and with more localized impacts.

To compare the relative health risks of these diverse toxic pollutants, cancer-weighted emissions are used as a screening tool. This method, outlined in OEHHA's 2015 Guidance Manual[9] and the Technical Support Document for Cancer Potency Factors[10], involves multiplying the mass emissions of each toxic compound by its cancer potency factor or unit risk value. These values reflect the estimated risk of cancer from lifetime exposure to a given concentration of the pollutant. The result is a normalized metric, cancer-weighted emissions, that allows for comparison across pollutants with vastly different toxicities.

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[5] An emission inventory estimates the amount of air pollutants released into the atmosphere by emission sources in a specific geographical area and over a certain time period. Emission inventories are developed with the best data available and are updated over time to reflect sound science and robust new data.
[6] California Emissions Inventory Data Analysis and Reporting System (CEIDARS) - https://ww2.arb.ca.gov/ceidars
[7] Office of Environmental Health Hazard Assessment criteria pollutants - https://oehha.ca.gov/air/criteria-pollutants
[8] Office of Environmental Health Hazard Assessment toxic air contaminants - https://oehha.ca.gov/air/toxic-air-contaminants
[9] Office of Environmental Health Hazard Assessment – Risk Assessment Guidelines: *https://oehha.ca.gov/sites/default/files/media/downloads/crnr/2015guidancemanual.pdf*
[10] Office of Environmental Health Hazard Assessment – Technical Support Document for Cancer Potency Factors: *https://oehha.ca.gov/sites/default/files/media/downloads/crnr/tsdcancerpotency.pdf*

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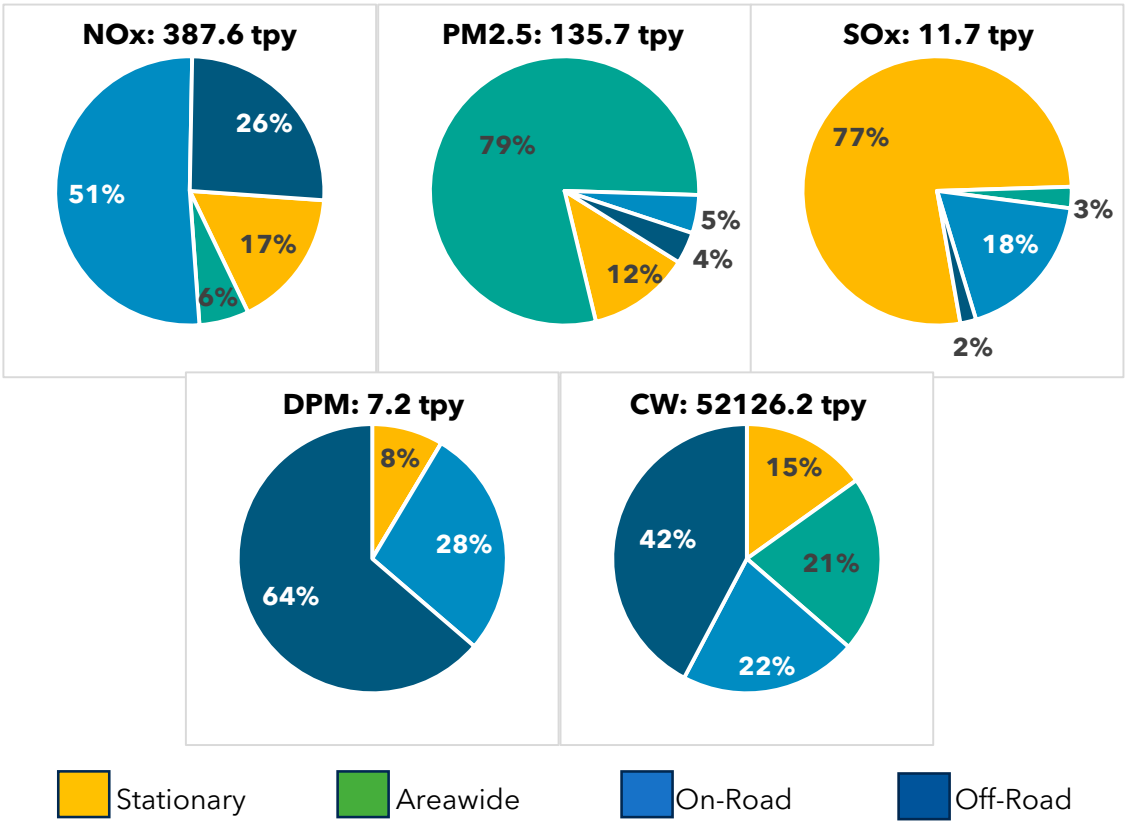
It is important to emphasize that cancer-weighted emissions are not actual risk estimates. They are intended solely for screening and prioritization, helping identify which sources or pollutants may warrant more detailed health risk assessments.

Figure 10 summarizes the draft estimated emissions for key air pollutants, such as Oxides of nitrogen (NOx), particulate matter 2.5 microns or smaller ($PM_{2.5}$), oxides of sulfur (SOx), diesel particulate matter (DPM) and an aggregate of toxic contaminants weighted for contribution to cancer risk (CW) for this community.

Figure 10 Preliminary Source Contributions in the Lost Hills community. (2023 Estimated Emissions in Tons/Year, tpy)



The activities that are the main contributors to these emissions are listed in Table 2 and detailed in Table 3 through Table 5 in Appendix D: Estimated Community Emissions Inventory, along with an initial spatial distribution based on a preliminary planning emissions inventory.

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Table 1 Top Source Categories by Stationary, Areawide, and Mobile for the Lost Hills Community. (Estimated Emission Inventory for 2023)[11]

Stationary Sources							
NOx	%	PM2.5	%	SOx	%	Cancer Weighted	%
Food And Agricultural Processing	58%	Coatings And Related Process Solvents	38%	Oil And Gas Production	82%	Food And Agricultural Processing	33%
Oil And Gas Production (Combustion)	19%	Oil And Gas Production (Combustion)	16%	Food And Agricultural Processing	10%	Landfills	23%
Manufacturing And Industrial	17%	Food And Agricultural Processing	14%	Manufacturing And Industrial	7.3%	Oil And Gas Production	22%
Other (Fuel Combustion)	3.8%	Manufacturing And Industrial	13%	Service And Commercial	0.2%	Oil And Gas Production (Combustion)	15%
Oil And Gas Production	2.2%	Food And Agriculture	10%	Oil And Gas Production (Combustion)	0.1%	Other (Fuel Combustion)	3.1%

[11] See Appendix D in this document for additional information on the emissions inventory. For more details on source categories and associated activities (emission inventory codes), see documentation at *https://ww3.arb.ca.gov/ei/documentation.htm*

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Area Sources							
NOx	%	PM2.5	%	SOx	%	Cancer Weighted	%
Managed Burning And Disposal	97%	Managed Burning And Disposal	31%	Managed Burning And Disposal	95%	Farming Operations	53%
Residential Fuel Combustion	2.6%	Farming Operations	29%	Residential Fuel Combustion	4.9 %	Fugitive Windblown Dust	33%
Fires	0.03 %	Fugitive Windblown Dust	19%			Unpaved Road Dust	5.7 %
		Unpaved Road Dust	15%			Construction And Demolition	4.0 %
		Cooking	2.4 %			Managed Burning And Disposal	2.5 %

Mobile Sources							
NOx	%	PM2.5	%	DPM	%	Cancer Weighted	%
Heavy Heavy Duty Trucks	41 %	Heavy Heavy Duty Trucks	27 %	Heavy Heavy Duty Trucks	33 %	Farm Equipment	39 %
Farm Equipment	17 %	Farm Equipment	24 %	Light Duty Passenger	20 %	Off-Road Equipment	25 %
Off-Road Equipment	15 %	Off-Road Equipment	16 %	Medium Duty Trucks	14 %	Heavy Heavy Duty Trucks	21 %
Light Heavy Duty Trucks - 1	5.4 %	Light Duty Passenger	8.0 %	Light Duty Trucks - 2	12 %	Light Heavy Duty Trucks - 1	4.7 %
Medium Duty Trucks	4.6 %	Light Heavy Duty Trucks - 1	6.1 %	Light Heavy Duty Trucks - 1	4.3 %	Off-Road Recreational Vehicles	2.1 %

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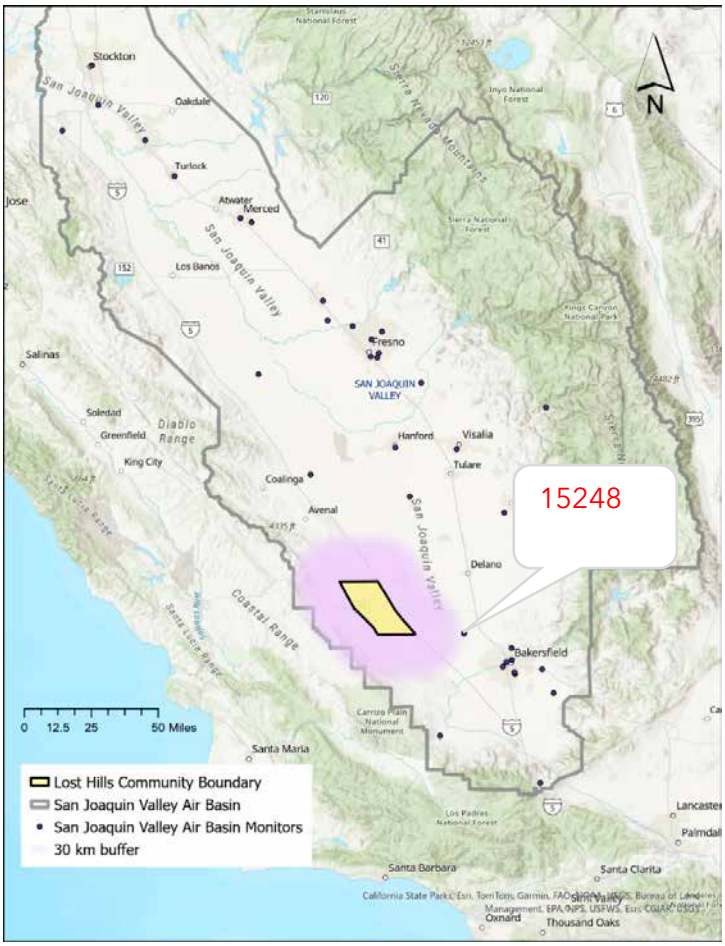
Appendix A
Regulatory Air Quality Monitoring Sites



CARB Site Number	AQS Site Number	Site Name	County	Basin	Agency	Latitude	Longitude
15248	60296001	*Shafter*	*Kern*	*San Joaquin Valley*	*California Air Resources Board*	35.50349	-119.27264

Measurements: *O_3*, *NO_2*, *Outdoor Temperature*, *Relative Humidity*, Wind Direction-Scalar, Wind Direction-Resultant, *Wind Speed-Resultant*, *Wind Speed-Scalar*

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Appendix B: Location of Sensitive Receptors

Preschools

	Name	Address	Coordinates
California State Preschool	Lost Hills Headstart	21109 Paso Robles Hwy	35.615952, -119.700813

Public Schools

District	Name	Address	Coordinates
Kern County Office of Education	Wonderful College Prep Academy - Lost Hills	14848 Lamberson Ave.	35.612719 , -119.684962
Lost Hills Union Elementary	Lost Hills Elementary	14821 Primary Ct.	35.61418 , -119.70005
Lost Hills Union Elementary	A. M. Thomas Middle	20979 Lobos Ct.	35.61494 , -119.69939

Healthcare Center

	Name	Address	Coordinates
Omni Family Health	Lost Hills Health Center	21138 Paso Robles Hwy, Lost Hills, CA 93249	35.61608 , -119.69528

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Appendix C: Estimated Community Emissions Inventory

A screening-level emissions inventory was developed for the Lost Hills communities using best available data for stationary, areawide, and mobile sources. A brief description of these source categories and types of sources that are available at CARB's emissions inventory data website.[12]

An air quality emissions inventory, such as the one maintained in CEIDARS (California Emissions Inventory Development and Reporting System) and used for this analysis, provides a comprehensive accounting of the types and quantities of pollutants released into the air from various sources—industrial facilities, mobile sources, area-wide sources, and more. While this data is essential for understanding the potential for air pollution in a given region, it does not directly translate to actual human exposure. Emissions inventories are typically reported as annual or daily totals and are spatially aggregated, which limits their ability to capture the dynamic nature of air pollution dispersion and human exposure patterns.

This is where tools like the California Air Toxics Assessment (CATA)[13] become critical. CATA integrates emissions inventory data with air dispersion modeling, meteorological data, and geographic information to estimate how pollutants move through the atmosphere and where they are likely to concentrate. This modeling allows for a more refined understanding of exposure at the community level, accounting for factors like wind patterns, topography, and proximity to emission sources. Without such modeling, it is difficult to assess the actual health risks posed by emissions, especially in environmental justice communities where exposure can be highly localized and variable.

In short, while CEIDARS provides the "what" and "how much" of emissions, tools like CATA are necessary to understand the "where" and "how it affects people", bridging the gap between emissions data and public health outcomes.

Preliminary stationary source emissions inventory for this community was developed using the 2023 facility specific emissions reported to CARB by the local air district into CARB's CEIDARS.[14] For areawide source and off-road mobile source (also referred as other mobile) inventories, the 2023 State Implementation Plan emissions inventory was gridded at a 1 kilometer (km) by 1 km resolution, and total emissions for the community was developed by summing the emissions from the individual grids (see Figure 11, for example). Gridded on-road mobile source inventory was developed using 2022 vehicle miles traveled data from regional Metropolitan Planning Organization(s) in their adopted Regional Transportation

[12] *https://ww3.arb.ca.gov/ei/emissiondata.htm*. The emissions used to develop the preliminary inventory are based on the latest SIP inventory with a 2017 base year (CEPAM 2019SIP v1.03).
[13] CARB - California Air Toxics Assessment: *https://california-air-toxics-assessment-californiaarb.hub.arcgis.com/*
[14] The facility locations were mapped, and all facilities that are located within the 1-km grids are included in the preliminary emission inventory.

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Plan/ Sustainable Communities Strategy, and county-level aggregated emissions factors and vehicle distribution from CARB's on-road mobile source model (EMFAC2021).[15]

The results presented in Appendix D are estimations of the air emissions in the community. Note that this estimated emissions inventory presents aggregated emissions for the 1-km grids covering the Lost Hills community. This includes emissions for grids fully within the community boundary and partially intersecting the community boundary. Emissions were not area-weighted for grids that are only partially within the community area.

Figure 11: 1 km x 1 km Grids Used to Develop the Lost Hills Estimated Community Emissions Inventory

[15] Data Source: https://arb.ca.gov/emfac/

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Figure 12: Lost Hills Community Estimated NOx Emissions with population density

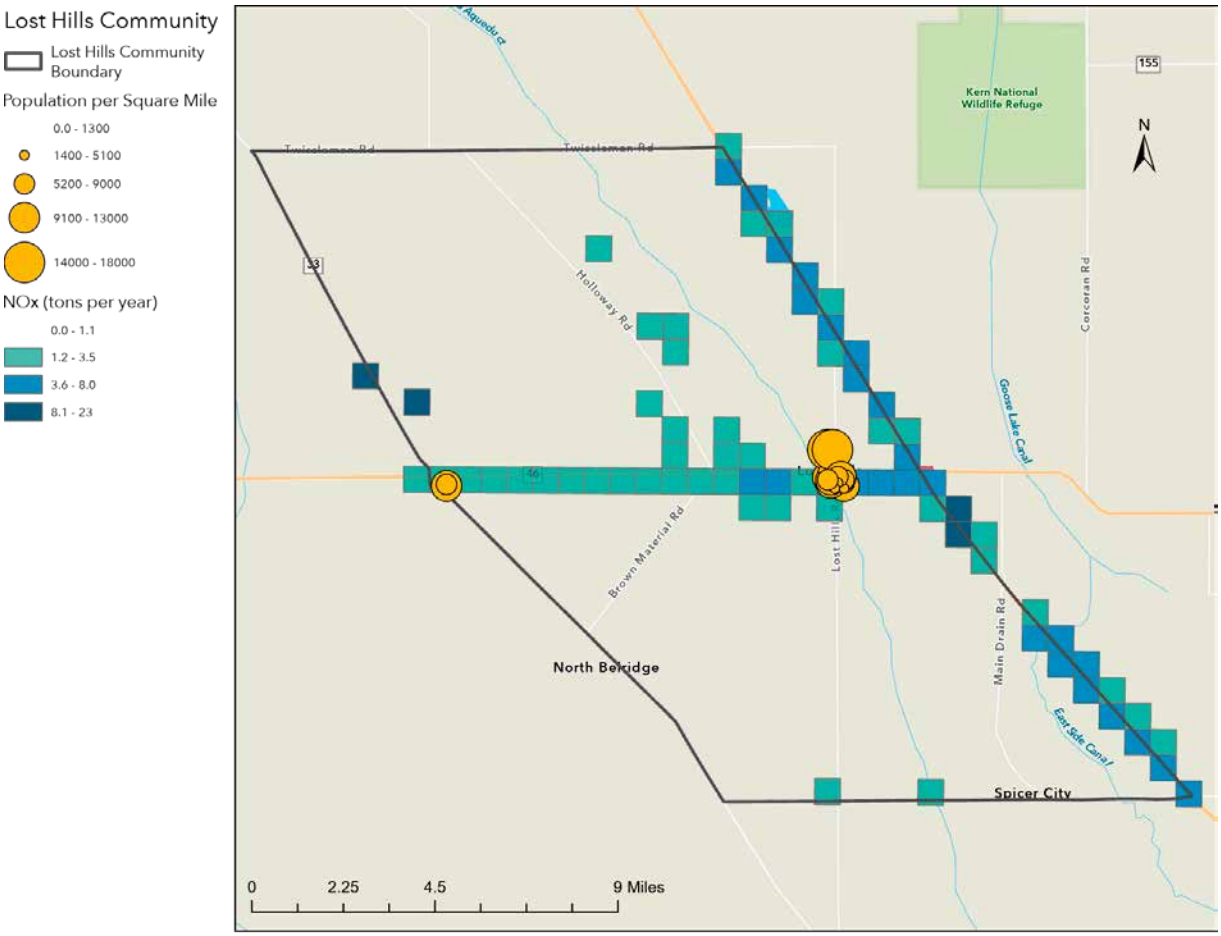

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Figure 13: Lost Hills Community Estimated PM2.5 Emissions with population density

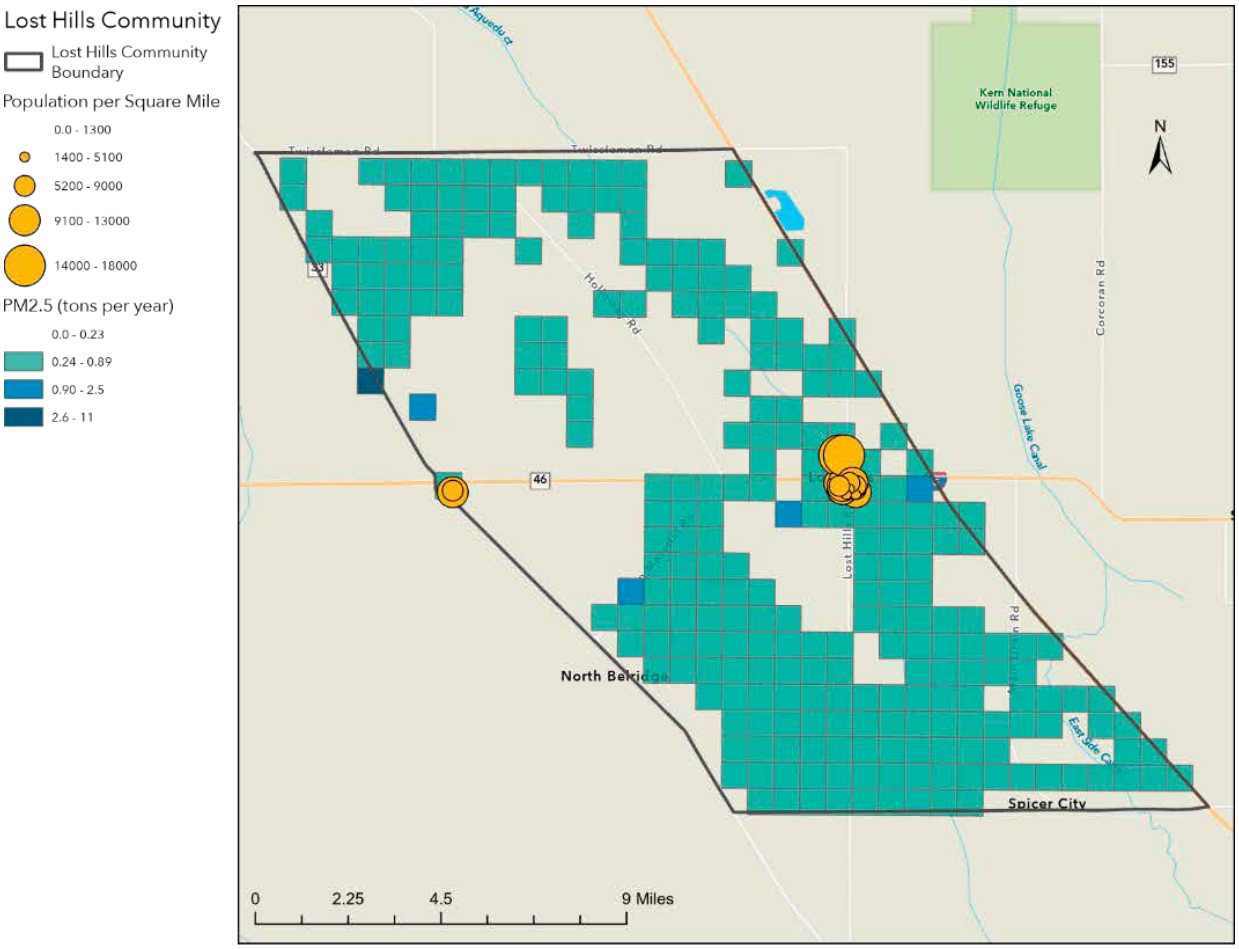

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Figure 14: Lost Hills Community Estimated SOx Emissions with population density

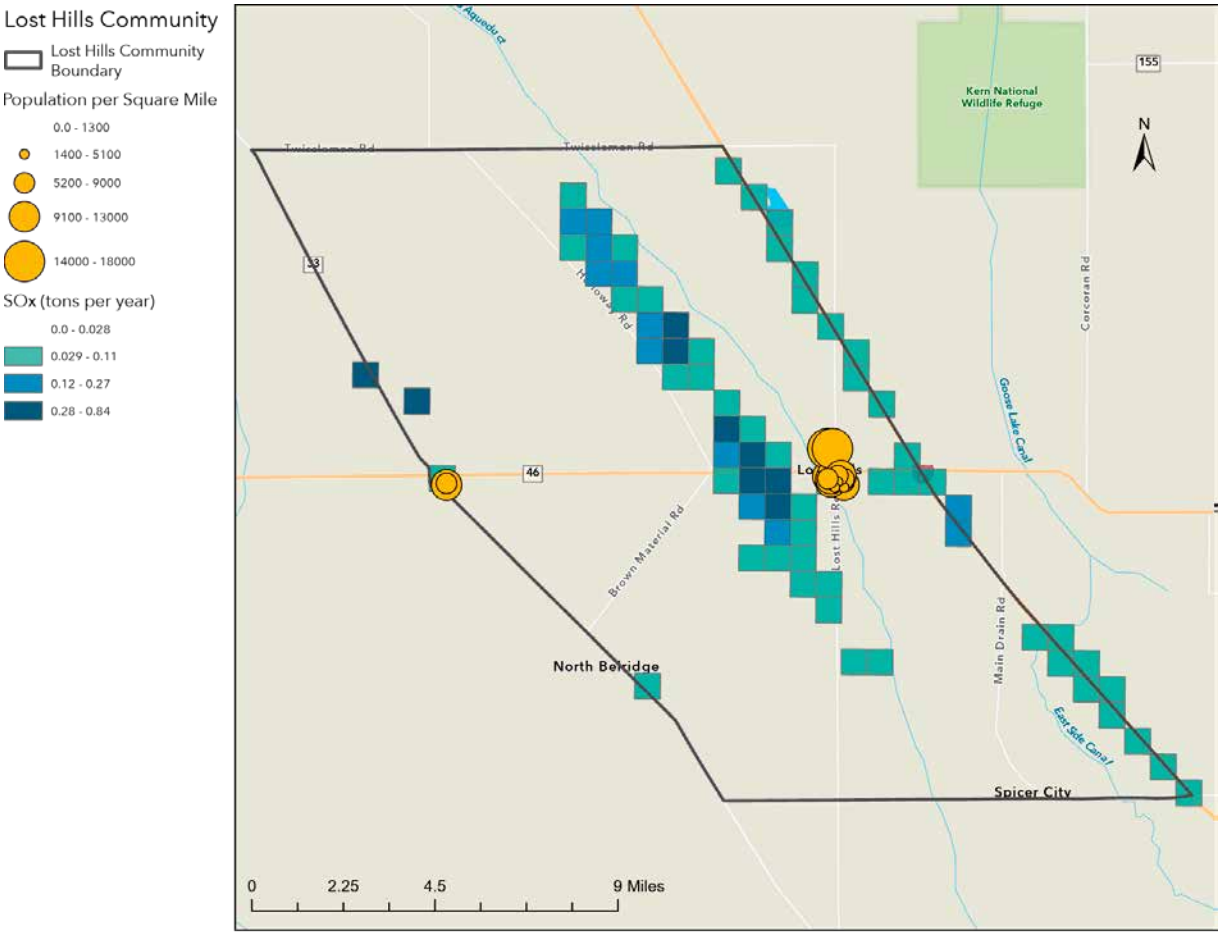

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Figure 15: Lost Hills Community Estimated DPM Emissions with population density

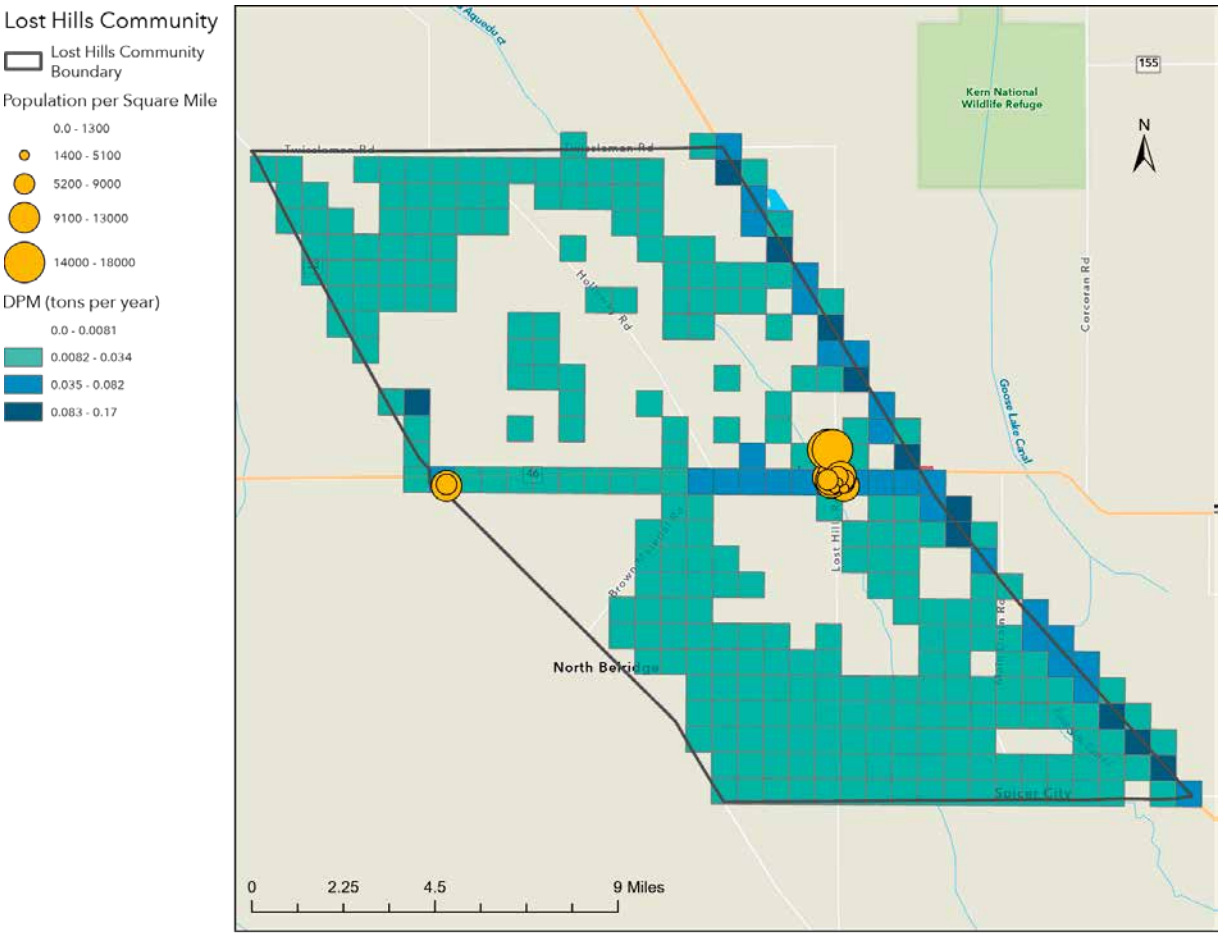

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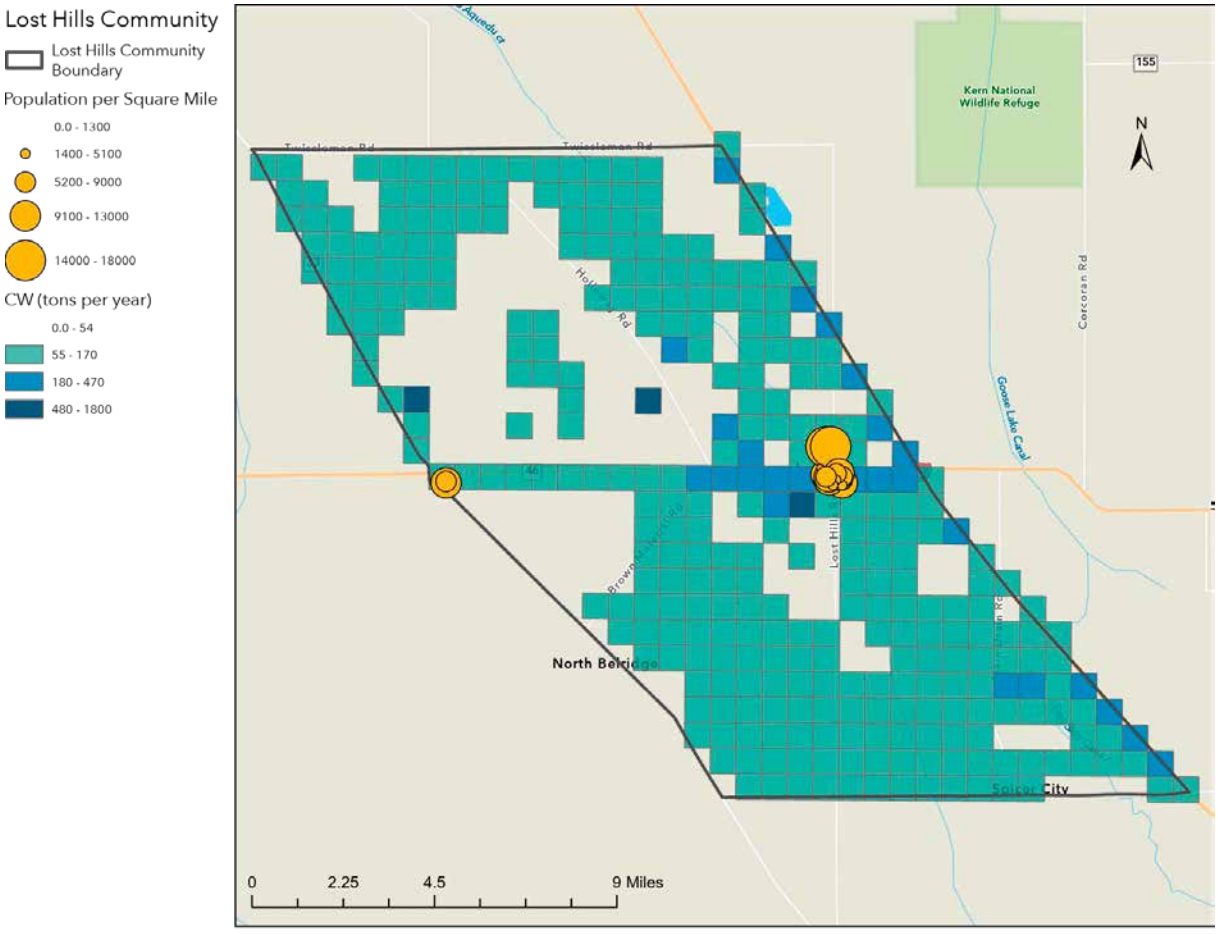
Figure 16: Lost Hills Community Estimated Cancer Weighted Emissions with population density



Lost Hills Local Community Emissions Reduction Plan Technical Report

Figure 17: Lost Hills Stationary Facilities with population density

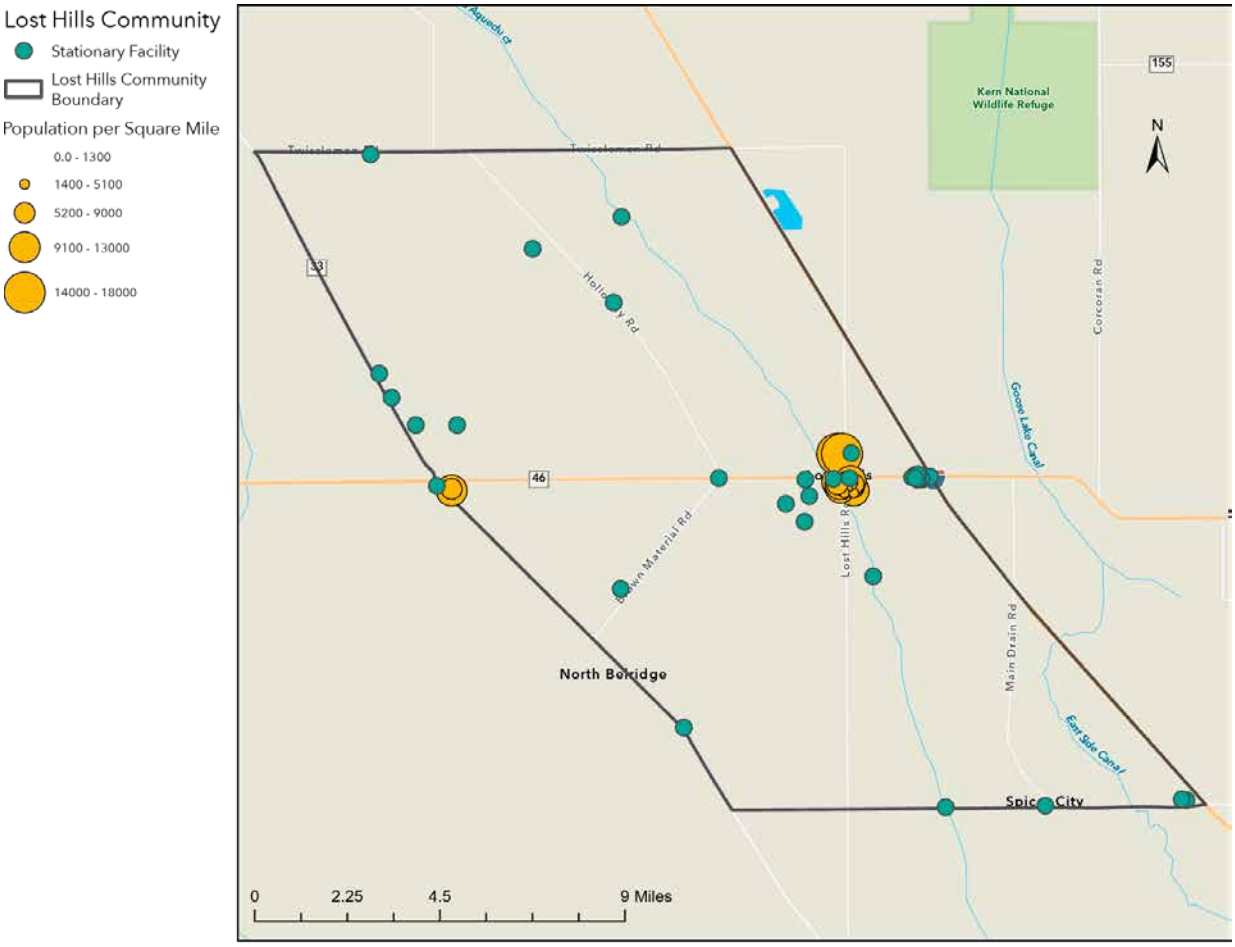


Table 2: Lost Hills Stationary Estimated Emissions Inventory

Stationary Sources													
Summary Category Name	Pollutants (tons per year)												
	CO	DPM	Lead	NH3	NOX	PM	PM10	PM25	ROG	SOX	TOG	VOC	Cancer Weighted
Uncategorized Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.72
Electric Utilities	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
Oil And Gas Production (Combustion)	19.47	0.00	0.00	0.00	12.06	2.64	2.63	2.61	0.65	0.01	2.88	0.46	1152.78
Manufacturing And Industrial	11.92	0.00	0.00	0.00	10.88	2.18	2.16	2.16	1.60	0.66	6.79	0.00	115.17
Food And Agricultural Processing	26.53	0.57	0.00	0.00	37.46	2.43	2.43	2.41	3.70	0.92	17.47	2.34	2630.51
Service And Commercial	0.79	0.00	0.00	0.00	0.67	0.06	0.06	0.06	0.08	0.02	0.32	0.02	12.51
Other (Fuel Combustion)	0.72	0.05	0.00	0.00	2.47	0.05	0.05	0.05	0.16	0.00	0.18	0.00	241.23
Fuel Combustion Subtotal	59.44	0.62	0.00	0.00	63.55	7.36	7.33	7.28	6.18	1.60	27.64	2.83	4196.19
Sewage Treatment	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landfills	0.00	0.00	0.00	2.97	0.00	0.00	0.00	0.00	18.18	0.00	2754.11	0.00	1779.97
Other (Waste Disposal)	0.00	0.00	0.00	453.41	0.00	1.17	0.22	0.15	482.58	0.00	5848.63	16.23	62.43
Waste Disposal Subtotal	0.00	0.00	0.00	456.53	0.00	1.17	0.22	0.15	500.76	0.00	8602.74	16.23	1842.40
Degreasing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.79	0.00	18.29	0.00	5.50
Coatings And Related Process Solvents	0.00	0.00	0.00	0.00	0.00	9.23	6.88	6.38	1.50	0.00	1.65	1.08	4.86
Adhesives And Sealants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	0.00	5.42	0.00	6.06
Cleaning and Surface Coatings Subtotal	0.00	0.00	0.00	0.00	0.00	9.23	6.88	6.38	21.20	0.00	25.37	1.08	16.42
Oil And Gas Production	7.42	0.00	0.00	0.00	1.41	0.12	0.12	0.12	303.86	7.45	671.99	31.34	1756.65
Petroleum Marketing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.53	0.00	554.36	7.62	27.55
Petroleum Production and Marketing Subtotal	7.42	0.00	0.00	0.00	1.41	0.12	0.12	0.12	321.40	7.45	1226.35	38.96	1784.19
Chemical	0.00	0.00	0.00	0.00	0.00	0.33	0.30	0.30	0.00	0.00	0.00	0.00	2.05
Food And Agriculture	0.00	0.00	0.00	0.01	0.00	4.14	2.90	1.74	0.06	0.00	0.06	0.01	3.42
Mineral Processes	0.00	0.00	0.00	0.00	0.00	10.49	5.24	0.79	0.00	0.00	0.00	0.00	31.13
Metal Processes	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Industrial Processes Subtotal	0.00	0.00	0.00	0.01	0.00	14.98	8.46	2.83	0.06	0.00	0.06	0.01	36.60
Stationary Total	66.86	0.62	0.00	456.53	64.96	32.87	23.01	16.77	849.60	9.05	9882.17	59.12	7875.79

Table 3: Lost Hills Areawide Estimated Emissions Inventory

Areawide Sources													
Summary Category Name	Pollutants (tons per year)												
	CO	DPM	Lead	NH3	NOX	PM	PM10	PM25	ROG	SOX	TOG	VOC	Cancer Weighted
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.99	0.00	4.98	0.00	7.15
Architectural Coatings And Related Process Solvents	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.00	1.77	0.00	13.10
Pesticides/Fertilizers	0.00	0.00	0.00	298.46	0.00	0.00	0.00	0.00	45.93	0.00	45.93	0.00	0.00
Asphalt Paving / Roofing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.00	0.90	0.00	26.20
Solvent Evaporation Subtotal	0.00	0.00	0.00	298.46	0.00	0.00	0.00	0.00	52.36	0.00	53.59	0.00	46.46
Residential Fuel Combustion	0.32	0.00	0.00	0.00	0.60	0.06	0.06	0.06	0.05	0.01	0.11	0.00	2.37
Farming Operations	0.00	0.00	0.00	5.92	0.00	462.90	210.42	31.71	1.91	0.00	23.92	0.00	5842.04
Construction And Demolition	0.00	0.00	0.00	0.00	0.00	27.63	13.52	1.35	0.00	0.00	0.00	0.00	447.60
Paved Road Dust	0.00	0.00	0.00	0.00	0.00	32.92	15.05	2.26	0.00	0.00	0.00	0.00	120.27
Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	265.60	157.85	15.78	0.00	0.00	0.00	0.00	629.00
Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	262.79	125.97	20.66	0.00	0.00	0.00	0.00	3688.68
Fires	0.31	0.00	0.00	0.00	0.01	0.15	0.15	0.14	0.06	0.00	0.07	0.00	0.48
Managed Burning And Disposal	297.58	0.00	0.00	0.42	22.57	35.57	34.91	32.93	27.46	0.29	33.49	0.00	280.63
Cooking	0.00	0.00	0.00	0.00	0.00	2.69	2.63	2.61	0.92	0.00	2.47	0.50	22.17
Other (Miscellaneous Processes)	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous Processes Subtotal	298.21	0.00	0.00	7.59	23.18	1090.32	560.57	107.49	30.40	0.30	60.06	0.50	11033.24
Areawide Total	298.21	0.00	0.00	306.06	23.18	1090.32	560.57	107.49	82.76	0.30	113.65	0.50	11079.70

Table 4: Lost Hills Mobile Estimated Emissions Inventory

Mobile Sources													
Summary Category Name	Pollutants (tons per year)												
	CO	DPM	Lead	NH3	NOX	PM	PM10	PM25	ROG	SOX	TOG	VOC	Cancer Weighted
Light Duty Passenger	190.60	0.01	0.00	5.39	12.33	2.61	2.58	0.91	21.15	0.47	22.45	0.00	518.17
Light Duty Trucks - 1	39.45	0.00	0.00	0.50	3.51	0.24	0.24	0.09	5.35	0.05	5.72	0.00	105.72
Light Duty Trucks - 2	108.84	0.00	0.00	2.77	9.55	1.30	1.29	0.46	11.25	0.28	12.06	0.00	283.40
Medium Duty Trucks	125.21	0.01	0.00	2.39	13.74	1.24	1.23	0.44	15.09	0.33	16.24	0.00	401.55
Light Heavy Duty Trucks - 1	22.32	0.30	0.00	1.28	16.26	1.48	1.48	0.69	3.94	0.10	4.38	0.00	1545.50
Light Heavy Duty Trucks - 2	4.58	0.13	0.00	0.53	5.57	0.55	0.55	0.27	0.99	0.03	1.10	0.00	634.75
Medium Heavy Duty Trucks	5.64	0.07	0.00	1.29	10.87	0.46	0.45	0.20	0.54	0.08	0.68	0.00	379.63
Heavy Heavy Duty Trucks	40.74	1.44	0.00	10.82	123.38	6.85	6.84	3.09	2.96	0.77	4.23	0.00	6988.84
Motorcycles	20.77	0.00	0.00	0.01	0.83	0.02	0.02	0.01	6.38	0.00	6.70	0.00	115.41
Buses	8.52	0.01	0.00	0.39	2.62	0.11	0.11	0.05	0.20	0.01	0.85	0.00	77.09
Motor Homes	0.50	0.02	0.00	0.02	0.71	0.03	0.03	0.02	0.22	0.01	0.23	0.00	80.79
On-Road Motor Vehicles Subtotal	567.17	1.99	0.00	25.39	199.36	14.90	14.83	6.23	68.06	2.14	74.65	0.00	11130.84
Aircraft	0.30	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.02	0.05	0.02	0.00	1.04
Recreational Boats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.27	0.00	1.08
Off-Road Recreational Vehicles	190.47	0.00	0.00	0.00	2.51	0.64	0.62	0.59	31.04	0.00	32.42	0.00	701.93
Off-Road Equipment	54.08	1.78	0.00	0.00	43.66	1.90	1.89	1.81	7.42	0.09	9.00	0.00	8273.53
Off-Road Equipment (Perp)	1.11	0.04	0.00	0.00	1.21	0.04	0.04	0.04	0.13	0.00	0.15	0.00	191.84
Farm Equipment	86.32	2.77	0.00	0.08	52.02	2.87	2.85	2.72	9.75	0.08	10.94	0.00	12869.95
Fuel Storage And Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.19	0.00	0.48
Other Mobile Sources Subtotal	332.29	4.59	0.00	0.08	100.10	5.46	5.40	5.17	48.80	0.22	52.99	0.00	22039.85
Mobile Sources Total	899.45	6.58	0.00	25.47	299.46	20.36	20.23	11.40	116.86	2.36	127.63	0.00	33170.69
Grand Total	1264.53	7.20	0.00	788.07	387.59	1143.55	603.80	135.65	1049.22	11.71	10123.45	59.62	52126.18

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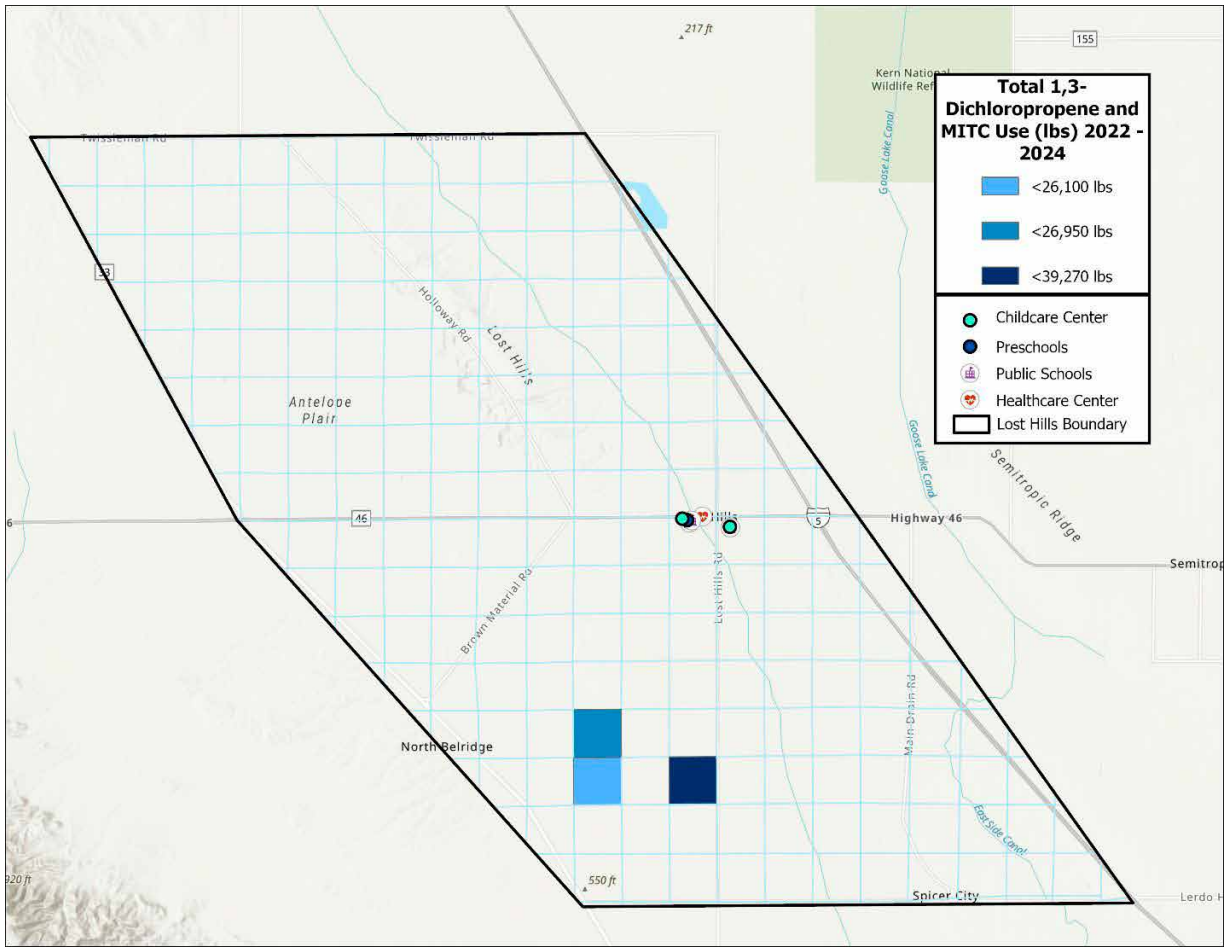
Appendix D: Pesticide Application in Lost Hills

There were five applications (two applications being 1,3-D and three applications being metam-sodium) within the Lost Hills boundary between 2022 - 2024. None of the applications were within 0.25 miles of a sensitive receptors.[16]



[16] Pesticide Use Reporting. *Pesticide Use Reporting - Department of Pesticide Regulation*

Lost Hills Local Community Emissions Reduction Plan Technical Report

Chemical Name	Fumigation Method	Lbs applied in Lost Hills	Lbs Applied Near Sensitive Receptors	Total times applied in Lost Hills	Most applied Season (month)
1,3-Dichloropropene	Nontarpaulin/deep/strip (100%)	53,016	0	2	Winter (100%)
Metam-Sodium	Other label method (67%), Sprinkler/broadcast or bed/two water treatments (33%)	39,271	0	3	Spring (67%) Summer (33%)

Appendix C

Study of Neighborhood Air near Petroleum Sources (SNAPS) Lost Hills, California

Summary Report

Prepared by:

California Air Resources Board

Office of Environmental Health Hazard Assessment

1001 I Street, Sacramento, CA 95814

October 2025

Acknowledgements

The Study of Neighborhood Air near Petroleum Sources (SNAPS) in Lost Hills, CA would not have been possible without the continued input and assistance from community members and local and regional community groups. Their support and engagement have been invaluable throughout the SNAPS Lost Hills study, and staff would like to express their deepest appreciation for all of their work and interest.

Additionally, staff express gratitude to all parties who participated in the public engagement process, and the Department of Water Resources for their willingness to host California Air Resources Board (CARB) monitoring equipment for the duration of air monitoring in Lost Hills.

Document Purpose

This document is intended to provide a summary of the complete Lost Hills Final Report (link). CARB accepted comments on the Lost Hills Draft Final Report in early 2024 and released this final version of the report with community and other public comments incorporated. Please refer to the SNAPS webpage for more details regarding public comments received.

Information presented in the summary report includes:

1. Scope of SNAPS Monitoring Data
2. Key Lost Hills Air Monitoring Results, including answers to the following questions:
    a. How does meteorology impact air quality?
    b. What is the air quality in Lost Hills?
    c. Is Lost Hills disproportionally affected compared to other areas in the Central Valley?
    d. What are the potential sources of the measured air pollutants?
    e. Are there elevated health risks associated with air quality in the community?
3. Actions, Ongoing Work, and Next Steps
4. Resources

A brief overview of air quality results is also provided to further summarize the key findings from SNAPS Lost Hills air monitoring.

SNAPS Air Monitoring in Lost Hills, California

Overview of the SNAPS Program

The California Air Resources Board (CARB) developed the Study of Neighborhood Air near Petroleum Sources (SNAPS) to better characterize air quality in communities located near oil- and gas operations, with a focus on production facilities. The goals of SNAPS are to respond to community concerns regarding air quality near oil and gas-related activities by improving our understanding of the pollutants the public may be exposed to, provide air quality

information publicly in real-time, and inform possible measures to minimize exposure. This summary describes the most comprehensive air monitoring study near oil and gas operations in California to date and its results.

Motivation to develop SNAPS originated from a 2015 report released by the California Council on Science and Technology[1] that emphasized a lack of air quality information for communities located near oil and gas facilities and the need to assess potential health impacts resulting from exposure to air pollutants. SNAPS focuses on assessing the cumulative impacts from these oil and gas sources, as well as all other potential anthropogenic (human-driven) and biogenic[2] (natural) sources, on air quality in these communities.

Lost Hills is the first community to receive air monitoring under the SNAPS program. CARB and the Office of Environmental Health Hazard Assessment (OEHHA) developed and implemented the SNAPS program with input from and collaboration with Lost Hills community members. Lost Hills was selected based on several factors: its location downwind of oil and gas wells and areas of high well density and production volume, a CalEnviroScreen 3.0 score greater than 75 (deemed a disadvantaged community according to the criteria established under SB 535[3]), support from local community groups, and public suggestions. Through a public process that took into consideration technical and logistical requirements of SNAPS monitoring equipment, a monitoring site in Lost Hills was selected (Lost Hills Department of Water Resources substation located near the southwest corner of the community), and stationary and mobile air quality monitoring was conducted over the course of almost one year, from May 2019-April 2020.

Once CARB prioritized Lost Hills as the first community to receive air monitoring under the SNAPS program, CARB had frequent conversations with local community organizations, including but not limited to, the Central California Environmental Justice Network and Clean Water Fund. These organizations provided extensive support with outreach and information sharing to the Lost Hills community, including distribution of flyers detailing upcoming meetings, responding to community member inquiries regarding program goals, helping to schedule community meetings with CARB in Lost Hills, and meeting with the community on a regular basis to discuss the SNAPS program and other local issues.

Prior to releasing the draft report, CARB and OEHHA staff held a series of three meetings in Lost Hills to present details about SNAPS, including an overview of the program, monitoring site selection, and preliminary results. During these meetings, the residents of Lost Hills and other communities, as well as other interested parties, provided valuable input and comment. Lost Hills community members made key recommendations that contributed to

[1] California Council on Science and Technology (2015). "An Independent Scientific Assessment of Well Stimulation in California." https://ccst.us/reports/well-stimulation-in-california

[2] "Biological sources such as plants and animals that emit air pollutants such as volatile organic compounds." CARB. Glossary. https://ww2.arb.ca.gov/glossary?keywords=&page=2.

[3] Disadvantaged Community Designation. https://oehha.ca.gov/calenviroscreen/sb535

the development of the Lost Hills Air Monitoring Plan.[4] Community members helped determine the length of stationary monitoring in Lost Hills, when mobile monitoring took place, and how information would be displayed on the SNAPS website. In addition, community members interacted with CARB staff during a period of mobile monitoring as the vehicle drove on various streets in Lost Hills. One recommendation by community members and implemented during Lost Hills monitoring was the operation of two community reporting telephone lines, one in English and one in Spanish, available for the reporting of air quality concerns, including odors and health concerns.

Staff hosted a fourth meeting in the community, led in Spanish, in March 2024 to discuss key findings from the air quality analysis and health risk assessment. Staff have since incorporated recommendations from this meeting into the final version of the SNAPS Lost Hills Report. More information on community engagement can be found in the Lost Hills Final Report.

Scope of SNAPS Air Monitoring Data

SNAPS air monitoring in Lost Hills was an intensive effort that included stationary and mobile measurements and constitutes the first-of-its-kind, comprehensive monitoring effort focused on communities near oil and gas facilities. Staff developed a monitoring plan[4], standard operating procedures (SOPs)[5], and a Quality Assurance Project Plan (QAPP)[6] to produce high quality monitoring data for characterization of air quality and health risks.

Staff deployed a stationary trailer containing air monitoring equipment to provide frequent measurements of over 200 pollutants, including criteria pollutants (particulate matter of diameter less than 2.5 microns [$PM_{2.5}$], ozone [O_3], carbon monoxide [CO], and lead), volatile organic compounds (VOCs), metals, greenhouse gases (GHGs), among others.[6] Some pollutants were directly measured at the trailer in near real-time, while others were collected as samples at pre-designated times and analyzed by several analytical laboratories. To supplement stationary monitoring, mobile monitoring captured "snapshots" of air quality in the community several times during the year-long monitoring period.

Data collection under the SNAPS program is significantly larger than many other regulatory monitoring or research projects (Figure 1). Figure 1 compares the typical range of pollutants and frequency of measurements per year for each site in several monitoring projects. SNAPS, in many cases, collected more than double the data collected from typical monitoring programs. The intensive nature of SNAPS monitoring was made possible by utilizing a wide range of available monitoring techniques, and the result is a comparatively large dataset for analysis.

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[4] SNAPS Lost Hills Air Monitoring Plan. CARB. https://ww2.arb.ca.gov/resources/documents/lost-hills-air-monitoring-plan-snaps.
[5] SNAPS Standard Operating Procedures. CARB. https://ww2.arb.ca.gov/resources/documents/study-neighborhood-air-near-petroleum-sources-snaps-monitoring-documents.
[6] SNAPS Quality Assurance Project Plan. CARB. https://ww2.arb.ca.gov/resources/documents/quality-assurance-project-plan-study-neighborhood-air-near-petroleum-sources.

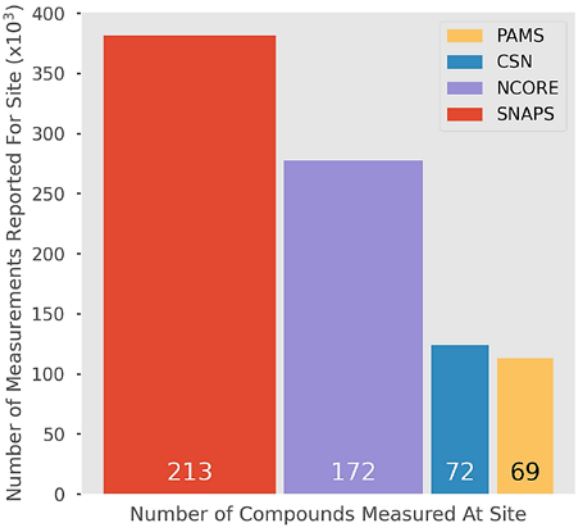

Figure 1. Comparison of the typical total number of measurements reported (vertical axis) and the number of compounds reported (horizontal axis) per year for different types of monitoring sites.[7]

Key Lost Hills Air Monitoring Results

How does meteorology impact air quality?

Meteorology, including wind speed and direction, plays an important role in the dispersion of pollutants from sources to communities and was an important consideration in where the monitoring trailer was located. In Lost Hills, wind measured at the SNAPS trailer frequently came from the west to west-northwest, meaning the Lost Hills community was often downwind of the Lost Hills Oil Field (Figure 2). Several Lost Hills residents have noted similar findings, reporting that winds come from the west-northwest more frequently than other directions.

[7] Data are based on observations reported to U.S. EPA in 2019 for National Core (NCORE), Photochemical Assessment Monitoring Stations (PAMS), and Chemical Speciation Network (CSN). All data is for the duration of the SNAPS Lost Hills monitoring. Number of compounds is based on the number of parameter codes reported to U.S. EPA. All sub-hourly data from SNAPS is aggregated to hourly measurements for the purpose of comparison.

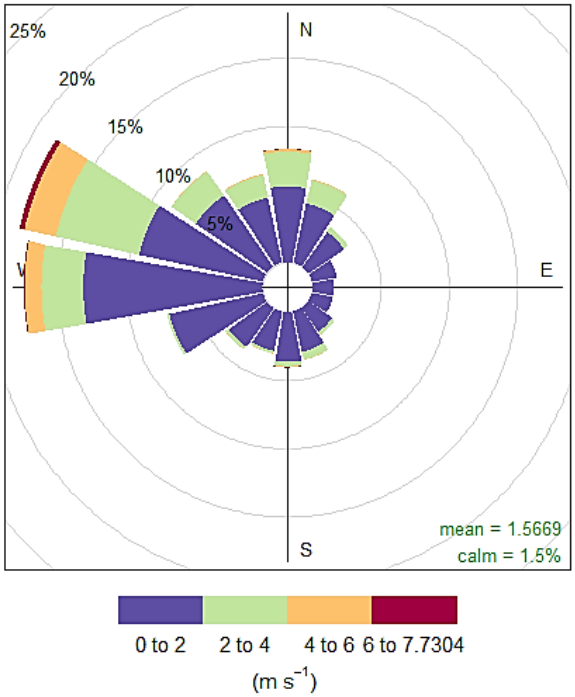

Figure 2. Wind speed (in meters per second (m/s)) and direction at the SNAPS trailer from May 2019 – April 2020. Wind speed is represented by various colors while the length of each colored slice corresponds to the percentage of time wind was measured at that speed from that specific direction.

Wind direction and speed varied throughout the day. Winds were lightest overnight through the morning hours, increasing during the afternoon and evening. While winds most frequently blew from the west-northwest, there are notable differences based on time of day. From midnight through 6 AM, winds came from the south, southwest, west, and northwest. After 6 AM, winds became more variable and gradually veered and predominately blew from the west, northwest, north, and northeast by the late morning and early afternoon. During the evening, winds gradually returned to a more consistent westerly wind direction, with some variation from west-southwest to northwest.

What is the air quality in Lost Hills?

The Air Quality Index (AQI) is a useful tool to describe pollution levels in outdoor air. The AQI is a numerical value that can be calculated using measured PM and ozone concentrations and is associated with health protective actions.[8] When the AQI is below 100 ("Good" or "Moderate" air quality), the outdoor air corresponds to ambient air concentrations less than

[8] AQI Basics. https://www.airnow.gov/aqi/aqi-basics/

or equal to the short-term National Ambient Air Quality Standard and the majority of the population is unlikely to be affected by negative health impacts. When the AQI is 101 to 150, the outdoor air may be unhealthy for sensitive groups, including those with underlying health conditions. An AQI above 150 indicates that the air is considered unhealthy for everyone. Based on SNAPS measurements, the AQI in Lost Hills was considered "Good" or "Moderate" (i.e., satisfactory or acceptable) 98.9% of the time, and "Unhealthy for Sensitive Groups" or "Unhealthy" 1.1% of the time (Figure 3). AQI in the "Unhealthy for Sensitive Groups" or "Unhealthy" range, indicating more polluted air, occurred due to elevated $PM_{2.5}$ concentrations during late October and early November 2019, as discussed later in this summary.

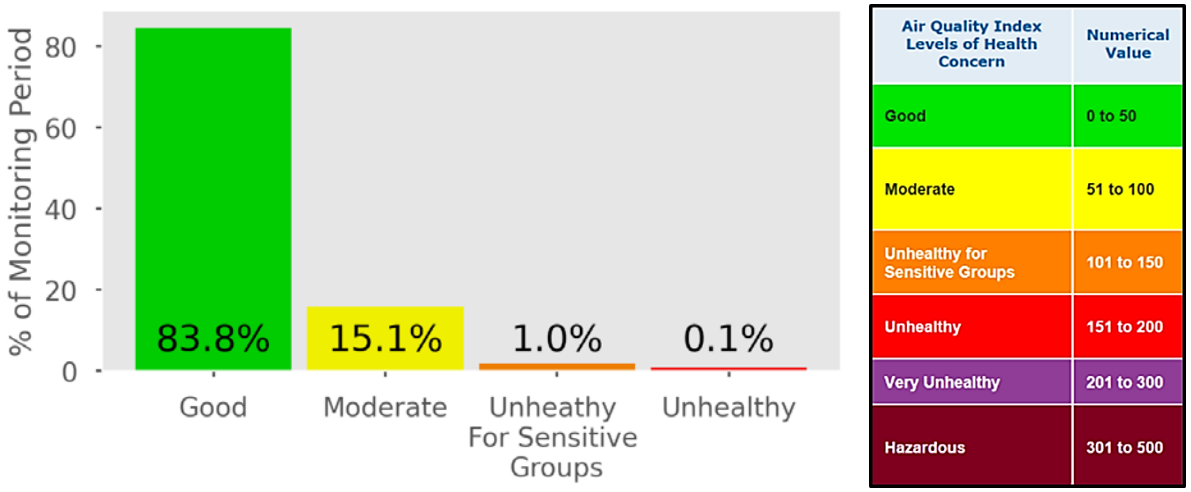

Figure 3. The Air Quality Index (AQI) in Lost Hills during the SNAPS monitoring period (May 2019 – April 2020), based on a rolling 24-hr average for $PM_{2.5}$ and rolling 8-hr average for O_3.

Concentrations of many pollutants measured at the SNAPS trailer followed clear trends likely influenced by atmospheric conditions, including but not limited to wind speed and direction. For example, stable atmospheric conditions, which often occur overnight, can trap emissions near the ground level, causing increased concentrations of air pollutants. Changing atmospheric conditions over time can dilute or concentrate air pollutant concentrations. Figure 4 illustrates the atmospheric influence on air quality in Lost Hills; concentrations of black carbon (BC), BTEX (benzene, toluene, ethylbenzene, and xylenes), methane (CH_4), CO, and hydrogen sulfide (H_2S) were elevated overnight and in the early morning hours.

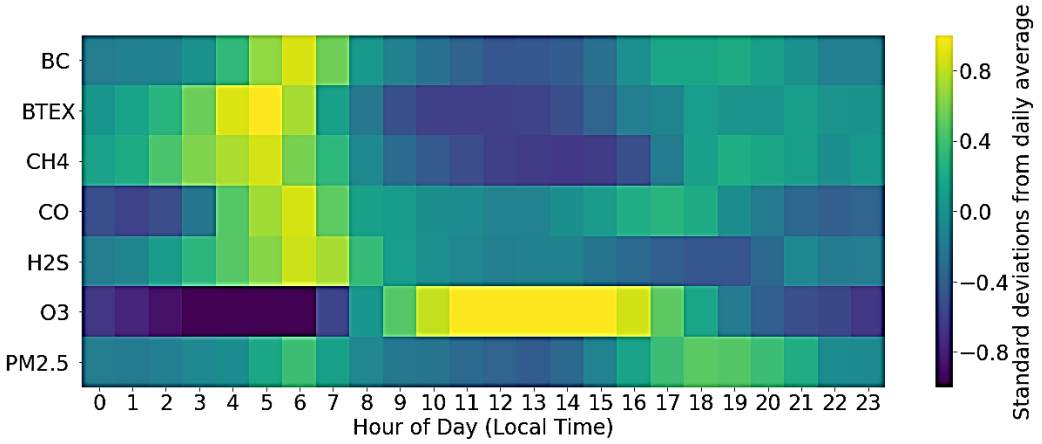

Figure 4. Heat map denoting the relative hourly concentrations of black carbon (BC), BTEX (benzene, toluene, ethylbenzene, and xylenes), methane (CH_4), carbon monoxide (CO), hydrogen sulfide (H_2S), ozone (O_3), and $PM_{2.5}$.

Similarly, higher overnight and early morning pollutant concentrations were observed during the fall and winter compared to the spring and summer, also likely due to stable atmospheric conditions.[9]

In addition to the overall trend of increasing overnight pollutant concentrations, Figure 4 shows $PM_{2.5}$ and ozone have other distinguishing concentration profiles. $PM_{2.5}$ concentrations peaked in both the early morning and evening hours. Peak concentrations of ozone occurred during the middle of the day, consistent with photochemical (sun-driven) processes.

Is Lost Hills disproportionally affected compared to other areas in the Central Valley?

Based on the current analysis of SNAPS data, for most pollutants measured in Lost Hills, the air quality was comparable to other areas in the Central Valley. A notable exception was acrolein, the concentrations of which were elevated in Lost Hills compared to other areas in the Central Valley. More information regarding air quality comparisons is discussed below.

$PM_{2.5}$ and Ozone

$PM_{2.5}$ concentrations in Lost Hills were relatively stable throughout the year, with a sharp increase in concentrations seen across the Central Valley and in Lost Hills in October and November 2019, coinciding with a period of stronger winds (Figure 5). Elevated concentrations of metals were measured in Lost Hills and throughout the Central Valley,

[9] To interpret Figure 4, note that the hour of day is located on the horizontal (x-) axis, with the pollutant labeled on the vertical (y-) axis. Each box shaded in warm colors (i.e., yellow) denotes concentrations higher than the average observed during that hour throughout the year of monitoring, while a box shaded in cool colors (i.e., blue) denotes concentrations lower than the average. For reference, midnight is the zeroth hour and noon is the 12th hour.

suggesting that wind-blown dust was one contributor to the increase in $PM_{2.5}$.[10] Additional analysis showed a large increase in inorganic aerosols, likely from mobile and agricultural sources, and is typical for the fall/winter in the Central Valley. Organic $PM_{2.5}$ also increased in October and November, likely from wildfire smoke (such as the Kincade Fire in Sonoma County) and the transition to wood burning heat sources as the temperature dropped toward the end of the year.

Thereafter, concentrations of $PM_{2.5}$ sharply decreased regionally by December 2019, with smaller increases and decreases observed through May 2020. $PM_{2.5}$ concentrations in Lost Hills tended to follow the levels seen at other regional monitors, though concentrations in Lost Hills were, on average, lower than those observed across the Central Valley.

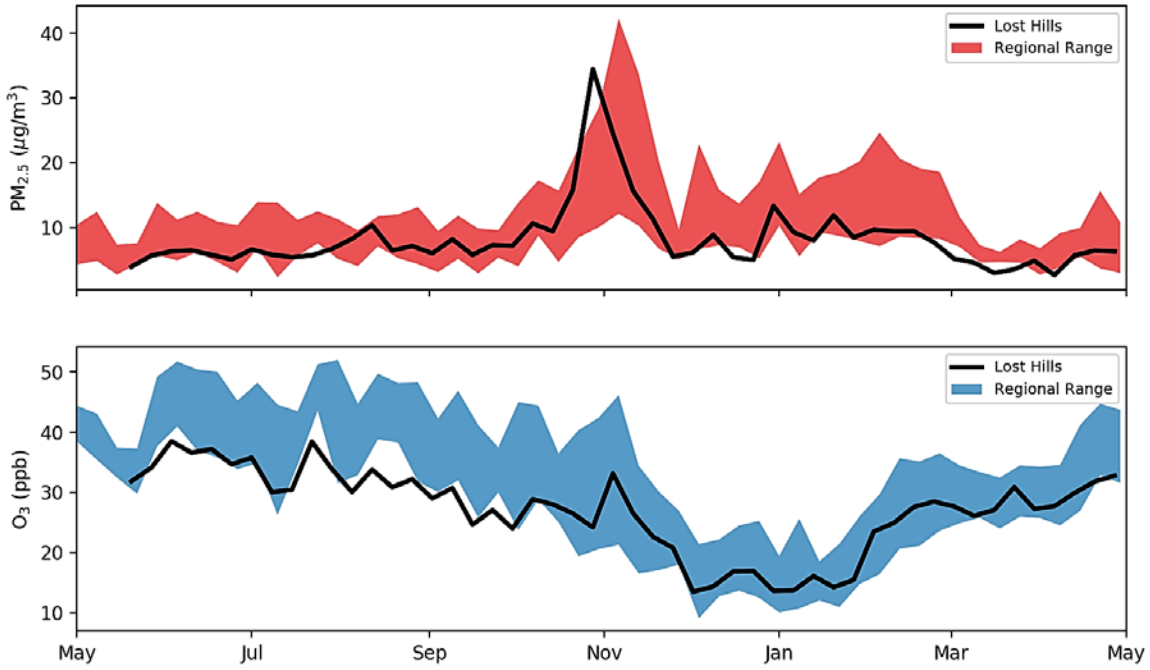

Figure 5. Seven-day average of $PM_{2.5}$ (top) and O_3 (bottom) at the Lost Hills monitoring site (black line) and the range for other sites in the region (shaded area).[11]

Ozone concentrations in Lost Hills and across the Central Valley gradually decreased from summer 2019 through winter 2019-20. Minimum ozone concentrations occurred in December-February then gradually increased across the region through May 2020. This summer maximum and winter minimum were expected, consistent with increased temperatures and sunlight resulting in greater ozone formation during the summer, and less

[10] Based on speciated filter measurements and analysis.

[11] $PM_{2.5}$ and O_3 regional data include 10 sites from the Central Valley (Manteca, Tracy, Modesto, Turlock, Visalia, Hanford, Corcoran, Porterville, Oildale and Bakersfield).

ozone formation during the cooler winter months. Like $PM_{2.5}$, ozone concentrations in Lost Hills followed similar trends as the rest of the Central Valley but were on average lower.

Acrolein

Further characterization of air quality was carried out by comparing the concentrations of toxic pollutants in Lost Hills with those at other sites in the Central Valley. Acrolein and BTEX are shown in Figure 6. These sites were selected based on their geographic proximity to Lost Hills.

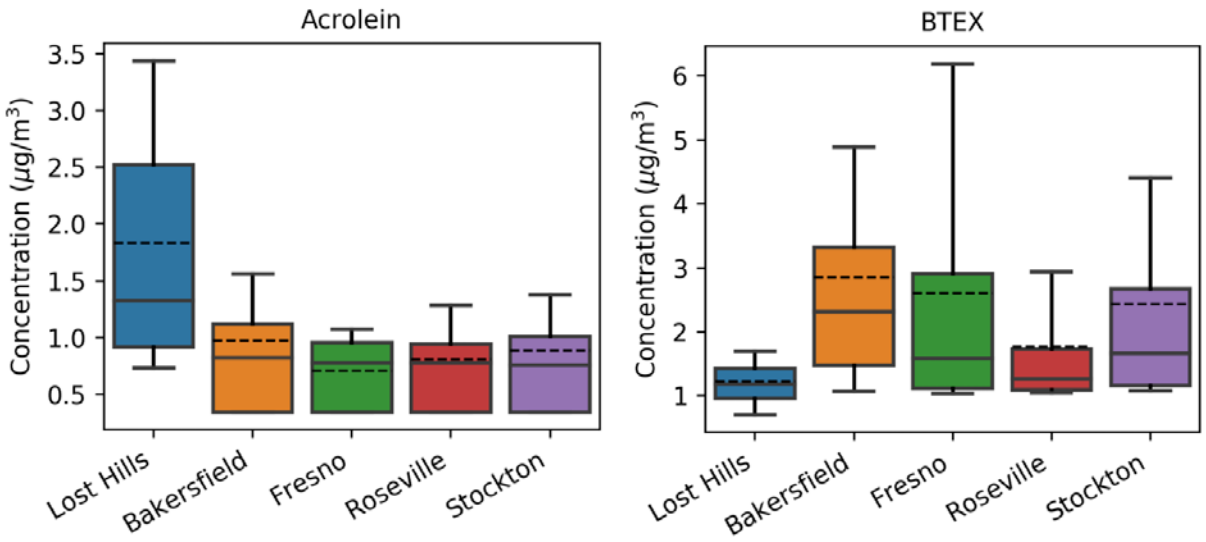

Figure 6. Concentrations of acrolein (left) and BTEX (right) measured in Lost Hills vs. at four regional sites in the Central Valley. Data for other regional sites are from the iADAM dataset[12] for the years 2016-2019. The median concentration at each site is denoted by individual solid lines within each box while the mean (average) concentration is denoted by individual dashed lines within each box.

Benzene (a component of BTEX) ranked as one of top four contributors to cancer risk in Lost Hills; however, benzene concentrations did not pose a substantial noncancer health risk. Concentrations of many compounds measured in Lost Hills, such as BTEX, were comparable to or less than concentrations across the Central Valley. However, acrolein was significantly elevated. Acrolein was the largest contributor to the noncancer risk, with potential health effects including eye irritation and damage to the respiratory tract. [13] To provide a holistic picture of health risk of toxics pollutants, OEHHA conducted a cumulative health risk assessment. A more detailed analysis on the health impacts of acrolein measured in Lost Hills, particularly noncancer health impacts, is discussed later in this document.

Acrolein can come from many sources including combustion processes (e.g., automobile and diesel exhaust on and off oil fields), photochemical reactions in the atmosphere, plants, and

[12] iADAM: Air Quality Data Statistics. CARB. https://www.arb.ca.gov/adam/
[13] Acrolein. OEHHA. https://oehha.ca.gov/chemicals/acrolein

is used as a pesticide/biocide in agriculture, water systems, and oil field operations. However, despite SNAPS localized monitoring and comprehensive data analysis, the relative contribution of these and other potential sources to the acrolein air concentration in Lost Hills remains unclear. CARB staff have since worked to developed novel sampling and analysis methods, which might improve our understanding of acrolein levels in Lost Hills (see Next Steps section below).

What are the potential sources of the measured air pollutants?

There are several sources near the community of Lost Hills that may have an impact on air quality (Figure 7), including:

- Mobile sources (I-5 east of town and SR 46 traversing directly through the community)
- Lost Hills Oil Field (including wells [nearest active well roughly 5100 feet from monitoring site], storage tanks, compressors, separators, and the gas processing plant)
- Local natural gas distribution and transmission pipelines in Lost Hills
- A landfill, aqueduct, and wastewater treatment facility
- Agriculture, composting facilities, a nut processing facility, additional oil fields, and other regional sources not depicted in Figure 7

Staff monitored air quality using intensive monitoring approaches[6] and carried out source apportionment analysis (e.g., polar frequency plots and positive matrix factorization; Figures 8 and 9, detailed below) to investigate the contributions of these sources to the measured air pollutants. In addition, staff utilized results from other CARB programs to understand the effects of these sources on air quality in Lost Hills.

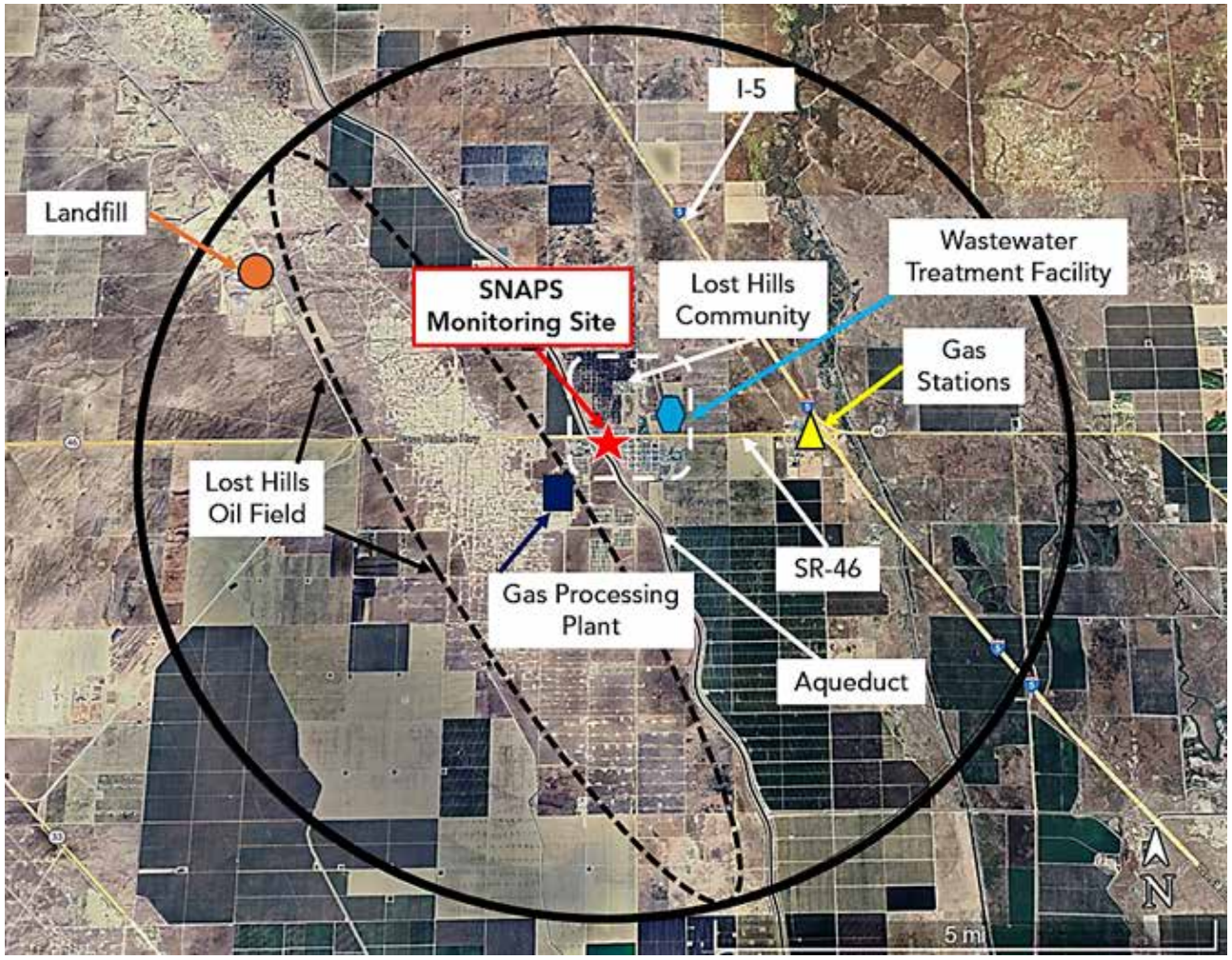

Figure 7. Map of the greater Lost Hills area showing the town of Lost Hills (white dashed line), the monitoring site (red star), and various potential sources of air pollution within five miles of the monitoring site, including the Lost Hills Oil Field (black circle), the gas processing plant (dark blue rectangle), gas stations (yellow triangle), landfill (orange circle), wastewater treatment facility (light blue hexagon), aqueduct, and SR-46 highway and I-5 freeway.

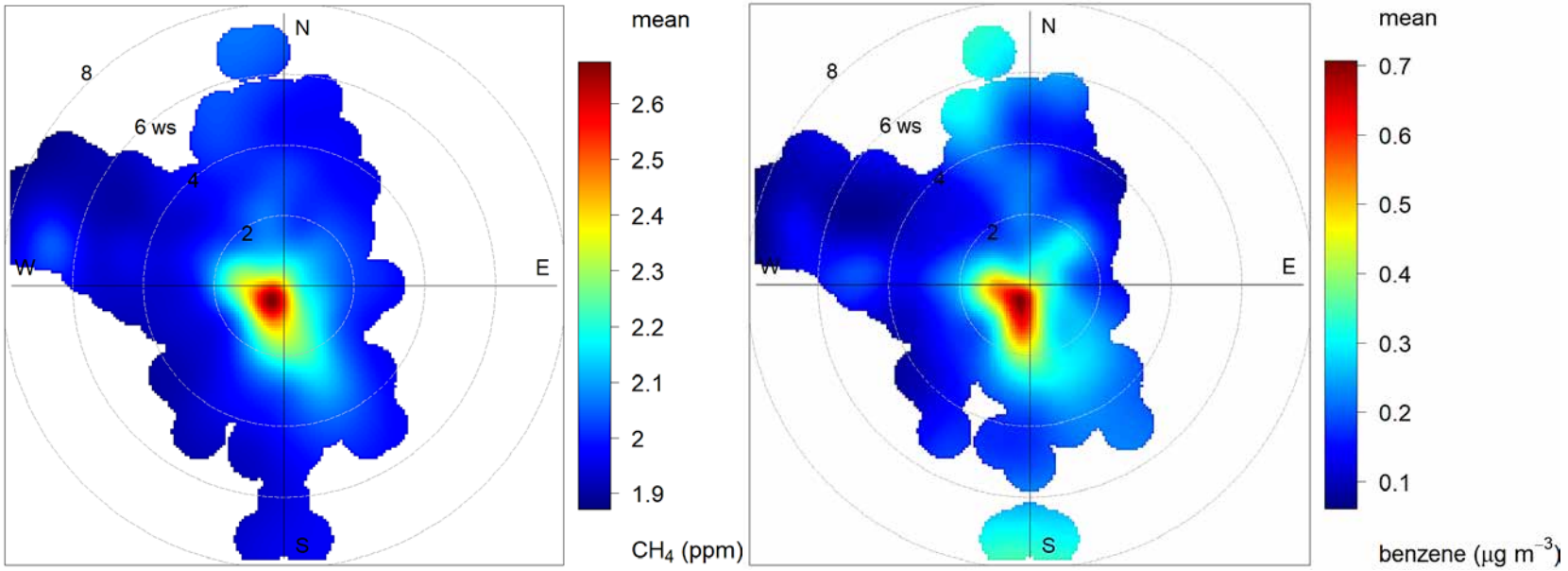

Figure 8. Polar plots[14] for methane (CH_4) and benzene. Successively increasing wind speeds are shown further from the center of each plot, with the average value of each pollutant concentration at that specific wind speed and wind direction shaded according to the keys on the right.

[14] Openair. Tools for the Analysis of Air Pollution Data. https://www.rdocumentation.org/packages/openair/versions/2.8-1

Stationary and mobile monitoring results indicated increased hydrocarbons and VOCs when the wind was coming from the direction of the gas processing plant. As shown in Figure 8, when winds were light and from the southwest, concentrations of methane and benzene (and several other hydrocarbons/VOCs, not pictured) were measured at their highest average concentrations. These findings expand on those illustrated in the previous heat map (Figure 4), indicating that the highest concentrations of many VOCs and hydrocarbons not only occurred during the evening and overnight hours, but also when wind was coming from the southwest. Furthermore, these correlations to wind speed and direction were consistent across all four seasons, with the most elevated concentrations of these pollutants occurring when winds originated from the southwest. One exception was during the Fall season, when elevated hydrocarbon and VOC concentrations were observed when wind was coming from both the southwest and the west-northwest. More figures illustrating these findings can be found in the complete Lost Hills Final Report, Section 3.5.2.

While it is possible fugitive emissions from wells, storage tanks, and compressors may have contributed to these observations, corroborating evidence from other monitoring projects, including FluxSense[15], JPL methane source finder[16], and SNAPS mobile monitoring, indicate the gas plant as a likely source of emissions.

Additional analysis of SNAPS data with oil field activity (e.g. well stimulation ("fracking"), workover, drilling events) indicated these activities are not well correlated with air pollutant concentrations measured at the trailer. However, this does not preclude oil field activities from impacting air quality in Lost Hills.

Mobile monitoring detected two natural gas leaks in residential areas of Lost Hills: one on October 30, 2019 and the second on January 15, 2020, at separate locations. CARB staff immediately reported these leaks to the Southern California Gas Company (SoCalGas) to have the equipment quickly inspected and repaired.

In response to feedback from the community and other interested parties, CARB staff conducted additional source apportionment analysis[17] to evaluate how various source types and source categories contribute to the air quality in the Lost Hills community. The source apportionment analysis focused on a group of VOCs and BC, which are important contributors to health risk and bear the information necessary to identify potential sources. Note, only the data collected in near real-time were used for source apportionment analysis. The analysis indicated that BC was mostly from mobile sources, VOCs were mostly from oil and gas-related sources (including, but not limited to, gas stations, natural gas distribution lines, and oil production and processing), and BTEX was from both mobile sources and oil and gas-related sources (Figure 9).

[15] FluxSense. Toxic Air Contaminant and Greenhouse Gas Measurements near Oil and Gas Operations and Proximate Communities. https://ww2.arb.ca.gov/resources/documents/toxic-air-contaminant-and-greenhouse-gas-measurements-near-oil-and-gas.

[16] CARB. Methane Source Finder. https://msf.carb.arb.ca.gov/map.

[17] Positive Matrix Factorization model for environmental data analyses. U.S. EPA. https://www.epa.gov/air-research/positive-matrix-factorization-model-environmental-data-analyses

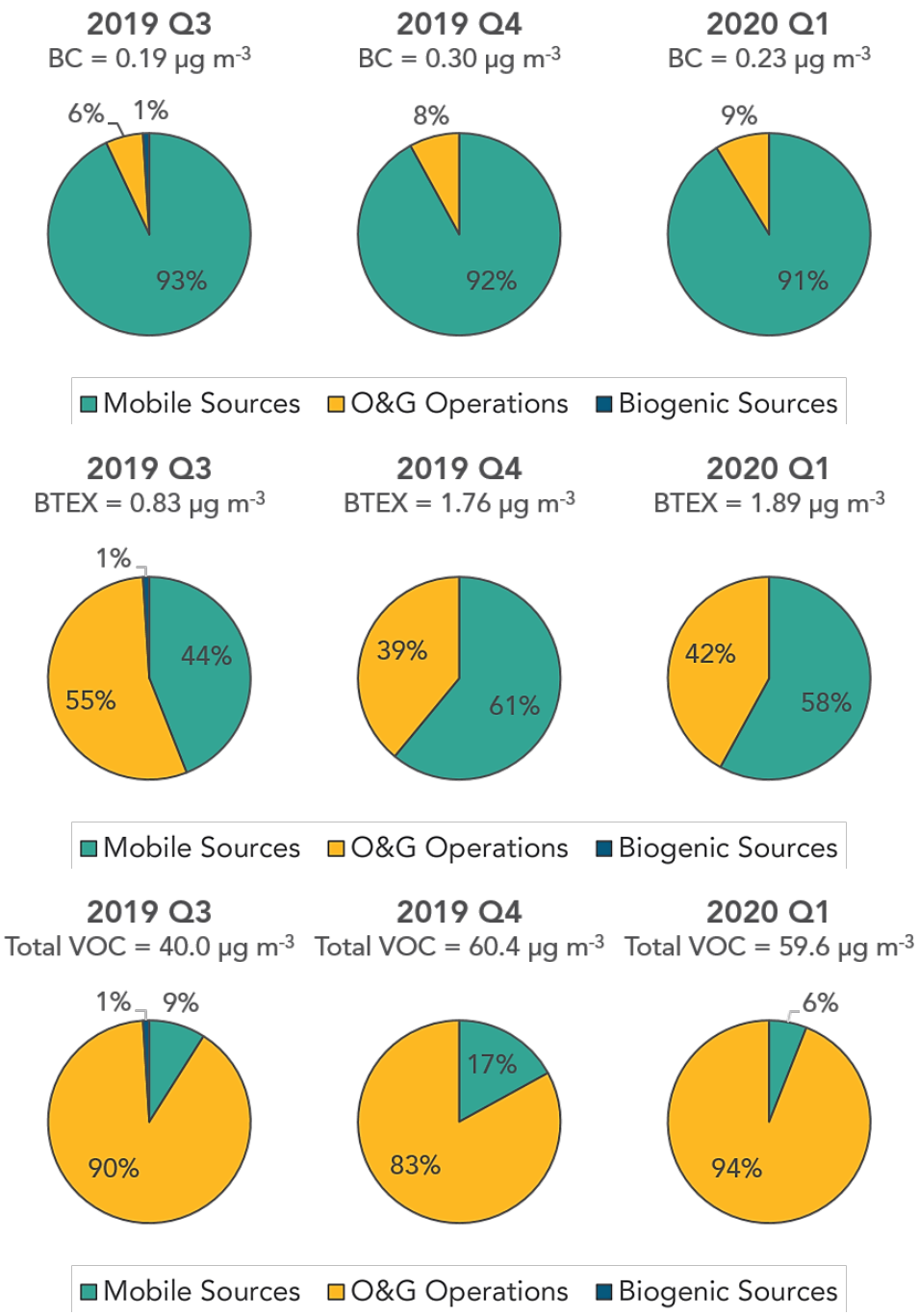

Figure 9. Summary of quarterly SNAPS source apportionment results, showing BC (top), BTEX (middle), and VOCs (bottom) contributions from mobile sources, oil- and gas- related (O&G) sources, and biogenic sources. The concentrations represent the quarterly sum.

There was also a small, but discernable contribution of biogenic emissions[2] in the third quarter of 2019, which was expected and is consistent with the detection of isoprene as reported in the scientific literature.

It is important to note that this source apportionment analysis cannot differentiate between BC, BTEX, and VOC emissions from vehicles on the highway versus vehicles/equipment operating within or near the oil field. As a result, the mobile source category includes emissions from vehicles on the roadways and within the oil field. BC is often used as a surrogate for diesel PM, which is important from a health perspective as covered in the health analysis below. This analysis also indicates a large majority of VOC emissions are from oil and gas-related operations. However, many of the individual VOCs driving this result are not at concentrations at which health impacts are expected (see below).

Are there elevated health risks associated with air quality in the community?

Cancer Risk

The cumulative cancer risk from all carcinogenic (cancer-causing) compounds measured in Lost Hills, both anthropogenic and biogenic[2], was estimated to be 710 per million (Figure 10). The cumulative cancer risk estimate means that breathing Lost Hills air over a lifetime is estimated to increase cancer risk by as many as 710 cases per million exposed individuals. As a percentage, this risk represents a 0.071% chance of getting cancer, or nearly 1/10th of 1%. It is possible that the cumulative cancer risk from ambient air pollution in Lost Hills may be higher, as acrolein, a recently identified carcinogen[18], was not evaluated quantitatively in the assessment due to lack of a cancer potency value. OEHHA is exploring the development of a cancer potency value for acrolein, which would facilitate assessment of acrolein in future SNAPS risk assessments.

These risk estimates are referred to as excess cancer risk, meaning they represent an increase in risk on top of the cancer risk already present due to other factors such as age, genetics, diet, obesity, and smoking[19]. Risk estimates for 13 of the 17 carcinogens evaluated exceeded a threshold of concern for cancer risk among the general population of one in a million (0.000001). After diesel PM (65%), the next greatest contributors to cancer risk were carbon tetrachloride (9%)[20] and formaldehyde (9%).[21] The risk calculation was estimated using approximately one year of air monitoring data but assumes continuous lifetime exposure to these concentrations for 70 years; as a result, the true risk may be different from the estimate. Diesel PM exposure often drives cancer risk assessments of ambient air pollution across the United States and in California, as it did in this assessment, contributing 65% of the cancer risk. An air monitoring study of the Inglewood Oil Field in Los Angeles (the Baldwin Hills Air Quality Study)[22], estimated diesel PM levels based on BC (as in this study) and found that ~74% of the excess cancer risk from ambient air from all sources was attributable to diesel PM. Similarly, a study of the South Coast Air Basin (which includes Los Angeles) found that diesel PM contributed 68% of the cancer risk based on air monitoring data and 76% based on computer-modeled concentrations[23].

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[18] International Agency for Research on Cancer. 2021. Carcinogenicity of acrolein, crotonaldehyde, and arecoline. Lancet Oncol 22(1):19-20.

[19] NCI (National Cancer Institute). 2015. Risk Factors for Cancer. National Cancer Institute, National Institutes of Health https://www.cancer.gov/about-cancer/causes-prevention/risk

[20] Carbon tetrachloride was produced in large quantities to make refrigerants and propellants for aerosol cans.

[21] Potential sources of formaldehyde include vehicle emissions, pesticides, and oil and gas production.

[22] STI (Sonoma Technology Inc.). 2015. Baldwin Hills Air Quality Study. https://planning.lacounty.gov/assets/upl/project/bh_air-quality-study.pdf

[23] SCAQMD 2015. Final Report: Multiple Air Toxics Exposure Study in the South Coast Air Basin. MATES-IV. https://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-iv

Beyond diesel PM, a comparison of data from other California locations (Figure 11), including the Central Valley, showed similar cancer risk estimates for three of the other top four pollutants contributing to risk in the Lost Hills study (carbon tetrachloride, formaldehyde, and benzene). Note that while similar, the estimated cancer risks for these three pollutants in all of the locations (including Lost Hills) exceed one in a million and are thus of concern. The Bakersfield, Fresno, Roseville, and Stockton sites were selected based on their geographic proximity to Lost Hills, while the statewide average is presented for context at a larger scale, the South Coast Air Basin MATES IV study is presented as an example of an ambient air assessment for a region (Los Angeles area), and the Baldwin Hills Air Quality Study as the only available air monitoring study of an oil field in California identified. An advantage of the Bakersfield, Fresno, Roseville, and Stockton data is that these compounds (carbon tetrachloride, formaldehyde, and benzene) were measured using the same methods as in SNAPS.

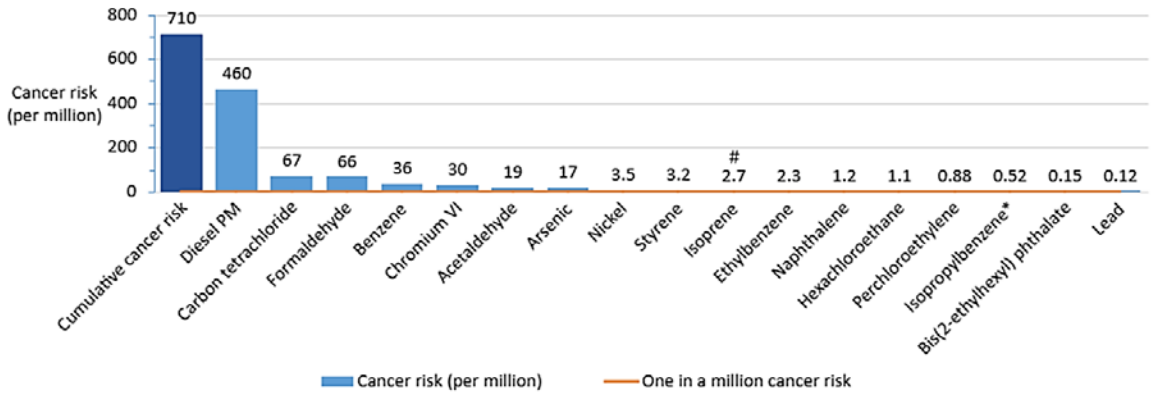

Figure 10. Cancer risk estimates for carcinogens measured in Lost Hills air.[24]

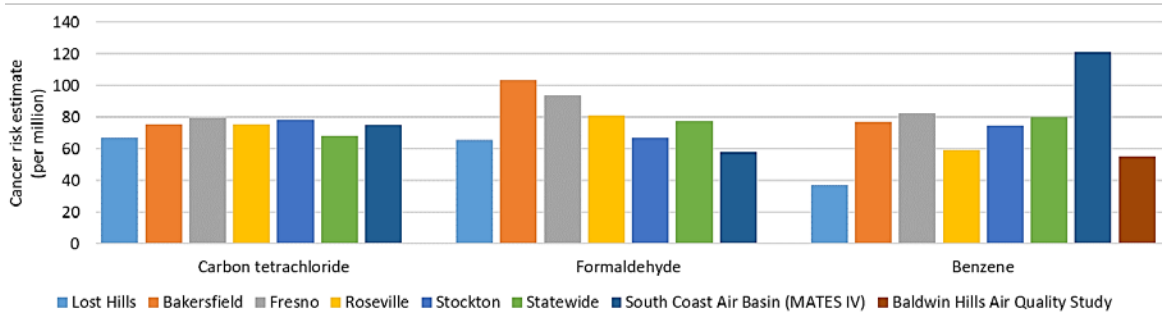

Figure 11. Cancer risk estimate comparisons for carbon tetrachloride, formaldehyde, and benzene.[25]

[24] Cumulative cancer risk (dark blue bar) and cancer risk estimates for each compound (lighter blue bars) are arranged by cancer risk in decreasing order. The orange horizontal line represents one in a million cancer risk, which is a threshold of concern for cancer among the general population. *Indicates that the health guidance value used to calculate risk for isopropylbenzene is provisional (not derived by OEHHA). #Indicates that isoprene is likely from biogenic sources.

[25] Based on average concentrations from: (1) SNAPS discrete data for Lost Hills (2019-2020), (2) various Central Valley sites (2016-2019)[12], (3) Statewide (2017 for formaldehyde and 2018 for carbon tetrachloride and benzene)[12], (4) MATES IV (2012-2013)[23], and (5) the Baldwin Hills Air Quality Study (2013)[22].

Noncancer Risk

For noncancer health effects, risk from individual pollutants is summed to give the hazard index (HI), which reflects the likelihood that a target organ (such as the respiratory system) will be affected by exposure. Noncancer health risk is determined with a hazard quotient (HQ), which is the ratio between the exposure and the health guidance value (HGV). Health-protective assumptions are built into the HGVs such that adverse outcomes may not occur even when they are exceeded, though harm from the compounds cannot be ruled out. In addition, lifestage (pregnancy, infancy, elderly), health status, genetics, lifestyle choices, and other factors can influence risk. HGVs take these factors into account so that the most sensitive individuals in a population will be protected.

The risk to the respiratory system, in terms of both acute and chronic noncancer risk, was largely driven by acrolein. For acute (short-term) exposures, acrolein and dimethyl disulfide (DMDS) were the only pollutants detected at a maximum concentration with the potential to cause adverse noncancer health effects, specifically, eye irritation (acrolein) and damage to the respiratory tract (acrolein and DMDS). People with asthma may be more sensitive to effects from acrolein. Epidemiology studies have reported an increased prevalence of past-year asthma in children in classrooms with high acrolein levels and a positive association between acrolein exposure and exercise-induced asthma in children.[26,27,28] For chronic (long-term) exposures, acrolein was the only pollutant detected at an average concentration with the potential to cause adverse noncancer health effects, specifically, effects to the respiratory system.

Beyond acrolein and DMDS, individual pollutants by themselves do not appear to pose a noncancer health risk in Lost Hills. Results did indicate, however, that due to cumulative exposure to multiple chemicals there is the potential for health effects to the respiratory system and eyes from acute (short-term) exposures as well as health effects to the respiratory and nervous systems from chronic (long-term) exposures (Figure 12).

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[26] Kuang, H., Li, Z., Lv, X., Wu, P., Tan, J., Wu, Q., Li, Y., Jiang, W., Pang, Q., Wang, Y., & Fan, R. 2021. Exposure to volatile organic compounds may be associated with oxidative DNA damage-mediated childhood asthma. Ecotoxicol Environ Saf, 210, 111864.

[27] Sakellaris, I., Saraga, D., Mandin, C., de Kluizenaar, Y., Fossati, S., Spinazzè, A., Cattaneo, A., Mihucz, V., Szigeti, T., de Oliveira Fernandes, E., Kalimeri, K., Mabilia, R., Carrer, P., & Bartzis, J. 2021. Association of subjective health symptoms with indoor air quality in European office buildings: The OFFICAIR project. Indoor Air, 31(2), 426-439.

[28] Annesi-Maesano, I., Hulin, M., Lavaud, F., Raherison, C., Kopferschmitt, C., de Blay, F., Charpin, D. A., & Denis, C. 2012. Poor air quality in classrooms related to asthma and rhinitis in primary schoolchildren of the French 6 Cities Study. Thorax, 67(8), 682-688.

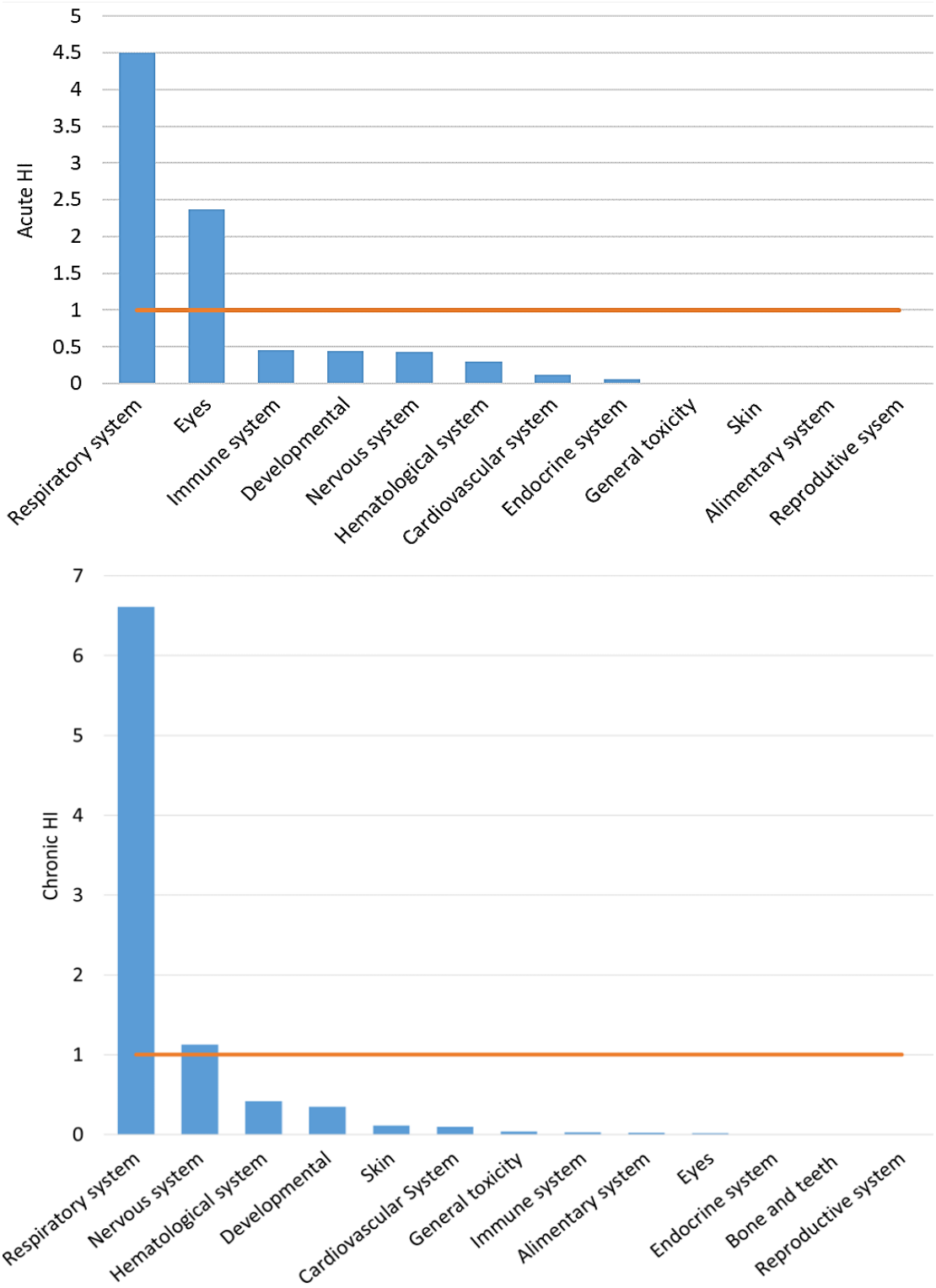

Figure 12. Acute (top) and chronic (bottom) hazard indices (HIs) which combine hazard quotients (HQs) for compounds with the same target organ. The orange horizontal line indicates an HI of one, below which health effects are not expected to occur.

Health Analysis for Criteria Pollutants and Hydrogen Sulfide

Concentrations of all criteria pollutants and hydrogen sulfide measured in Lost Hills met ambient air quality standards for $PM_{2.5}$, ozone (O_3), CO, hydrogen sulfide (H_2S), and lead (Figure 13). However, exposures to these pollutants at levels below the standards can add to the health risks for the air toxics evaluated in this assessment. As shown in Figure 13, the $PM_{2.5}$ and O_3 levels were measured closest to the standards, with concentrations representing 81% of the 24-hr National Ambient Air Quality Standards ($PM_{2.5}$) and 86% of the 8-hr California Ambient Air Quality Standards (O_3).

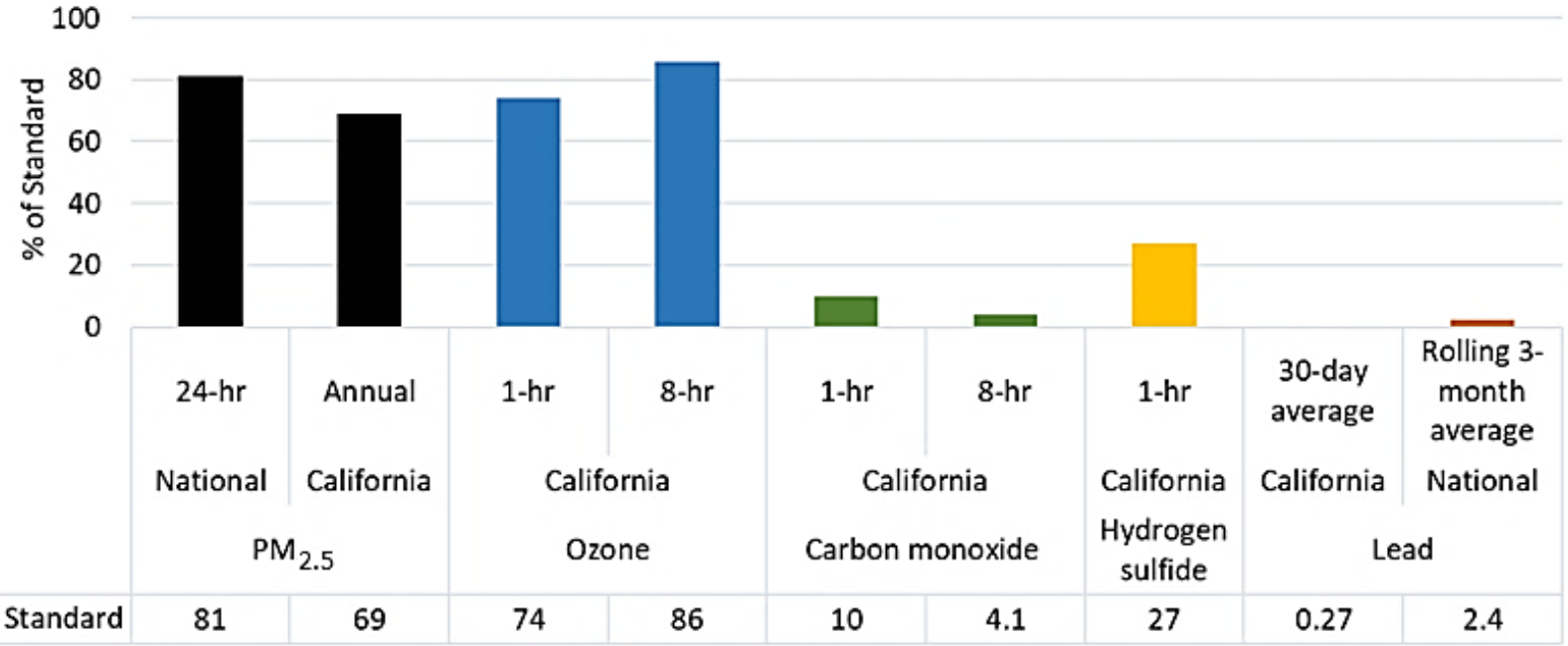

Figure 13. Concentrations of criteria air pollutants and hydrogen sulfide measured in Lost Hills as a percent (%) of relevant ambient air quality standards (California or National). The values plotted relative to the standard are (from left to right) the daily 24-hr 98th percentile for $PM_{2.5}$, average of hourly data over the monitoring period for $PM_{2.5}$, daily 1-hr and 8-hr maximum values for ozone, daily 1-hr maximum and rolling 8-hr maximum for carbon monoxide, daily 1-hr maximum for hydrogen sulfide, and the maximum 30-day average and maximum rolling 3-month average for lead.

Actions and Ongoing Work

SNAPS monitoring and analysis has characterized air quality and its potential health effects on the Lost Hills community. Actions that were and are being taken based on the results include the following:

1. Staff immediately responded to two separate natural gas leaks detected in Lost Hills by calling SoCalGas to have the leaking equipment inspected and repaired.
2. SNAPS stationary and mobile monitoring indicate that the gas processing plant is a potential source of pollution to the community. This finding is consistent with previous monitoring projects such as the JPL methane source finder and FluxSense. In January 2021, the local air pollution control district conducted an inspection of the facility as part of their annual inspections and issued a Notice of Violation for a component leak exceeding 50,000 parts per million (ppm) VOCs. There was also a separate leak for a component subject to California's Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities regulation cited under the registration for facility S-2010 near the gas plant. The operator fixed these leaks on the same day they were discovered, and they were reinspected by District staff to confirm compliance. The air district also conducted inspections of S-55 in November and December 2022. Two NOVs were issued as a result of the inspections. The first NOV was for three leaks exceeding 50,000 ppm, which were repaired and re-inspected by the facility and confirmed repaired by air district staff. The second NOV was issued for a leak exceeding 50,000 ppm, which was repaired and re-inspected the same day. Additionally, as part of the California Environmental Protection Agency's (CalEPA) Environmental Justice Task Force, compliance information and coordination of inspections of facilities like the gas processing plant near Lost Hills are underway and include US Environmental Protection Agency, California Environmental Protection Agency, CARB, local Air Districts, state and local Water Boards, Department of Toxic Substances Control, and California Geologic Energy Management Division (CalGEM). Coordinated multiagency inspections of other facilities have been conducted in other communities in the San Joaquin Valley such as Shafter, Arvin, Maricopa, Fellows, and Bakersfield. At a joint inspection of the Cahn 3 gas processing plant in December 2021, the task force noted a violation on a gas separator with a leak concentration of 90,000 PPM methane. The leak was immediately fixed, and the team checked and confirmed repair before leaving the site.
3. SNAPS data indicates mobile sources and oil- and gas-related operations are substantial pollution sources with potential health impacts to the Lost Hills community. The State of California recently passed legislation to address some of these pollution sources. Recently signed legislation included locking in a pathway to

carbon neutrality by no later than 2045[29] and establishing a 3200-foot buffer zone between sensitive populations and oil and gas-related operations[30].

4. CARB, and the State of California, continue to make progress reducing pollution from mobile sources. To continue California's history of leadership in reducing pollution from mobile sources, Governor Newsom issued an Executive Order (EO) in 2020 that requires all new cars and passenger trucks sold in California to be zero emission by 2035. The EO also sets a goal for all medium and heavy-duty trucks to transition to zero emission by 2045, where feasible (with drayage trucks transitioning to zero-emission by 2035). Additionally, the EO sets a zero-emission goal for off-road vehicles and equipment by 2035. Implementation of this EO, as well as additional regulations and incentive programs adopted by CARB, will mean substantial air quality improvements for the Lost Hills community and the Central Valley more broadly. CARB has also made significant efforts to reduce diesel emissions over the last several decades since identifying diesel particulate matter (DPM), the largest contributor to cancer risk in Lost Hills, as a TAC in 1998.[31] CARB expects that under currently adopted programs, DPM emissions will decrease 52% by 2050 compared to a 2020 baseline.[32,33] This is beyond the substantial reductions already achieved prior to 2020.[31]
5. Oil and gas-related sources are also a major source category impacting Lost Hills. In April 2021, Governor Newsom directed CalGEM to stop issuing new hydraulic fracturing permits by 2024 and requested that CARB analyze pathways to phase out oil extraction by 2045.[34] CARB's 2022 Scoping Plan for Achieving Carbon Neutrality lays out a path to achieve targets for carbon neutrality and reduce anthropogenic GHG emissions by 85 percent below 1990 levels no later than 2045, as directed by Assembly Bill 1279. The actions and outcomes in the plan will achieve: significant reductions in fossil fuel combustion by deploying clean technologies and fuels, further reductions in short-lived climate pollutants, support for sustainable development,

[29] Muratsuchi. 2022. AB 1279. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB1279.
[30] Gonzalez and Limon. 2022. SB 1137. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB1137.
[31] CARB. Overview: Diesel Exhaust and Health. https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health.
[32] CARB. 2025 Mobile Source Strategy. https://ww2.arb.ca.gov/resources/documents/2025-mobile-source-strategy.
[33] CARB. 2025 Mobile Source Strategy Public Webinar January 23, 2024. https://ww2.arb.ca.gov/sites/default/files/2024-01/2025%20MSS%20Kick-Off%20Webinar_ADA.pdf.
[34] Office of Governor Gavin Newsom. "Governor Newsom Takes Action to Phase Out Oil Extraction in California." https://www.gov.ca.gov/2021/04/23/governor-newsom-takes-action-to-phase-out-oil-extraction-in-california/.

increased action on natural and working lands to reduce emissions and sequester carbon, and the capture and storage of carbon.[35,36]

Next Steps

1. While the local air district conducts annual inspections of oil and gas facilities, additional inspections may be conducted as a result of public complaints and equipment breakdowns.
2. Acrolein concentrations were found to pose noncancer health risks to the Lost Hills community and were substantially increased compared to other regional sites. A recently identified carcinogen, acrolein was not included in the cancer risk assessment due to lack of a cancer potency value. OEHHA is exploring the development of a cancer potency value for acrolein, which would facilitate assessment of acrolein in future SNAPS risk assessments. In addition, source identification for acrolein in this report was limited by the available analytical method, which had a low sampling frequency and low time resolution. CARB staff have worked on new monitoring approaches which employ state-of-the-art techniques. These new techniques enable ambient measurements of acrolein with hourly time resolution (i.e., more frequent measurements) and allow improved source apportionment analysis. Further investigation of acrolein sources will focus on two sampling periods (summer and winter) when the elevated acrolein concentrations were observed during SNAPS in Lost Hills. CARB staff collected the first round of additional acrolein measurements in February 2025 and will soon carry out or facilitate further monitoring of acrolein and other VOCs. After this additional data is collected, source apportionment analysis will be performed to explore potential sources contributing to acrolein concentrations in Lost Hills. CARB and OEHHA staff have been and will continue to collaborate with the Lost Hills community throughout the sampling plan process.
3. From June 2023 through March 2025, staff conducted air monitoring in the next community selected for the SNAPS program, communities near the Inglewood Oil Field. Staff monitored air quality at two stationary sites, and deployed the mobile monitoring vehicle, to characterize air quality near the Inglewood Oil Field for more than one year. CARB and OEHHA staff are currently analyzing the data obtained from the Inglewood Oil Field communities' monitoring study, allowing for a comparison between the rural Lost Hills site and the urban Inglewood Oil Field communities sites. Preliminary data analysis updates for these communities were released in February

[35] CARB. AB 32 Climate Change Scoping Plan. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan.
[36] CARB. 2022 Scoping Plan Documents. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

2024 and January 2025.[37,38] As staff continue to analyze data from Inglewood Oil Field community monitoring, they will be evaluating next steps for SNAPS. Staff will consider opportunities to improve the program based on lessons learned, including logistical constraints of siting and maintaining monitoring equipment, as well as where to monitor next based on needs of the State and communities.

Data obtained from the SNAPS Lost Hills monitoring study was released with this report and can be found on the SNAPS website. These data can be used for further analysis by regulatory agencies and interested parties.

Resources

SNAPS

- Email: *SNAPS@arb.ca.gov*
- Website: *https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources* (Full list of relevant SNAPS links in Appendix A of full draft report)
    - Quality Assurance Project Plan
        - *https://ww2.arb.ca.gov/resources/documents/quality-assurance-project-plan-study-neighborhood-air-near-petroleum-sources*
    - Lost Hills Air Monitoring Plan
        - *https://ww2.arb.ca.gov/resources/documents/lost-hills-air-monitoring-plan-snaps*
- For general questions, call (279) 208-7687

Reporting air quality and odor complaints (Kern County)

- Visit IVAN Kern[39]: *https://www.kernreport.org/*
- Call SJVAPCD[40] at (800) 926-5550

CARB Community Air Protection Program Resource Center

- Website: *https://ww2.arb.ca.gov/ocap_resource_center*
    - *Introduction to Community Air Quality*
        - *https://ww2.arb.ca.gov/introduction-community-air-quality*
    - *Community Health*
        - *https://ww2.arb.ca.gov/our-work/programs/community-health*

[37] CARB. SNAPS Inglewood Oil Field Communities Update: February 2024. https://ww2.arb.ca.gov/resources/documents/snaps-inglewood-oil-field-communities-update-february-2024.
[38] CARB. SNAPS IOF Communities Data Analysis Update and Community Meeting: January 2025. https://ww2.arb.ca.gov/resources/documents/snaps-iof-communities-data-analysis-update-and-community-meeting-january-2025.
[39] IVAN Kern. https://www.kernreport.org/
[40] SJVAPCD. File a Complaint. https://ww2.valleyair.org/file-a-complaint