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Maywood, Commerce (east), Vernon, Bell
Community Air Monitoring Plan

California Statewide Mobile Monitoring Initiative (SMMI)

September 2025

Prepared by Aclima, Inc.
in partnership with Breathe SoCal and the SMMI Project Expert Group

CALIFORNIA CLIMATE INVESTMENTS
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The Statewide Mobile Monitoring Initiative is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment — particularly in disadvantaged communities.

Summary

This Community Air Monitoring Plan is prepared under the Statewide Mobile Monitoring Initiative (SMMI), a California Air Resources Board project. The SMMI is a statewide effort to use mobile monitoring methods to gather a comprehensive dataset of criteria pollutants, toxic air contaminants, and greenhouse gases. The SMMI is part of California Climate Investments and aims to reduce greenhouse gas emissions and improve public health, particularly in disadvantaged communities. Aclima, Inc., a California Public Benefit Corporation focused on air monitoring technology, was contracted by the California Air Resources Board to develop and implement Community Air Monitoring Plans using mobile monitoring in 62 Consistently Nominated Communities (CNCs), which have been nominated for the community air protection program, but have not been selected for participation. Resources are needed to address air pollution in these communities.

The primary purpose of the SMMI is to provide better understanding of air pollution in 62 CNCs through mobile monitoring following a rigorously developed community air monitoring plan based on effective and inclusive community engagement.

The purpose of this Community Air Monitoring Plan (CAMP) is to outline the mobile air monitoring that will be conducted in response to air quality issues identified by community outreach in Maywood, Commerce (east), Vernon, Bell and inform future plans and community actions. This CAMP will outline monitoring objectives that reflect resident concerns about where and what pollution is most impactful. Community voices directed where mobile air monitoring will take place, the monitoring objectives, and where focused pollution studies are needed. This project also seeks to ensure that data is shared in an accessible way with all interested parties, including community members, to support the planning and implementation of emissions reduction actions. Data will be presented in digital format, in physical printout form, and verbally in public webinars.

Contents

List of Abbreviations Used in the Community Air Monitoring Plan

Abbreviations	Term
AMN	Aclima Mobile Node
AMPs	Aclima Mobile Platforms
AQS	Air Quality System
BC	Black Carbon
C2H6	Ethane
CAMP	Community Air Monitoring Plan
CARB	California Air Resources Board
CBOs	Community-Based Organizations
CES	CalEnviroScreen
CH4	Methane
CNC	Consistently Nominated Community
CO	Carbon Monoxide
CO2	Carbon Dioxide
EPA	Environmental Protection Agency
GHGs	Greenhouse Gases
L0	Level 0
L1	Level 1
L2a	Level 2a
L2b	Level 2b
L3	Level 3
L4	Level 4
NO	Nitric Oxide
NO2	Nitrogen Dioxide

O3	Ozone
NOx	Total Oxides of Nitrogen
PEG	Project Expert Group
PEL	Permissible Exposure Limit
PI	Principal Investigator
PM2.5	Fine Particulate Matter
PML	Partner Mobile Laboratory
QA	Quality Assurance
QC	Quality Control
REL	Reference Exposure Level
RFP	Request for Proposal
SMMI	Statewide Mobile Monitoring Initiative
TSP	Total Suspended Particulate
TVOC	Total Volatile Organic Compounds

What is the reason for conducting air monitoring?

1. Community partnership approach

The Statewide Mobile Monitoring Initiative (SMMI) prioritizes forming strong community partnerships from the outset to guide the development of Community Air Monitoring Plans (CAMPs).

The SMMI Community Engagement Plan (Appendix A) is central to the success of the SMMI, emphasizing that communities must have a leading role in design, engagement, and implementation for the initiative to be successful. Aclima has implemented a co-leadership model with existing community experts and co-ownership with communities. This model is informed by CARB's Community Engagement Model, the People's Blueprint, CARB's Blueprint 2.0, and Facilitating Power's Spectrum of Community Engagement to Ownership. The goals of the community partnership approach include:

1. Develop and implement CAMPs that are responsive to the air quality concerns and needs of community members in pollution-overburdened areas.
2. Define monitoring objectives that reflect resident concerns about where and what pollution is most impactful. Community voices will direct where mobile air monitoring takes place, the monitoring objectives, and where focused pollution studies are needed.
3. Build community capacity to interpret mobile air quality data and help translate data into actions for emissions reduction and public health improvement.
4. Ensure that data is shared in an accessible way with all interested parties, including community members, to support the planning and implementation of emissions reduction actions.

Several groups play integral roles in the implementation and success of the SMMI. The SMMI Project Expert Group (PEG) includes community members, representatives from local air districts, community-based organizations (CBOs), and academia. Over 50 percent of the PEG comprises community members or representatives of CBOs. Engagement Leads, who are trusted community organizations, are subcontracted to lead and facilitate community engagement in the 62 Consistently Nominated Communities (CNCs). These Engagement Leads work closely with Aclima and the PEG to ensure CAMPs are responsive to community needs and that engagement is culturally and linguistically relevant. The California Air Resources Board (CARB) funds and oversees the SMMI. Aclima, as the contracted air monitoring technology company, is responsible for conducting community engagement and mobile monitoring. The project aims for a collaborative process where community members actively contribute to defining air monitoring objectives and the scope of actions.

1.1 Project Team Roles and Responsibilities for Community Partnerships

The core project team is made up of paid staff at a number of different organizations. These are described in Table 1.1. Additional project roles and responsibilities are outlined in Section 5.

Engagement Leads: Aclima has subcontracted with trusted community-based organizations or leaders to lead and co-manage community engagement efforts in the designated communities. These Engagement Leads are responsible for designing and implementing engagement strategies, conducting outreach, and working with Aclima to translate community knowledge (e.g., air pollution concerns) into responsive CAMPs. Some organizations may cover more than one community. Engagement Leads distribute an air pollution concerns survey and lead and conduct outreach for two community meetings, which serve as forums for community members and other interested parties to discuss local air pollution concerns and define where they would like air quality monitoring to occur. The Engagement Lead is also responsible for summarizing these meetings for Aclima, who then integrates community concerns into the CAMP. Engagement Leads serve as a conduit between community members and Aclima and CARB, helping to raise community questions and concerns and communicating project updates to the community.

Project Expert Group (PEG): A cross-sector group of representatives from local air districts, community-based organizations, academia, and residents from overburdened communities that guides community engagement and decision-making for this project. Over 50 percent of the Project Expert Group is composed of community members or representatives of community-based organizations. The PEG serves as a trusted group of experts to help define and steer the initiative and ensure it meets community needs. PEG members are responsible for attending eight meetings during the project period, and completing six assignments that help inform and steer the project. Specifically, PEG members helped shape the content of the Community Engagement Plan, served on the selection committee for Engagement Leads, and shaped the methodology for allocating monitoring miles to each project community. Outside of meetings and assignments, Aclima requests that PEG members support decision-making in areas relevant to their professional and lived experiences.

Aclima's Project Team: Aclima monitors local engagement strategies and supports Engagement Leads by offering technical expertise, data interpretation, outreach materials, and meeting support. Aclima is responsible for organizing and facilitating all PEG meetings and managing PEG assignments.

Table 1.1: Project teams and contact details

Organization/team	Contact details	Type of Support Offered
CARB	smmi@arb.ca.gov	All project questions after the project has completed (May 2026)
Aclima	carb-team@aclima.earth	Monitoring updates and CAMP questions during the project period (through May 2026)
Project Expert Group	carb-team@aclima.earth	Questions about community engagement framework and statewide engagement opportunities during the project period (through May 2026)
Breathe Southern California (Engagement Lead)	jmercado@breathesocal.org	Community engagement questions during the project period (through May 2026)

1.2 SMMI resources

The CARB SMMI website (https://ww2.arb.ca.gov/statewide-mobile-monitoring-initiative) details the objectives of the SMMI; the size and recipient of the contract award and collaborations with research institutions. Additionally, the website outlines community engagement efforts, public participation opportunities, and the development of air monitoring plans. The website provides access to summary documents including the original CARB Request for Proposal (RFP), a project summary one-pager, FAQs, and Aclima's technical proposal.

The Aclima SMMI website (https://aclima.earth/ca-smmi) provides an overview of the SMMI. It explains the community engagement approach, project scope, monitoring technology and approach, and data availability. The website also provides access to the joint Aclima-CARB press release.

1.2.1 Engagement tools

The online and offline tools used to support community engagement as part of CAMP development include:

Online

- Aclima Project Website: For updates, resources, and contact information.

- Air Pollution Concern GeoSurvey: Online survey to gather community input on air quality concerns.

- Broad Area Monitoring Selection tool for community members to select the boundaries for broad area monitoring given allocated driving resources for each community

- Social Media Graphics: Customizable graphics and text for outreach efforts.

- Meeting Summary Report: Document template for documenting meeting content.

Offline

- Physical Flyers: Customizable flyers for distribution at community hubs.

- Community Air Monitoring Plan Development Handout: Infographic detailing the Community Air Monitoring Plan development process.

- Door-to-door outreach (in some communities)

- Phone call/text message outreach (in some communities)

- Radio announcements and/or project interviews (in some communities)

1.3 Statewide community meetings

The Community Engagement Plan includes the following statewide community meetings:

- **Pre-meeting / Introduction to project**: An online meeting introducing the project and answering questions, held at the air district level.

- **Meeting 1 / First Draft Community Air Monitoring Plan Boundary**: A hybrid (in person and online) meeting to identify community air quality concerns, monitoring objectives, monitoring areas, and community roles in the project.

- **Meeting 2 / Affirming Community Air Monitoring Plan**: A hybrid (in person and online) meeting to confirm monitoring areas and review draft Community Air Monitoring Plan(s).

- **Meeting 3 (series) / Project Results**: A series of online meetings, organized geographically by air district (or at a sub-district level if necessary), to explain project results, answer questions, and discuss next steps.

1.4 Engagement during and after monitoring

There will continue to be opportunities for the public to engage with the SMMI throughout monitoring and after completion of monitoring.

During the monitoring period:

- Project website: use the project website to access updates, resources, and contact information

- Webinars and training: participate in online sessions about data literacy, interpretation, emissions reduction success stories, and air management policies/regulations

- Community-specific project pages (via project website): Find updates, contact information, and leave comments/feedback for each Consistently Nominated Community on the project website

- Continued communication: receive email updates on progress towards monitoring completion (if contact information was provided during the engagement process). For example, monthly event notifications summaries (see Section 14.1), broad area monitoring progress, and locations where PMLs have completed monitoring.

- Office hours: Attend online office hours to ask project-related questions of the Aclima team

After the monitoring period:

- Publicly available data hosted by CARB

- StoryMaps: Explore interactive data visualizations for each Consistently Nominated Community

- Project Results meeting: Attend online meetings to learn about project results, ask questions, share experiences, and discuss next steps. These meetings will be held in English with Spanish interpretation and designated Spanish breakout rooms.

- Post-Meeting Survey: Provide anonymous feedback on the project and engagement process after the Project Results Meetings.

2. State the community-specific purpose for air monitoring

The primary purpose of the SMMI is to develop and implement Community Air Monitoring Plans that are responsive to the air quality concerns of community members and other stakeholders in the 62 CNCs. These communities have been consistently nominated by air districts, CBOs, and community members as needing extra attention to address high levels of air pollution.

 Community air monitoring generally falls into two types of air pollution concerns:

1. Ambient air quality monitoring - measure the levels of relevant air pollutants to understand which areas of the community are experiencing **disproportionate or unequal impacts** from air pollution as well as evaluate measured concentrations against existing standards and historical information.

2. Stationary source monitoring - measuring air pollutants near **specific stationary emission sources** (e.g. industrial facilities) to better understand and characterize the air within the vicinity of these known or suspected sources.

This air monitoring plan will address these monitoring aims - to identify and characterize areas experiencing disproportionate air pollution impacts and specific air pollutant emission sources - by focusing on specific sources and air pollution concerns identified by the community. Residents and other interested parties' knowledge were solicited through community meetings and surveys to understand the community's pollution burdens. A specifically designed Air Pollution Concerns Survey was used to help identify priority air pollution concerns in each community and collect detailed information to guide monitoring objectives. The CAMPs will define where mobile air monitoring takes place, what the monitoring objectives are, and where focused pollution studies are needed, all directed by community voices.

2.1 Maywood, Commerce (east), Vernon, Bell Community profile
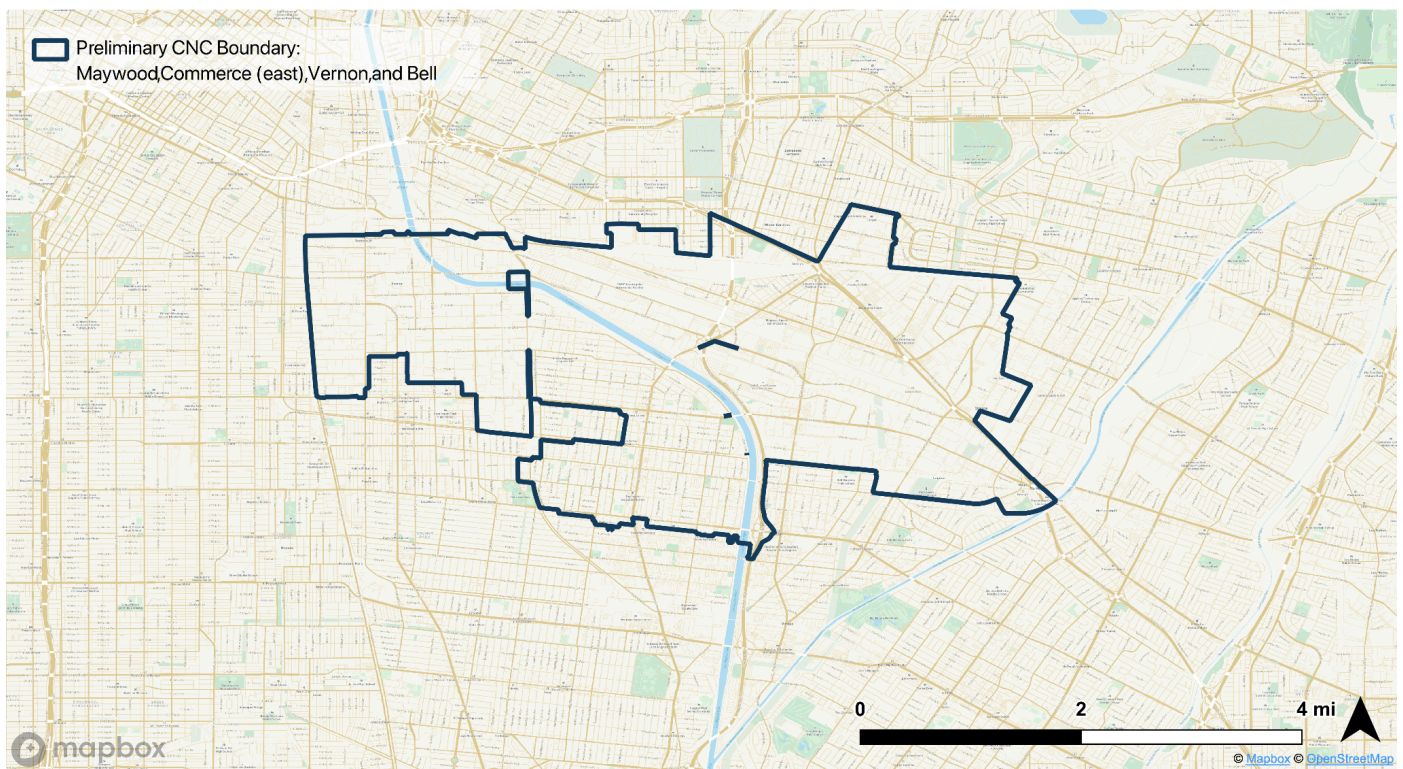
Figure 2.1: Preliminary Maywood, Commerce (east), Vernon, and Bell CNC Boundary

The communities of Maywood, Commerce (east), Vernon, and Bell are located in southeast Los Angeles County, part of the dense urban core of the greater Los Angeles metropolitan area. These communities are among the smallest by land area in the county, but they are densely populated and heavily industrialized. Maywood is the most densely populated city in California by square mile, while Vernon has fewer residents but hosts a vast network of industrial operations. The area is crisscrossed by major transportation corridors, including the I-5, I-710, and SR-60 freeways, as well as major rail lines, contributing significantly to local air pollution levels. Proximity to the Los Angeles River also influences local meteorology, potentially trapping pollution under inversion layers during stagnant conditions.

The land use pattern is characterized by a tight mix of residential zones adjacent to industrial sites and goods movement infrastructure, which amplifies community exposure to air pollution.

The Maywood–East Commerce–Vernon–Bell cluster is a predominantly Latino, working-class community with a high concentration of Spanish-speaking households. Many residents are immigrants or first-generation Americans. Median household incomes fall well below county and state averages, and a significant portion of the population has not attained a high school diploma. These demographic factors, combined with a high population density, contribute to increased environmental vulnerability and create barriers to participation in traditional public engagement processes.

Poverty is widespread with over 30% of residents in Maywood and Bell living below twice the federal poverty level, and housing cost burden affecting more than half of all households across the cluster. Educational attainment is low as well with fewer than half of adult residents with completed high school in several census tracts.

This community faces severe environmental health burdens. According to the California Environmental Protection Agency's CalEnviroScreen, much of this area ranks in the 95th–100th percentile for pollution burden and vulnerability. Diesel PM and traffic density are particularly high due to the area's proximity to railyards, freight corridors, and industrial zones. The I-710 corridor is a major route for goods movement from the Ports of Los Angeles and Long Beach. The region suffers from elevated rates of asthma, respiratory illness, and cardiovascular disease, particularly among children and older adults. The California Department of Public Health has documented higher-than-average asthma emergency room visits and cardiovascular hospitalizations in these ZIP codes (e.g., 90270, 90040, 90058). Low birth weight is also a documented concern, with exposure to fine particulate matter ($PM_{2.5}$) and lead among contributing risk factors.

South Coast AQMD also monitors regional air quality and enforces emissions regulations. While this has led to some enforcement actions and facility-level improvements, many residents report little to no improvement in daily air quality or overall health outcomes. Benefits from state-led emissions reduction programs have disproportionately favored cleaner industrial operators or larger businesses capable of complying with incentive programs, while frontline residents continue to bear the brunt of cumulative exposures.

Although community advocacy has grown—led by groups such as Communities for a Better Environment and East Yard Communities for Environmental Justice—residents demand more transparent enforcement, swifter cleanup timelines, and equitable investment in emissions reduction. Without sustained funding and policy accountability, the area risks further entrenchment of health disparities.

2.2 Maywood, Commerce (east), Vernon, Bell community-specific motivations for air monitoring

Community-identified air pollution concerns

To identify the community-specific motivations for air monitoring in Maywood, Commerce (east), Vernon, Bell, Aclima worked with Breathe Southern California to gather air quality and emission source concerns directly from the community. An SMMI Air Pollution Concerns survey was circulated by email, distributed in person community meetings, and made available during other events in the community. In addition, Breathe Southern California collected air pollution concerns voiced during community meetings in support of the SMMI effort.

Industrial and transportation-related pollution sources are deeply embedded in the landscape. Vernon—home to more than 1,800 businesses despite having fewer than 200 residents—hosts meatpacking plants, metal foundries,

and food processing facilities that emit air pollutants like volatile organic compounds (VOCs), particulate matter, and sulfur oxides. The Exide Technologies battery recycling plant, now shuttered, left behind decades of lead and arsenic contamination that spread into surrounding neighborhoods. Despite clean-up orders, remediation remains incomplete, and residents continue to express concerns about toxic dust and soil contamination.

Other significant pollution sources include diesel emissions from nearby railyards, including the BNSF Hobart Yard, heavy truck traffic on Interstate 710 and local arterials, and industrial corridors near Bandini Boulevard and Soto Street. Metal recycling facilities, concrete batch plants, auto dismantlers, and logistics centers line these corridors and contribute to high levels of PM2.5, nitrogen dioxide (NO_2), and toxic air contaminants. In Maywood, residents have flagged facilities like SA Recycling and several rendering plants as persistent sources of odor and emissions.

In addition to those summarized above, other specific concerns identified through community engagement are included in the table 2.1 below. These concerns were compiled from community members during community meetings as well as through the SMMI Air Pollution Concerns Survey.

Table 2.1: Specific concerns identified through community engagement. Details about community concerns are direct quotes from the community member concern submissions.

Location and Concern	Details
Commerce and Vernon	Meeting Community members identified Commerce and Vernon as a broad area where they had significant air quality concerns due to the presence of industry and emissions from chemical processing factories, processes, and heavy duty truck transport.
The freeway intersections of the 101 & 5 as well as 5 & 710	Community members were concerned about communities on either side of freeways of this area.
World Oil Refiners (9302 Garfield Ave 90290)	Large plumes of smoke from the refining site were observed.
Gage between 710 and 5 freeways	Community members shared they live near this area and frequently have asthma attacks and their family members.
Roadway (Lat/Lon: 33.988788, -118.202638)	No additional details provided.
Roadway (Lat/Lon: 34.037743, -118.170842)	It's usually very busy during the day with high fumes everywhere air pollution
Roadway (Lat/Lon: 34.012464, -118.236135)	Businesses are suffering, we need government aid to recover.
Sterilization facility or medical equipment storage facility (Lat/Lon: 34.074144, -118.264939)	No additional details provided.

Top pollution sources identified via emission inventories

Aclima scientists gathered important sources from available emission inventories, focusing on major polluting facilities and AB2588 Air Toxics Hot Spots. Known pollution sources within Maywood, Commerce (east), Vernon, Bell are listed in Tables 2.2-2.3. The top ten facilities ranked by total toxicity-weighted emissions (TWE) are predominantly involved in meat processing, printing, manufacturing, and utilities. Facilities like Smithfield Packaged Meats Corp, Superior Lithographics, and Owens-Brockway Glass Container Inc report a wide array of harmful pollutants including diesel particulate matter (PM), formaldehyde, benzene, 1,3-butadiene, and hexavalent chromium, many of which are known carcinogens or respiratory irritants. Several sites, such as Vernon Public Utilities and Elite Comfort Solutions, emit dozens of toxic compounds, including both acute and chronic hazard contributors like ethylene oxide, lead, and manganese. These facilities are clustered within or just outside residential areas, underscoring the cumulative exposure risk for nearby communities.

Additional major sources of air pollution within or immediately adjacent to the monitoring boundary include electricity generation plants (e.g., Malburg Generating Station), glass and paper manufacturers, meat rendering plants, and metal fabrication facilities. These sources emit a consistent profile of diesel PM, formaldehyde, 1,3-butadiene, $PM_{2.5}$, and nitrogen oxides (NOx), pollutants associated with increased risk of asthma, cardiovascular disease, and cancer. Furthermore, within the boundary of the community lies Sterigenics, a commercial sterilization facility known to emit ethylene oxide, a potent carcinogen. The presence of multiple combustion sources within a compact, urbanized area compounds local health risks and highlights the need for sustained air quality monitoring and emission reduction strategies.

Table 2.2 Top 10 AB2588 Air Toxics Hot Spots located within the monitoring area boundary for Maywood, Commerce (east), Vernon, Bell (up to 200 m outside the boundary), as defined by the total toxicity-weighted emissions (TWE) for chronic, cancer causing, and acute categories combined.

Facility Name	Longitude	Latitude	Description	Reported Pollutants
SUPERIOR LITHOGRAPHICS	-118.2135	34.0088	COMMERCIAL PRINT/LITHOGRAPH/PRINTING AND PUBLISHING/COMMERCIAL PRINTING/COMMERCIAL PRINTING,LITHOGRAPH	Benzophenone, Styrene, Cobalt, Acrylic acid, Methyl methacrylate, Diethanolamine, Ethyl acrylate, Toluene, Formaldehyde, Triethylamine, Methyl isobutyl ketone {Hexone} {MIBK}, Xylenes (mixed), Ethyl benzene, Methanol, Ethylene dichloride {EDC}, Propylene oxide, Manganese, Isopropyl alcohol, Hydroquinone, Dipropylene glycol monomethyl ether, Ethylene glycol monopropyl ether, Ethylene oxide, Diethylene glycol monobutyl ether, Diethylene glycol monoethyl ether, Ethylene glycol monobutyl ether, Phenol, Ethylene glycol, Ethylene glycol monophenyl ether, Cobalt compounds, insoluble, including but not limited to:, 1,4-Dioxane
SMITHFIELD	-118.2185	34.0076	MEAT PACKING	Benzene, Acrolein, Toluene, Acetaldehyde,

PACKAGED MEATS CORP			PLANTS/FOOD AND KINDRED PRODUCTS/MEAT PRODUCTS/MEAT PACKING PLANTS	Lead, Diesel engine exhaust, particulate matter (Diesel PM), PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Hexane {n-Hexane}, Ethyl benzene, Styrene, Nickel, Glycol ethers (and their acetates), Ammonia, Formaldehyde, Methyl ethyl ketone {2-Butanone}, Xylenes (mixed), o-Xylene, Naphthalene, m-Xylene, Cadmium, Selenium, 1,3-Butadiene, Chromium, hexavalent (& compounds), Methanol, Manganese, Copper, Chlorine, Hydrochloric acid, 1,2,4-Trimethylbenzene, Mercury, Arsenic, Methyl tert-butyl ether {MTBE}
SMITHFIELD PACKAGED MEATS CORP	-118.2198	34.0074	MEAT PACKING PLANTS/FOOD AND KINDRED PRODUCTS/MEAT PRODUCTS/MEAT PACKING PLANTS	Benzene, Ammonia, Hexane {n-Hexane}, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Ethyl benzene, 1,3-Butadiene, Acrolein, Acetaldehyde, Cadmium, Copper, Naphthalene, Toluene, Chromium, hexavalent (& compounds), Hydrochloric acid, Formaldehyde, Nickel, Arsenic, Manganese, Diesel engine exhaust, particulate matter (Diesel PM), Mercury, Fluorocarbons (chlorinated), Xylenes (mixed), Selenium, Lead
OWENS-BROCKWAY GLASS CONTAINER INC	-118.2184	33.9969	GLASS CONTAINERS/STONE,CLAY,AND GLASS PRODUCTS/GLASS,PRESSED OR BLOWN/GLASS CONTAINERS	Xylenes (mixed), Acrolein, Acetaldehyde, Manganese, Naphthalene, Formaldehyde, Mercury, Benzene, Ethyl benzene, Beryllium, Hexane {n-Hexane}, Propylene oxide, Toluene, Chromium, hexavalent (& compounds), PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Nickel, 1,3-Butadiene, Arsenic, Ammonia, Lead, Copper, Hydrochloric acid, Cadmium, Selenium, Diesel engine exhaust, particulate matter (Diesel PM)
ELITE COMFORT SOLUTIONS	-118.1740	34.0110	PLASTICS FOAM PRODUCTS/RUBBER AND MISC. PLASTICS PROD/MISC. PLASTICS PRODUCTS,NEC/	Copper, Ethyl benzene, Mercury, Benzene, Xylenes (mixed), Diesel engine exhaust, particulate matter (Diesel PM), PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Cadmium, Arsenic, Acrolein, Hydrochloric acid, Ammonia,

				Formaldehyde, Lead, Naphthalene, Toluene diisocyanates, Nickel, Toluene, Selenium, Manganese, Hexane {n-Hexane}, 1,3-Butadiene, Acetaldehyde, Chromium, hexavalent (& compounds)
STERLING PACIFIC MEAT COMPANY	-118.1496	33.9794	FROZEN FOODS/WHLESLE TRADE-NONDURABLE GOODS/GROCERIES, RELATED PRODUCTS/FROZEN FOODS	Mercury, Lead, Formaldehyde, Ethyl benzene, Nickel, Copper, 1,3-Butadiene, Toluene, Manganese, Benzene, Hydrochloric acid, Chromium, hexavalent (& compounds), Xylenes (mixed), Acetaldehyde, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Selenium, Arsenic, Acrolein, Cadmium, Naphthalene, Ammonia, Hexane {n-Hexane}, Diesel engine exhaust, particulate matter (Diesel PM)
VERNON PUBLIC UTILITIES	-118.2219	33.9984	EXECUTIVE OFFICES/EXEC,LEGISLATIVE,GENERAL GOV./EXECUTIVE OFFICES/EXECUTIVE OFFICES	Propylene oxide, Ethyl benzene, Hexane {n-Hexane}, Mercury, Xylenes (mixed), Naphthalene, Cadmium, Formaldehyde, Acrolein, Methylene chloride {Dichloromethane}, Selenium, Copper, Acetaldehyde, Ammonia, Lead, Chlorine, Chromium, hexavalent (& compounds), m-Xylene, Benzo[b]fluoranthene, Ethylene dibromide {EDB}, Fluorene, Chloroform, 1,3-Butadiene, Acenaphthene, 1,1,2,2-Tetrachloroethane, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Benzene, Toluene, Methyl tert-butyl ether {MTBE}, Styrene, Benzo[e]pyrene, 2-Methylnaphthalene, Methanol, Methyl ethyl ketone {2-Butanone}, Fluoranthene, Ethylene dichloride {EDC}, Manganese, o-Xylene, Benzo[g,h,i]perylene, Pyrene, 1,2,4-Trimethylbenzene, Nickel, Chrysene, Acenaphthylene {Cyclopenta[de]naphthalene}, 1,2-Dichloropropane, 1,3-Dichloropropene, Hydrochloric acid, 1,1,2-Trichloroethane, Arsenic, Diesel engine exhaust, particulate matter (Diesel PM), Carbon tetrachloride, Vinyl chloride, Phenanthrene
THE NEWARK	-118.1640	33.9820	PAPERBOARD	Naphthalene, Xylenes (mixed), Toluene,

GROUP, INC. DBA GREIF, INC			MILLS/PAPER AND ALLIED PRODUCTS/PAPERBOARD MILLS/PAPERBOARD MILLS	Nickel, Benzo[b]fluoranthene, Hydrochloric acid, Ammonia, Methylene chloride {Dichloromethane}, Ethylene dichloride {EDC}, Fluorene, Hexane {n-Hexane}, Copper, Benzene, Arsenic, Acrolein, Chloroform, Acetaldehyde, Chromium, hexavalent (& compounds), 1,3-Butadiene, Styrene, Fluoranthene, 1,3-Dichloropropene, 1,2,4-Trimethylbenzene, Formaldehyde, 1,2-Dichloropropane, Benzo[g,h,i]perylene, Phenanthrene, Diesel engine exhaust, particulate matter (Diesel PM), 1,1,2-Trichloroethane, Vinyl chloride, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Ethyl benzene, Lead, Benzo[e]pyrene, Acenaphthene, Selenium, Acenaphthylene {Cyclopenta[de]naphthalene}, 2-Methylnaphthalene, Manganese, Chrysene, Pyrene, Ethylene dibromide {EDB}, Carbon tetrachloride, Methanol, 1,1,2,2-Tetrachloroethane, Mercury, Cadmium
UNION PACIFIC RAILROAD CO	-118.1815	34.0077	RAILROAD, LINE-HAUL OPERATING/RAILROAD TRANSPORTATION/RAILROADS/RAILROADS, LINE-HAUL OPERATING	Ethyl benzene, Hexane {n-Hexane}, Benzene, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Toluene, Arsenic, Diesel engine exhaust, particulate matter (Diesel PM), Formaldehyde, Xylenes (mixed), 1,3-Butadiene, Acrolein, Selenium, Cadmium, Manganese, Chromium, hexavalent (& compounds), Copper, Acetaldehyde, Naphthalene, Ammonia, Cobalt, Lead, Hydrochloric acid, Nickel, Chromium (III) compounds including but not limited to:, Mercury
MONARCH LITHO INC	-118.1262	33.9928	COMMERCIAL PRINT/LITHOGRAPH/PRINTING AND PUBLISHING/COMMERCIAL PRINTING/COMMERCIAL PRINTING,LITHOGRAPH	1-Chloro-4-(trifluoromethyl)benzene {PCBTF}, Formaldehyde, Octamethylcyclotetrasiloxane {D4}, 1,2,4-Trimethylbenzene, Ammonia, Ethylene glycol monobutyl ether, Decamethyl-1,3,5,7,9,2,4,6,8,10-pentaoxapentasilecane {D5}, PAHs, total, w/o individ. components reported [Treated as B(a)P for

				HRA], Acetaldehyde, Ethyl benzene, Naphthalene, Xylenes (mixed), Benzene, Toluene, Acrolein, Hexane {n-Hexane}

Table 2.3: Major polluting facilities (from CARB Pollution Mapping Tool v2.6, reporting year 2021) located within the monitoring area boundary (up to 200 m outside the boundary).

Facility Name	Longitude	Latitude	Description	Reported Pollutants
Malburg Generating Station	-118.221	33.999	Electricity Generation	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2.5, Nickel, NOx, PM10, Hydrochloric Acid, SOx, N2O
Owens-Brockway Glass Container, Vernon	-118.217	33.997	Other Combustion Source	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2.5, Nickel, NOx, PM10, Hydrochloric Acid, SOx, N2O
PABCO Paper	-118.229	34.004	Other Combustion Source	Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2.5, Nickel, NOx, PM10, SOx, N2O
Baker Commodities, Inc., Vernon Division	-118.193	34.004	Other Combustion Source	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2.5, Nickel, NOx, PM10, Hydrochloric Acid, SOx, N2O
Kaiser Aluminum Fabricated Products, LLC	-118.148	33.988	Other Combustion Source	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2.5, Nickel, NOx, PM10, Hydrochloric Acid, SOx, N2O
Darling Ingredients Inc - Los Angeles	-118.225	34.015	Other Combustion Source	1,3-Butadiene, Formaldehyde, Benzene, CH4, PM2.5, Nickel, NOx, PM10, SOx, N2O
Newark Pacific Paperboard (opt-in 2013)	-118.165	33.982	Other Combustion Source	CH4, PM2.5, NOx, PM10, SOx, N2O
Clougherty Packing, LLC	-118.219	34.005	Other Combustion Source	CH4, PM2.5, NOx, PM10, SOx, N2O

Table 2.4: Commercial Sterilization facilities known to emit Ethylene Oxide located within 5 miles of the boundary of the monitoring area. Data from:
https://www.epa.gov/hazardous-air-pollutants-ethylene-oxide/forms/ethylene-oxide-risk-commercial-sterilizers

Facility Name	Longitude	Latitude
Sterigenics	-118.1910	33.9962

Past and ongoing air quality measurements and studies

The nearest regulatory air quality data for this area comes from the South Coast AQMD's Los Angeles station to the north (located at 1630 North Main Street) and Compton's station to the south (located at 700 North Bullis Rd). These stations measure a full suite of criteria pollutants (O_3, NO_x, CO, SO_2, $PM_{2.5}$, PM_{10}) and speciated VOCs. Additionally, a third site located at 4010 E. 26th Street in Vernon measures total suspended particulate (TSP). These stations are operated by the South Coast AQMD and are part of the national regulatory network overseen by the U.S. EPA under the Clean Air Act. Their purpose is to monitor regional air quality trends and ensure compliance with federal ambient standards.
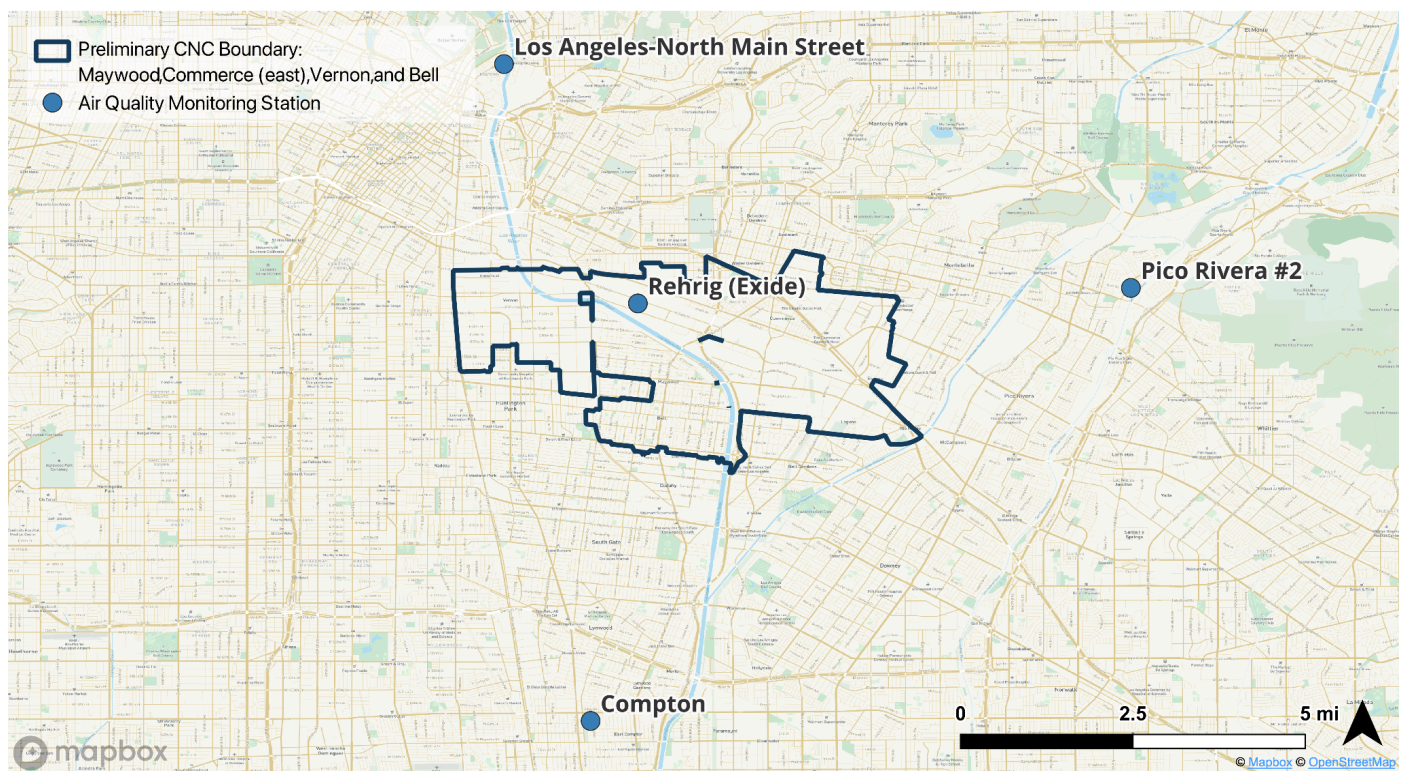
Figure 2.2: Map of the preliminary Maywood, Commerce (east), Vernon, and Bell CNC boundary and local US EPA Air Quality System (AQS) monitoring sites.

In Vernon, the SCAQMD operates multiple monitoring stations near the Exide Technologies facility. These stations measure pollutants such as lead and arsenic, which are of particular concern due to the facility's past operations involving lead-acid battery recycling. The data collected from this station are used to assess the impact of the facility's emissions on local air quality and to ensure compliance with air quality standards.

Additionally, the SCAQMD conducts special monitoring studies in response to specific events or concerns. For instance, following a fire in Maywood on June 14, 2016, the SCAQMD deployed a team to assess the situation and collect air samples to evaluate air quality impacts. These targeted monitoring efforts are designed to provide timely data to inform public health responses and regulatory actions.

A portion of the CAMP monitoring area to the north was also included as part of the East Los Angeles/Boyle Heights/West Commerce AB617 community. The South Coast Air Quality Management District (AQMD) worked with the community to develop and execute on a Community Air Monitoring Plan and submitted a Community Emissions Reduction Plan to support reductions in air pollution in that community. Extensive detail about those activities can be found at the AQMD AB617 community specific website. As part of the AB617 efforts, Aclima mapped the community in the summer and fall of 2021 in cooperation with SCAQMD, with the results summarized in a Community Air Quality Report available on the web.

In 2022, CARB launched a community air monitoring project in the area, supported by a $250,000 U.S. EPA grant. The initiative includes air sensor deployment, mapping tools, and training for local groups to collect and analyze air quality data. An interactive web portal allows residents to propose monitoring locations and share observations. (CARB Community Monitoring Project – Maywood/Vernon/Bell/East Commerce)

At the basin-wide level, the SCAQMD conducts MATES studies, which consistently identify diesel PM, arsenic, acrolein, and benzene as dominant toxic-risk drivers across South Coast communities. This underscores the relevance of targeting these pollutants in local monitoring and mitigation efforts.

2.3 Gaps in air quality information that SMMI will address

The regulatory air quality monitoring stations neighboring the Maywood, Commerce (east), Vernon, and Bell communities provide valuable regional data on criteria pollutants and some toxic air contaminants. However, these stations are designed primarily to assess broad regional air quality trends and regulatory compliance rather than capture the fine-scale spatial variability of pollution experienced at the neighborhood or community level. As a result, localized pollution hotspots influenced by proximity to major roadways, industrial facilities, and other emission sources are often underrepresented.

Previous monitoring efforts, including special studies and AB 617 community monitoring programs, have improved understanding of key pollutants such as $PM_{2.5}$ and metals in the area. Nevertheless, limitations remain. Many of these studies lack continuous, long-term measurements or comprehensive speciated toxics data, including volatile organic compounds (VOCs) and diesel PM, which are important to fully characterize exposure risks. Stationary monitors are also limited in coverage and often do not measure directly near sensitive community locations such as homes, schools, or parks. This limitation restricts the ability to assess exposure disparities for vulnerable populations in these communities.

Basin-wide assessments, such as the MATES studies conducted by South Coast AQMD, provide important context by identifying dominant toxic pollutants across the region, including diesel particulate matter, benzene, and acrolein. However, these studies are not designed to capture community-specific patterns and thus do not fully address local-scale exposure variability.

The Maywood–Commerce (east)–Vernon–Bell area is a densely urbanized and industrialized region, heavily influenced by nearby freeways, rail yards, and a range of manufacturing and processing facilities. This context shapes the community's air pollution concerns. A summary of the air pollution concerns and sources identified by the community, supported by information about major polluting facilities and AB2588 toxics hotspots, includes:

- Diesel particulate matter and emissions from heavy-duty trucks, freeways, and rail operations
- Multiple industrial sources including metal-processing plants, plastics manufacturers, meatpacking plants, and glass container production
- Toxic air contaminants such as hexavalent chromium, lead, arsenic, benzene, and formaldehyde

To provide the type of data necessary to characterize the areas of concern identified by the community and prioritize locations for further plans and community action, the following data gaps were identified:

- A lack of localized, high-resolution air monitoring data that can capture intra-community spatial variability
- Insufficient speciated measurements of both gaseous and particulate air toxics in immediate proximity to key sources
- Limited information about pollutant levels near sensitive receptors such as schools, childcare centers, parks, and community centers
- The predominance of single-pollutant measurements (e.g., $PM_{2.5}$ only), with inadequate simultaneous monitoring of co-pollutants such as VOCs or black carbon

This plan proposes to use mobile air pollution monitoring to provide highly spatially resolved pollutant concentration data for the community. The detailed spatial information from mobile monitoring can help identify specific, localized sources of pollution and show how pollutant levels change across and between different neighborhoods. The Aclima Mobile Platform includes an expanded suite of pollutants that support improved characterization of sources including the use of black carbon to diesel particulate matter and TVOCs to indicate areas where toxic air contaminants may be located. Furthermore, the use of the expanded suite of equipment in the Partner Mobile Laboratories enables communities to be monitored for specific toxic air contaminants. The information gathered through mobile monitoring supports the development of pollution reduction plans that can be different for various parts of a community, allowing for solutions that are specifically suited to local needs.

3. Scope of actions

Data gathered by mobile air monitoring can support a wide range of actions by communities and governments to reduce emissions and/or exposure. Examples of possible actions include, but are not limited to:

- Regulatory investigation: where these data identify locations of persistently elevated concentrations, local and state agencies may decide to do further investigative work that can lead to compliance and enforcement actions (e.g. fines, new emissions control requirements)
- Traffic management strategies: by identifying locations of persistently elevated concentrations caused by vehicular emissions, these data can inform local and state vehicular emissions control strategies, including initiatives like anti-idling enforcements or vehicle emissions inspection programs
- Urban planning: governments can use an understanding of how air quality varies over time and space to direct investment in green spaces or update zoning regulations to restrict certain land uses
- Corporate action: individual companies may be able to use these data to adjust their transportation routes and schedules, or facility operations, to reduce emissions and health impacts
- Modeling and forecasting: mobile air monitoring data can support improved modeling of historical air quality that allows better prediction of future patterns and impacts across a community

- Health risk assessments: where these data identify disproportionate impacts of pollution across the geography of a community, these insights can be used in conjunction with other datasets to assess potential health impacts for communities or identify locations where formal health risk assessments should be performed
- Community action: data provided by mobile air monitoring may be useful to community-based organizations in advocacy work to reduce emissions and/or exposure, including the development of Local Community Emissions Reduction Plans (LCERPs)

When monitoring has concluded, CARB, Air Districts, community groups, regulatory agencies, researchers, and other parties are encouraged to leverage the data to address specific air pollution concerns.

4. Air monitoring objectives

4.1 Define objectives

The air monitoring aims described in Section 2 can be expanded into two primary **air monitoring objectives**:

1. **Identification and characterization air pollutant emission sources**
   This objective seeks to better understand and characterize the air within the vicinity of known, suspected, or unknown sources, which can include the following goals:

   - Understand what locations in communities are impacted by pollution near sources
   - Understand how concentrations can vary directly downwind of a given source
   - Understand how concentrations near a given source may vary by time of day

2. **Identification disproportionate air pollution impacts**
   Mobile air monitoring can also be used to investigate various objectives focused on understanding the unequal distribution of air pollution within a community:

   - Identify the key pollutants that impact ambient air in a community
   - Understand the typical concentrations of pollutants in ambient air in the community
   - Understand how pollution is distributed across a community
   - Understand how pollution varies in time across a community

These two objectives support investigation of the majority of concerns identified by the community by either characterizing both individual sources such as refineries, commercial sterilization facilities, or a range of industrial sources, and broader source types such as heavy duty trucking and other mobile source emissions, as well as the impact of these sources across the community.

4.2 Define mobile monitoring methods to support objectives

Given the gaps identified in Section 2.3 and the community specific air quality concerns, the types of data needed include high spatial resolution data in a wide variety of locations across the community of Maywood, Commerce (east), and Vernon, Bell, in particular for black carbon, VOCs, and specific air toxics, such as benzene, toluene, formaldehyde, particle bound organics, and ethylene oxide. The mobile monitoring approach enables the collection of data at high spatial resolution throughout the community over the entire mapping period. This approach results in measurements of a snapshot of the concentration of air pollutants near to many if not most of the areas of concern

identified by the community during the project. The data resulting from mobile monitoring support targeting a wide range of source types within the monitoring area, allowing for flexibility of source analysis without predetermined source selection.

The CAMP will use two mobile monitoring approaches to support project air monitoring objectives - broad area monitoring and targeted area monitoring. Broad area monitoring supports the air monitoring objectives throughout the entire CAMP monitoring areas over the entire monitoring time period while targeted area monitoring will focus on a subset of specific air pollution concerns with focused driving around those concerns for shorter periods of time.

Broad area monitoring: monitoring vehicles collect data within the entire CAMP monitoring area over an extended time period using the Aclima Mobile Platform. Vehicles monitor on publicly accessible roads, gathering repeat measurements at different times of day, days of the week, and seasons. Broad area monitoring tells us about the typical concentrations of pollutants and locations of persistently high pollutant concentrations throughout the CAMP area over the whole period of monitoring. As an example, Figure 4.1 shows results of a broad area monitoring approach in San Francisco, displaying typical NO_2 concentrations observed over a 1-year time period. Broad area monitoring will occur over a 9-month time period between June 2025 and March 2026.

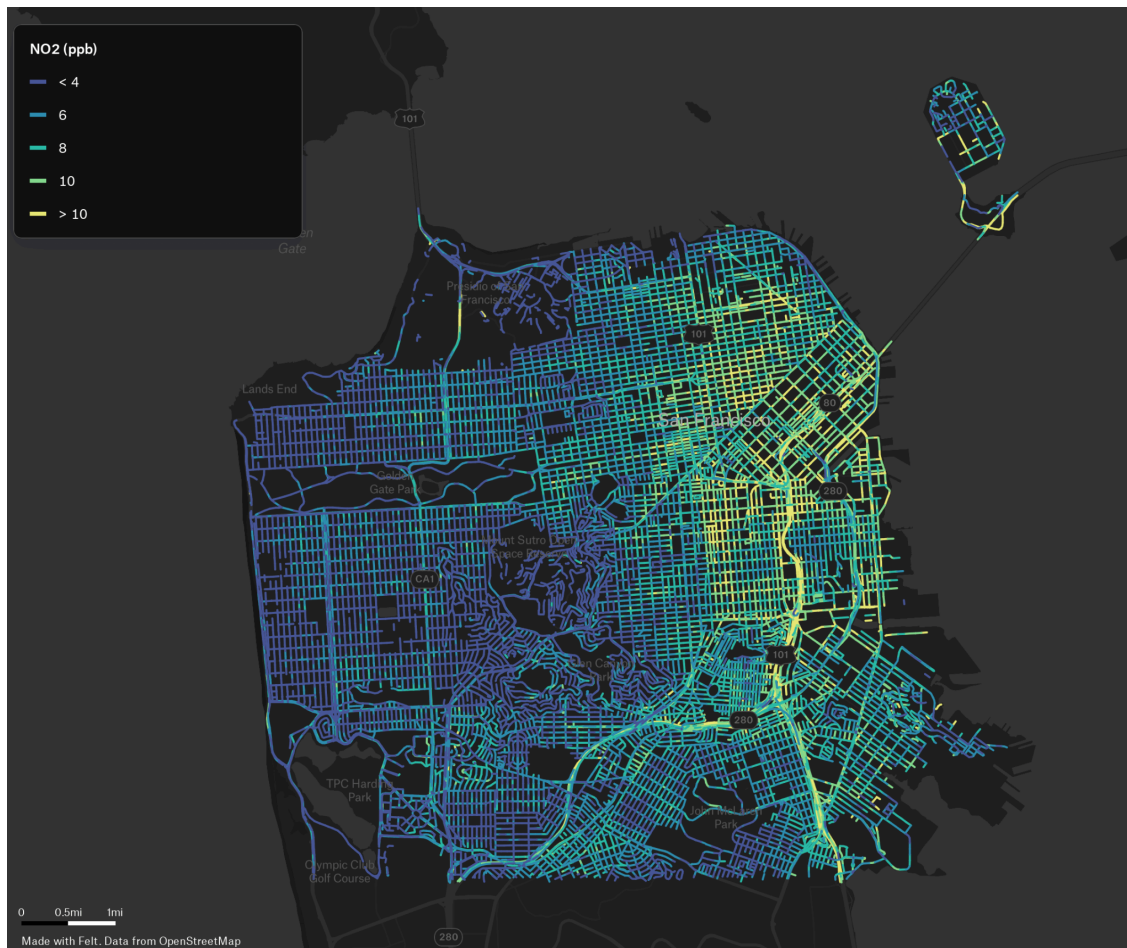**Figure 4.1:** Example of plotted ambient concentration estimates for NO_2 in the San Francisco Bay Area, CA, showing typical concentrations observed over a 1-year monitoring period. This example shows how high NO_2 concentrations (as illustrated by the brighter green colors) are disproportionately impacting the eastern parts of the city. This plot uses data generated by the broad area monitoring method.

The suite of pollutants measured by the AMP supports the exploration of many source types identified by the community. Black carbon measured in combination with NO_2 and other combustion related pollutants help identify areas impacted by diesel particulate matter pollution. TVOC data help identify areas where organic toxic air contaminants may be located such as near refineries or other petroleum facilities. Methane and ethane data combined with other pollutants help identify emissions from natural gas, either from refineries or gas distribution systems.

Targeted area monitoring: a subset of monitoring vehicles focuses on specific air pollution concerns (sources or impacted areas) at smaller spatial scales and shorter time periods. This measurement strategy involves monitoring over a relatively small area over a shorter time period with more intensive driving (i.e. more samples in a specific area on any single day). There is an inherent limitation in the targeted area studies in that they will typically occur over a short time period and the results are likely to not be representative over longer time periods (different facility operating patterns and/or meteorological conditions). While broad area monitoring may provide more temporally representative results, targeted area monitoring is a complimentary approach that can tell us more detail about a specific concern, such as the exact makeup of chemicals being emitted from a particular facility, what areas of a community are most impacted in the immediate vicinity of pollution sources, or what times of day these areas are most impacted. Targeted area monitoring vehicles will either be drawn from the broad area monitoring fleet (Aclima Mobile Platforms) or from a special mobile laboratory fleet (a small number of vehicles with higher accuracy/precision sensors detecting a wider range of pollutants including toxic air contaminants), depending on the specific source of concern. In contrast to the broad area monitoring approach, the number of concerns that can be addressed is much more limited, but the depth at which the data about the concerns can be collected and analyzed is potentially greater.

Targeted area monitoring vehicles can be deployed in different ways to meet different objectives.

- *Fenceline* driving (Figure 4.2) gathers data systematically on predetermined routes around the perimeter of a known or suspected source facility/site. Fenceline driving can help determine the chemical makeup of emissions from a known source.
- *Transect* driving (Figure 4.2) follows a path designed to go upwind, through, and downwind of a potential plume of pollution from a known or potential source. Transect driving can help us better understand the chemical makeup of emissions in a plume, and where the plume is impacting in the local community.
- *Pseudo-stationary* driving approximates a more traditional stationary monitoring approach by temporarily stopping a monitoring vehicle within a potential plume of pollution from a known or potential source. Pseudo-stationary driving can help us better understand how pollution from a source varies in time. It can also allow for measurements of certain pollutants where measurement methods require longer sampling times (minutes up to an hour).
- *General Survey driving* is repeated monitoring along a predetermined route or on all roads within a predetermined area, attempting to collect air pollutant data evenly across time.
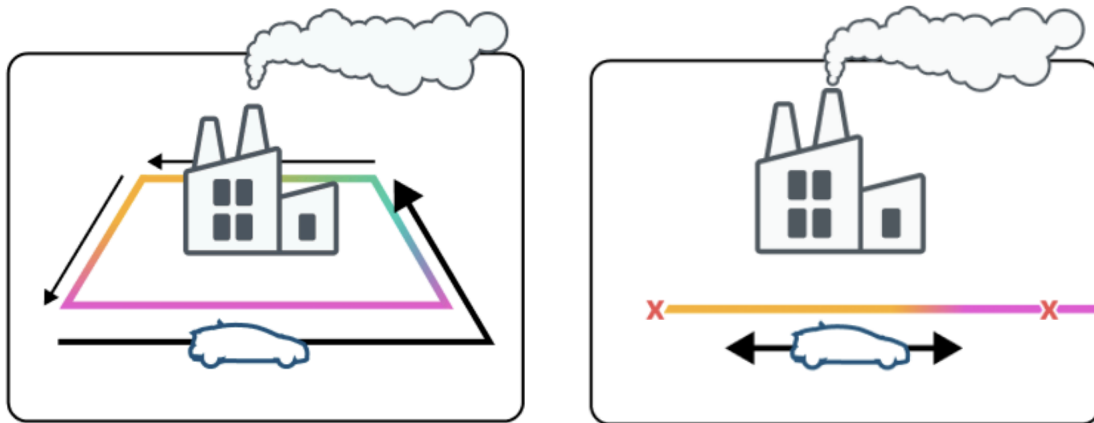
Figure 4.2: Example measurement technique for targeted area monitoring using (left) fenceline driving systematically surveys around the perimeter of a known or suspected source facility/site and (right) transect driving following a path designed to sample upwind, in, and downwind of a potential plume of pollution from a known or potential source.

Targeted area monitoring for Maywood, Commerce (east), Vernon, Bell will be conducted by Riverside, and additional information about the targeted area monitoring can be found in Section 8.3. The suite of pollutants for monitoring by Riverside includes benzene, toluene, polycyclic aromatic hydrocarbons (PAHs), 1,3-butadiene, speciated organic aerosols, ethylene oxide, particulate matter, and SO2 that are relevant to the mixture of air pollutants expected from the concerns and sources identified in Section 2. The Riverside mobile laboratory can measure a wide variety of organic gas phase and particle phase species, allowing for characterization of the composition of pollution coming from refineries or petroleum facilities, as well as a number of other sources in the community.

4.3 Community-defined concerns, objectives, and analysis plans

The community engagement process has defined a range of air pollution concerns. These concerns were translated into specific high-level monitoring objectives and sub-objectives, which in turn allowed the selection of appropriate mobile monitoring methods and data analysis plans to collect the type of data needed to address gaps in prior monitoring efforts and to address specific community concerns. Not all concerns and identified pollution sources are assigned specific monitoring objectives. In some cases it is because the measurement methods for monitoring the sources are not available to address the specific pollution sources. More generally, however, it is because resources for targeted area monitoring are limited across the entire SMMI project (62 different communities) and not all concerns can be directly addressed through the targeted area monitoring approach. While the concerns listed below will be the primary focus of the monitoring in Maywood, Commerce (east), Vernon, Bell, the final collected data set can be further analyzed beyond the scope of SMMI to address a much wider set of concerns and sources.

Note that the selection of specific concerns to be included as monitoring objectives for targeted area studies does not imply that these are the most impactful sources or the most impacted areas in the community. The results of these studies will not be able to provide a comprehensive view into all possible sources in the community and the monitoring objectives listed here should not be interpreted that way.

Table 4.1 below provides an outline of the community specific concerns, objectives/sub-objectives, mobile monitoring methods, and data analysis approaches that may support actions to reduce emissions or exposure in a

community. More details on the monitoring methods and presentation approaches can be found in Section 8 and Section 13, respectively.

Table 4.1: Community-defined concerns, objectives, and analysis plans

Community Concern	Primary Monitoring Objective	Monitoring Sub-objective	Mobile Monitoring Methods	Analysis Approach
World Oil Refiners (9302 Garfield Ave 90290)	Characterizing Sources	Key pollutants Pollutant levels Where is pollution coming from	Targeted Area: Fenceline Conducted by UC Riverside	Clusters of enhancement detections on a map Statistics on detections Chemical speciation bar/pie graph
Gage St between 710 and 5 freeways	Identify disproportionate impacts	Locations impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map
The freeway intersections of the 101 & 5 as well as 5 & 710	Identify disproportionate impacts	Locations impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map
Commerce and Vernon general pollution concerns	Identify disproportionate impacts	Locations impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map Ambient concentration map of key pollutants

5. Project roles and responsibilities

The SMMI defines the roles and responsibilities of various stakeholders in the community monitoring. The Community Engagement Plan details these roles and responsibilities and outlines how different groups will work together for community engagement. This section outlines the organizational structure for the SMMI partners (Figure 5.1), a list of community organizations that are Engagement Leads, and a list of the PEG members (Figure 5.2). Information on the SMMI project, including links to Engagement Leads, PEG members, and PEG meetings is also available at https://aclima.earth/ca-smmi. Responsibilities for Engagement Leads and PEG members are laid out in Section 1.1 in detail.

CARB's Monitoring and Laboratory Division is responsible for funding, managing and overseeing the project and ensuring it meets all contractual requirements. Aclima is the primary contractor for the project and is responsible for

designing and implementing a plan for statewide community engagement, developing CAMPs for all project area communities, deploying mobile platforms to collect data, managing and analyzing data, and developing public reports. CARB and Aclima meet weekly to discuss project updates and ensure the project is progressing.

Based on the project's Community Engagement Plan, Breathe Southern California, the Engagement Lead for Maywood, Commerce (east), Vernon, Bell, plans and implements community outreach and engagement for the project, with the goal of understanding specific community concerns around air pollution. In addition to the distribution of an air pollution survey, Breathe Southern California holds and conducts outreach for two community meetings focused on local air pollution concerns that are tailored to the specific linguistic, cultural, and accessibility needs of the community. Breathe Southern California then summarizes community air pollution concerns for Aclima to translate into the CAMP. Community members play a crucial role in providing their knowledge and experiences with air pollution both through participating in the community meetings and through completing the air pollution concerns survey. The Project Expert Group guides community engagement and decision-making throughout the project, meeting eight times over the project period in meetings facilitated by Aclima.

SMMI Partners

Figure 5.1: SMMI Project Organizational Chart

Community Organizations

Engagement Leads lead and co-manage community engagement efforts in the designated communities

- Acterra
- Breathe SoCal
- Californians for Pesticide Reform
- Canal Alliance
- CCEJN
- Center for Community Action and Environmental Justice (CCAEJ)
- Center on Race, Poverty, and the Environment
- Citizen Air Monitoring Network
- Clean Water Fund
- Climate Action Campaign
- Community Agency for Resources, Advocacy and Services (CARAS)
- Cool OC
- Day One
- El Concilio
- Girl Plus Environment
- Greenbelt Alliance
- HARC, Inc.
- Healthy Fresno Air
- HOPE Collaborative
- Just Cities
- Leadership Counsel
- Los Amigos de la Comunidad
- Madera Coalition for Community Justice
- One Treasure Island
- Our Children's Earth Foundation (for Rodeo Citizens Association)
- Pacoima Beautiful
- Rise South City
- Sacramento EJC
- San Leandro 2050
- SOMCAN
- Sustainable Contra Costa
- Sustainable Solano
- The Niles Foundation
- Tri-Valley Air Quality Climate Alliance
- UNIDOS Network
- United for Justice
- Valley Improvement Projects
- Valley Onward
- Valley Vision

Project Expert Group

A cross-sector group of representatives from local air districts, community-based organizations, academia, and residents from overburdened communities that guides community engagement and decision-making for this project.

- Nader Afzalan
- Stephanie L. Mora Garcia
- Brent Bucknum
- Mikela Topey
- Agustin Angel Bernabe
- Amelia Stonkus
- Anna Lisa Vargas
- Gustavo Aguirre Jr
- Jamallah Green
- Jonathan Mercado
- Ken Szutu
- Lillian Garcia
- Moses Huerta
- Ms. Margaret Gordon
- Brad Dawson
- Kate Hoag
- Lily Wu-Moore
- Payam Pakbin

Figure 5.2: List of Engagement Lead organizations and PEG members for SMMI

How will monitoring be conducted?

6. Data quality objectives

Data quality objectives are a series of goals set to make sure that the data collected, the analyses performed, and the visualizations produced are of good enough quality to address the stated monitoring objectives. These goals can be related directly to the quality of the measurement method, for example the accuracy or the precision of a sensor. They can also be more qualitative goals that determine how the measurement data is analyzed and visualized to accurately address community air quality concerns without being misleading. Data quality indicators are sometimes included as part of a data quality objective and are specific metrics that can be used to tell how good a measurement is. Some commonly used data quality indicators are data completeness, precision, bias, or limit of detection. Additional information on these and other data quality indicators can be found in Appendices C, D, E, F, and G.

Mobile air quality monitoring enables a variety of high-resolution spatial analyses that support different air monitoring objectives. One output uses time-resolved data from multiple individual drives of the same location to identify areas where pollution concentrations vary substantially and persistently from local background levels, indicating a probable local emissions source. This supports the air monitoring objective of attempting to identify and characterize pollution sources. Another output is the creation of maps of typical air pollution concentrations at block-by-block resolution that show areas of persistently high or low levels of individual pollutants, supporting the air monitoring objective of identifying areas of disproportionate impact.

Different monitoring objectives have different data quality objectives. The two primary monitoring objectives for SMMI and their associated data quality objectives are:

1. **Identify and characterize air pollutant emission sources**

   Typical pollutants of interest: CH_4, C_2H_6, BC, $PM_{2.5}$, NO, CO, TVOC, benzene, formaldehyde, toluene, PAHs, 1,3-butadiene, ethylene oxide, or other relevant air toxics

   Data quality objectives:

   a. Find and map spots where pollution is likely coming from by detecting noticeable spikes in measurement readings that are clearly above normal background levels. More specifically, this means that the spike measurement must have a signal to noise ratio of at least 3.

   b. Ensure high confidence in the locations where pollution emissions sources are detected and minimize the presence of "false positives" in the resulting data. This is done by ensuring that multiple detections of emissions sources occur in the same location before identifying it as a likely source of pollution. This can be quantified as the number of detections per visit to a particular location.

   c. Aclima will monitor and track the performance of each underlying measurement using the following key data quality indicators: gain drift and limit of detection. Additional information is in Appendix C.

2. **Identify disproportionate air pollution impacts**

   Typical pollutants of interest: O_3, NO_2, $PM_{2.5}$, BC

Data quality objectives:

a. Produce an ambient concentration estimate of pollution for the monitoring area by collecting measurements at different times of day, day of week, and across seasons to account for natural variability of pollution levels.

b. Ensure data are spatially distributed throughout the entire user-defined area.

c. Produce concentration estimates at desired and practical spatial aggregation scales (e.g. hexbins, road segments).

d. Include a measure of confidence (i.e. a confidence interval) with each ambient pollution concentration estimate, so users can understand the reliability of the values and whether pollution levels are truly different between locations.

e. Monitor and track the performance of each pollutant measurement using the key data quality indicators of bias, drift, precision

These data quality objectives are largely qualitative goals that provide the foundation for the types of insights that mobile monitoring is designed to support. A critical aspect of quality assurance underlying these objectives is characterizing and maximizing the measurement quality of the air pollution measurements, particularly for the sensors. However, confidence in these data products will depend on a number of additional factors such as mobile monitoring strategy, the number of samples collected for features of interest (i.e. road segment or other spatial length scale), magnitude and variability in pollution concentrations, and meteorology over the contract period. Different sensors in Aclima's Mobile Platform have varying levels of data quality and limitations to consider, which are outlined in Appendix C.

Data completion is an important quantitative data quality indicator in air quality monitoring as incomplete data can lead to biased conclusions from the data collected. Traditionally, data completeness is quantified across the time dimension, for example, number of data points collected per total time elapsed. With mobile monitoring, in some cases it is more important to quantify data completion in the spatial dimension, for example, total number of data points collected in a specific location compared to an expected number of data points in that location. Aclima's completeness metric for monitoring is discussed in Section 12. For the customized targeted area monitoring, metrics for completion are discussed in Section 8.3. Achieving completion for the monitoring plan relies on individual sensors having high temporal data completeness rates and uptime. Completeness rates of 80% or higher generally allow for efficiently achieving the spatial completeness objectives. If completeness is below 80%, additional driving will be done to compensate in order to meet the monitoring completeness metrics. If this is not possible for specific monitoring objectives, the impact will be detailed in the final report.

The comprehensive quality assurance approach incorporates processes and metrics to minimize uncertainty. Achieving data quality objectives relies on more than just individual indicators, as real-world challenges (e.g., driver absences) and external events (e.g., wildfires) can affect data quality despite a robust QA plan. The primary aim of these objectives is to generate high-quality data with well-defined performance parameters, enabling effective aggregation and analysis of mobile data for informed decision-making and pollution reduction initiatives across various applications. Section 12 details the evaluation of the effectiveness in meeting these data quality objectives. Section 12.2 details the QA/QC information that will be included in the final report.

7. Monitoring methods and equipment

Aclima will deploy two distinct but complementary monitoring methods enabled by the use of a mixed fleet of AMPs and PMLs:

- **Broad area monitoring** collected by AMPs, with mobile monitoring guided by dynamic algorithm in monitoring areas defined by the community as areas of high pollution concern during community meetings and through survey submissions
- **Targeted area monitoring** for investigations of specific sources and areas of concern, collected by UC Riverside PML, with mobile monitoring guided by community-defined air quality concerns and monitoring objectives

7.1 Monitoring equipment

Broad area monitoring as part of this CAMP will be conducted using a fleet of Aclima Mobile Platforms (AMPs, Figure 7.1).

Figure 7.1: An Aclima Mobile Platform.

All AMPs have a standardized measurement suite that covers a core range of priority pollutants and greenhouse gases (GHGs) shown in Table 7.1, operating at a collection frequency of every second (with the exception of ozone which is measured every 2 seconds). The Aclima fleet will conduct broad area monitoring measurements during different times of day and different days of the week.

Table 7.1: Air pollution and greenhouse gas species measured by the AMP.

Pollutant	Measurement Frequency
Carbon Monoxide (CO)	1 sec
Carbon Dioxide (CO2)	1 sec
Nitric Oxide (NO)	1 sec
Nitrogen Dioxide (NO2)	1 sec
Ozone (O3)	2 sec
Methane (CH4)	1 sec
Ethane (C2H6)	1 sec
Total Volatile Organic Compounds (TVOC)	1 sec
Fine Particulate Matter	1 sec
Black Carbon	1 sec

Experienced scientists from academia and industry will be deploying 3 Partner Mobile Laboratories (PML) that are equipped with instruments that measure a wide set of speciated air toxics. The PMLs are research groups from UC Berkeley, Aerodyne Research, and a consortium including researchers from UC Riverside, Baylor University, and University of Houston. Each vehicle is custom-built with different specifications and instrumentation. All 3 vehicles sample in real time with sample time ranging from 1 second up to 30 minutes, depending on the instrument. A full list of PML instrumentation and pollutants measured is available in Appendix I.

For Maywood, Commerce (east), Vernon, Bell, the Riverside/Houston/Baylor Mobile Air Quality Lab #3 (MAQL3) will be conducting the targeted area monitoring. The MAQL3 is a 24' box truck with a crew cab to carry a driver and up to four scientists. The MAQL3 has a flexible payload system which will carry a variety of instruments to measure gases, aerosols, volatile organic compounds, meteorological, and other state parameters (latitude, longitude, altitude, speed, etc). Trace gas measurements include ozone (2B Technology Model 205; modified Thermo 42c), carbon monoxide (Los Gatos 913-0024), carbon dioxide (Licor LI-7000), nitric oxide (Thermo 42c-TL or custom Air Quality Design 2-channel), nitrogen dioxide (modified Thermo 42c-TL or custom Air Quality Design 2-channel), total reactive nitrogen (modified Thermo 42c), sulfur dioxide (Thermo 43i-TLE), and reactive alkenes (Hills Scientific Reactive Alkene Detector). An Airmar 220WX reports temperature, humidity, pressure, wind speed and direction, latitude, longitude, altitude, and vehicle speed. Boundary layer heights are derived from a Vaisala CL-31 using BL-View software. The downwelling photolysis rate of nitrogen dioxide is measured with a 2-pi field of view filter radiometer (MetCon). Volatile organic compounds analysis includes a Proton Transfer Reaction Mass Spectrometer (PTR-MS; Ionicon Analytic), AROMA-VOC Mobile Trace Chemical Analyzer (Entanglement Technologies), and a Picarro G2307 gas concentration analyzer to measure formaldehyde (HCHO) and methane (CH_4). Aerosol analysis includes an aerosol light scattering (TSI 3563 nephelometer) and light absorption with a three-wavelength tricolor absorption photometer (TAP; Model 2901, Brechtel Inc). Aerosol size distributions will be measured with a home-built scanning mobility particle sizer, a Handix Portable Optical Particle Spectrometer, and a TSI Aerodynamic Particle Sizer (3321).

Aerosol composition will be measured with a high resolution time-of-flight mass spectrometer (HR-ToF-MS; Aerodyne Research Inc, Aerosol Mass Spectrometer). Particle size distributions will be measured using a Scanning Mobility Particle Sizer (SMPS; custom, UCR), a Portable Optical Particle Spectrometer (POPS; Handix Scientific, Inc.), and an Aerodynamic Particle Sizer (APS; Model 3321, TSI, Inc.). Total particle number concentration will be measured with a condensation particle counter (CPC; Model MAGIC, Aerosol Dynamics, Inc.).

7.2 Monitoring methods - broad area monitoring

In broad area monitoring, Aclima's fleet of Mobile Platforms will collect data within the community defined monitoring area boundary. AMPs will measure on publicly accessible roads within this boundary, gathering repeat measurements at different times of day, days of the week, and seasons.

Aclima will conduct monitoring within the defined boundary such that the fleet will complete an average of 20 repeat measurements distributed across all residential and major roads in all census block groups to provide adequate coverage throughout the monitoring area. However, rather than specify the number of samples on any specific length of road within each census block group, Aclima uses a dynamic mobile sampling algorithm that is updated daily with the specific goal of collecting data that will maximize improvement in the characterization of a location's air quality. This approach ensures that sufficient measurements are collected in areas where greater pollutant variability requires additional sampling to achieve representativeness, or measurements that are representative of the conditions across the specific monitoring period. The system uses observed data in combination with predictive models to prioritize data collection in locations based on these factors:

- Number of visits to-date relative to expected visits, given the time elapsed over the 9-month monitoring period
- Time elapsed since the last visit
- Variability in observed pollutant concentrations over repeat visits, i.e. a mismatch between observed concentration and the predicted concentration based on prior observations

At the beginning of the monitoring period, the number of visits is more heavily weighted than the other factors and once a suitable number of observations have been made to make reliable predictions, the variability of observed pollutant concentrations becomes more heavily weighted. In the end, locations where pollutant variability is higher, will be prioritized for more repeat visits in order to more adequately characterize the average pollutant concentrations in these locations.

Aclima ensures continuous mobile monitoring throughout the day by staffing driving shifts throughout the day and staggering start times to avoid operational gaps when drivers are ending and starting shifts. The drive planning algorithm operates across large areas, not individual communities of varying sizes, and aims for spatially diverse data collection daily across all CNCs, regardless of the amount of road miles contained in those communities. To mitigate time-of-day bias, specific road locations are randomly assigned to 6-hour windows on a daily basis to mitigate against overly biased collection in certain locations to certain times of day. The sampling algorithm also prioritizes maintaining an equal revisit rate across the monitoring area, aiming for the 20-visit average over a nine-month period rather than quickly completing specific locations. Locations that receive 20 visits early on in the nine-month period will continue to be visited over time.

The mobile sampling algorithm ensures sufficient data collection to support the calculation of spatially resolved ambient concentration estimates. In addition, the method supports source identification and assessment of disproportionate impacts by directing more sampling either in regions where there is larger variation in pollution

concentrations. For a detailed discussion of the broad area mobile monitoring and the dynamic mobile monitoring algorithm, see Aclima's QA documentation in the Appendices C, D, and E.

The broad area monitoring boundary for Maywood, Commerce (east), Vernon, Bell is shown in Section 8: Monitoring Areas.

7.3 Monitoring methods - targeted area monitoring

UC Riverside will conduct targeted area monitoring that focuses on specific air pollution concerns at smaller spatial scales. This involves monitoring over a relatively small area over a shorter duration in time (approximately 1 to 2 weeks) and is designed to complement the broad area monitoring coverage by providing more in-depth information about a specific area of concern. This can provide both enhanced characterization of pollution sources as well as an assessment of the locations of concern and sensitive receptors in the community that are impacted by source emissions. Targeted area monitoring is designed to perform detailed chemical, temporal, and/or spatial characterization at a select number of locations of concern identified by communities. The characterization can include aspects such as denser temporal information about pollutants by time of day, detailed chemical speciation around sources of concern in a particular area, or spatial information about the location of an emission source and extent of the areas and people impacted by the source.

The mobile monitoring method for targeted area monitoring is different from that used for broad area monitoring. By the nature of targeted area monitoring, a more customized driving method is necessary to support air monitoring objectives and concerns specific to individual communities. As with the broad area monitoring, representativeness is achieved by conducting repeat measurements to sufficiently characterize pollutant concentrations; however, the repeat measurements will typically (though not exclusively) occur over a more condensed time period in these targeted investigations.

Section 8 (Monitoring Areas) details the targeted area monitoring study that will be conducted in Maywood, Commerce (east), Vernon, Bell.

7.4 Strengths and limitations of mobile monitoring

Because of the nature of mobile monitoring and how it differs from stationary monitoring, there are inherent strengths and limitations to the approach.

- Mobile monitoring can cover more area at a higher spatial resolution than stationary networks (i.e. fewer spatial gaps in coverage). However, because mobile monitoring vehicles can only spend a limited period of time at a given location, there may be gaps in time for that location where monitoring data is not available.
- Mobile monitoring sensors and instruments can gather valid data on a wide variety of important pollutants for informing community action, but to achieve high spatial resolution, gather data on fewer pollutants and at lower precision and accuracy than is possible in stationary networks. As a result, mobile monitoring sensors are not certified by the U.S. EPA for gathering data that can be compared against national ambient air quality standards (NAAQS) and used in regulatory actions under the Clean Air Act. For certain regulatory actions, a follow-up study using U.S. EPA-approved monitoring methods may be necessary.
- While mobile monitoring can provide a significant amount of information across a given geographic area, monitoring vehicles may be present in that area for a limited period of time. This may mean rare events or seasonal patterns are not captured in the dataset.

8. Monitoring Areas

8.1 Community Mileage Allocation

A requirement for SMMI is that at least 50% of the population in the areas monitored are living in areas designated as Disadvantaged Communities (DAC), as defined by the top 25% of CalEnviroScreen scores under SB535. Across all CNCs designated for monitoring as part of SMMI, the total population is approximately 7.9M people, of which 2.9M people live in DACs (approximately one quarter of the California-wide DAC population). Aclima's monitoring resourcing scales with the length of roads contained within the selected monitoring area; in other words, more vehicles and drivers are required to monitor areas with a higher total length of roads. For all CNCs combined the total contained road length is approximately 18,000 miles. The DAC census tracts combine to about 6700 miles. Aclima determined that allocating resources for SMMI such that approximately 12,000 miles of roads could be covered would allow for covering the DAC communities while also keeping the total % of DAC population at 50% or above, whereas adding additional resources would reduce the percentage of DAC population receiving monitoring resources. The implication of this is that because not all communities will receive monitoring resources to cover the entire community, an equitable process for allocating monitoring resources per community would need to be developed that would ensure that communities with higher proportions of DAC population will receive more monitoring resources. In consultation with the Project Expert Group (PEG), Aclima developed a method for allocating monitoring resources for broad area monitoring across the 62 CNCs that are part of the SMMI. The approach involved 3 steps:

1. The total number of available road miles was distributed across air districts according to the proportion of population contained within the CNCs in each of the 5 air districts containing the 62 CNCs (Imperial County, South Coast, San Joaquin Valley, Sacramento Metro, and Bay Area)[1]. This resulted in 100% of the road miles for CNCs in Sacramento, San Joaquin, and Imperial County Air Districts being allocated, because the proportion of these air districts' population is higher than their proportion of the CNC road miles compared to that over all CNCs. For the Bay Area and South Coast CNCs, there were more miles present within the CNCs than there were miles available, and therefore a method was required for allocating the remaining miles among individual CNCs.

2. A customized prioritization metric for each census tract across all CNCs was defined to rank CNCs according to various socioeconomic and environmental indicators. This prioritization method was defined in consultation with the PEG. A description of how this prioritization metric was defined is given below.

3. Individual census tracts within CNCs were successively selected based on this customized ranking until the total road miles available for monitoring in each air district was exhausted. The road mile length of the census tracts selected is added up for each CNC, and that total is the number of miles available for monitoring for that CNC. The total number of miles assigned to each community by this method is presented in Appendix B.

The prioritization metric was created as an alternative to the CalEnviroScreen (CES4.0) score, addressing concerns raised by the PEG about the relevance of many of the metrics used in CalEnviroScreen as applied to the SMMI. Note that because the DAC communities are defined based on CES (under SB535), the PEG's prioritization metric will

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[1] The populations used for each Air District in this calculation are: Bay Area - 2838232; Imperial - 15330; Sacramento Metro - 138633; San Joaquin Valley Unified - 687473; South Coast - 4573865.

result in some non-DAC communities being prioritized over DAC communities. The methodology Aclima used, in coordination with the PEG, is outlined below.

- Aclima proposed a customized weighting of individual environmental and socioeconomic indicators relevant to the SMMI monitoring methodologies (including some in CalEnviroScreen plus others). The weighting was determined by a survey of PEG members, who collectively assigned weights to each available indicator.

- Survey Score Normalization: The Max/Min method was used to normalize the survey responses from PEG members to a scale of 0 to 1. This ensured that individual respondents' tendencies to give consistently higher or lower ratings did not skew the overall results.

- Indicator Weighting and Scoring: The normalized raw survey results were used to create weighting factors for each indicator. These weighting factors are shown in Appendix B. For each census tract, a mileage allocation score is derived by converting each indicator value into a percentile rank across all census tracts contained in the CNCs. This rank is multiplied by its corresponding weight, summing across all indicators, and normalizing to a value between 1-100. The indicators were taken from CES 4.0 and two additional non-CES indicators were added: the density of AB2588 Air Toxics Hot Spots and the density of large permitted sources, both measured as the number of sources per unit road length in census tracts. Some of the sources in the inventory had no emissions reported; these sources were first removed before calculating the density of sources.

- Final Score Calculation: The weighted scores for each indicator were summed for each census tract. This summed result was then normalized to a scale of 1-100 to create a PEG mileage allocation score for every census tract contained within the 62 CNCs. The final indicators and scores are available in Appendix B.

While this approach resulted in census tracts with the highest prioritization scores being prioritized within CNCs for the purposes of mileage allocation, the Community Engagement Plan (Appendix A) outlined a process for the Engagement Leads to work with communities directly to use the road mileage budgeted to select monitoring boundaries according to the priorities indicated by the communities. While this process empowers the local communities to make the decisions about where to direct monitoring, it should be acknowledged that the final monitoring area boundaries may not necessarily include the most disadvantaged communities as defined by established metrics such as CalEnviroScreen or by the PEG-developed metric.

For Maywood, Commerce (east), Vernon, Bell, the total road length (for residential and major roads only) within the community is 189 miles, and the allocated mileage is 187 miles, as determined through the process above.

8.2 Broad Area Monitoring Coverage

Aclima's vehicles will gather detailed location-based and time-based pollution measurements throughout the community. This will happen over a nine-month period as the vehicles drive on roads that are open to the public. The specific neighborhoods where this mobile monitoring will take place were decided by the community members themselves during meetings led by Breathe Southern California. Broad area monitoring will occur consistently across a 9-month period from June to March, with repeat frequency in all locations (at the census block group level) on average approximately once every 2 weeks.

The maps below identify the region selected by the community for broad area monitoring along with location characteristics about known air pollution sources and community-identified concerns. Meteorological data (wind speed and direction) will be collected on the mobile platform and will be an additional location-based characteristic for incorporating into analysis and interpretation of data.
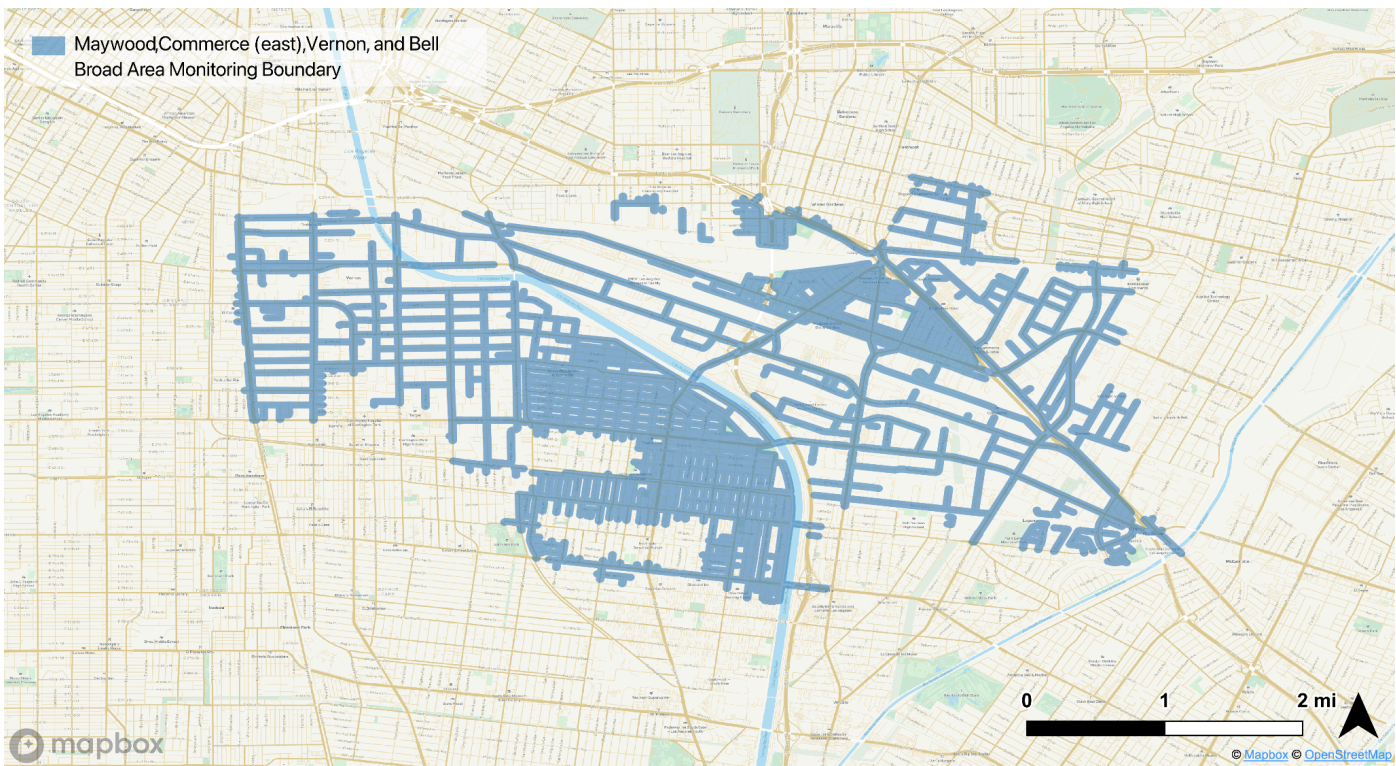
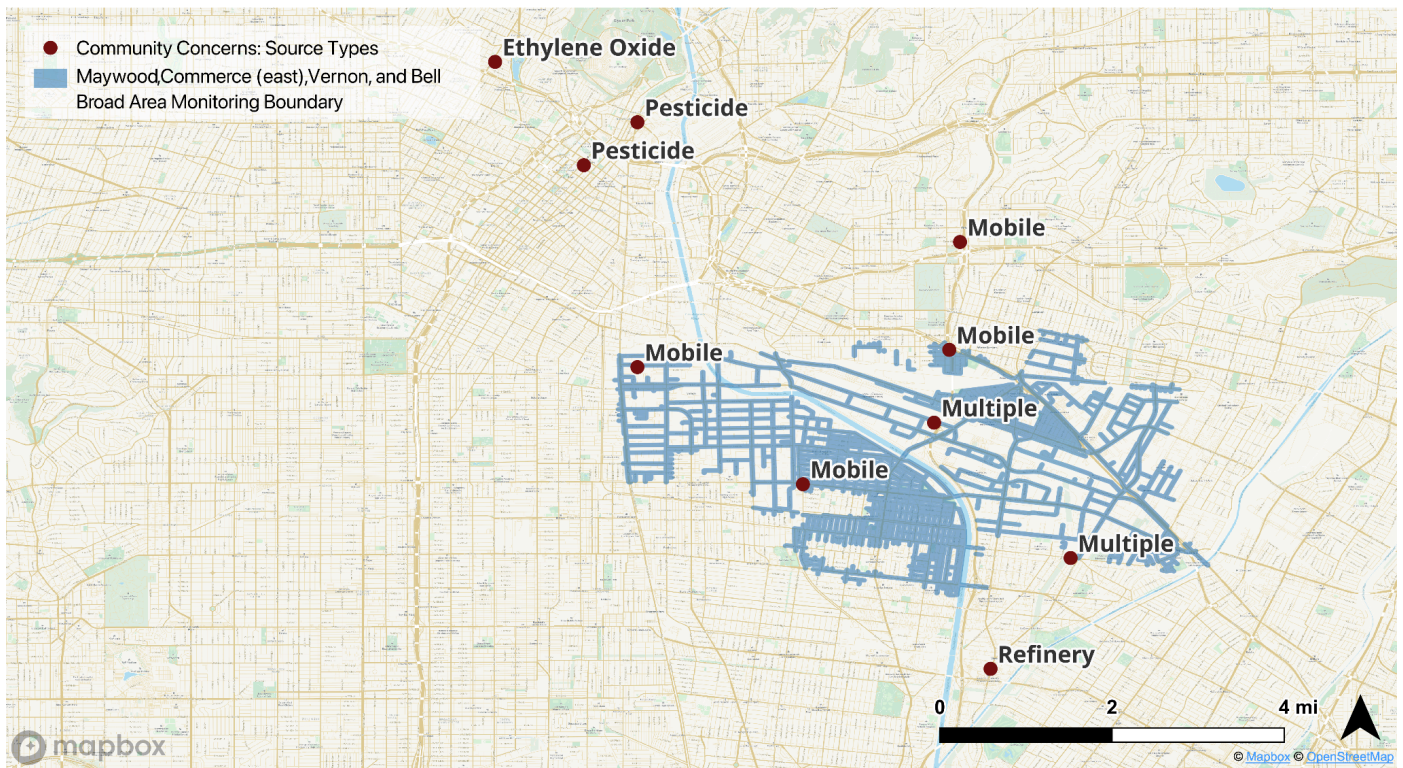**Figure 8.1**: Map of selected areas for broad area mobile monitoring.

Figure 8.2: Map of the Maywood, Commerce (east), Vernon, and Bell broad area monitoring boundary and local air quality community concerns. Concerns noted by Maywood, Commerce (east), Vernon, and Bell community members include traffic from a number of freeways, oil refinery operations, a sterilization facility, and a variety of mixed industrial sources.
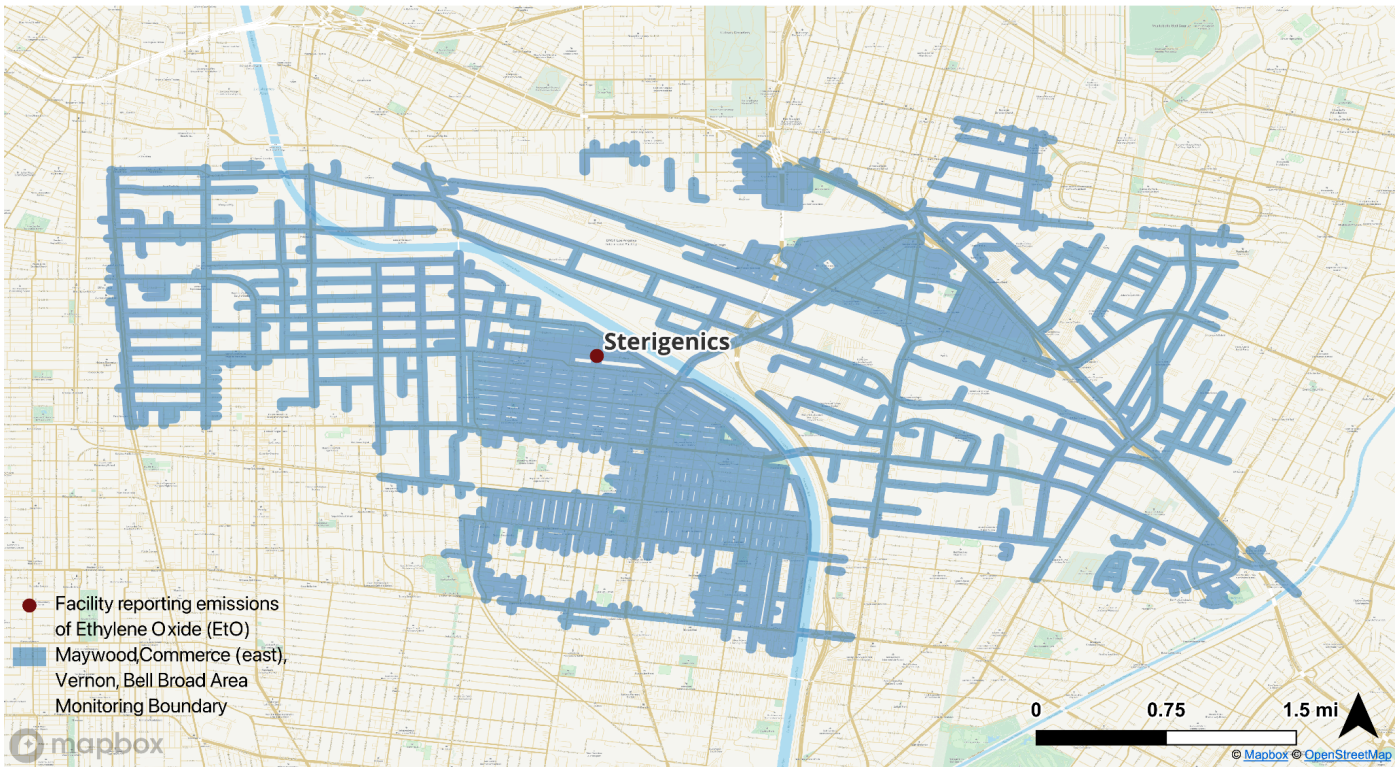
Figure 8.3: Map of the Maywood, Commerce (east), Vernon, and Bell broad area monitoring boundary and Sterigenics, a nearby ethylene oxide (EtO)-emitting commercial sterilization facility.
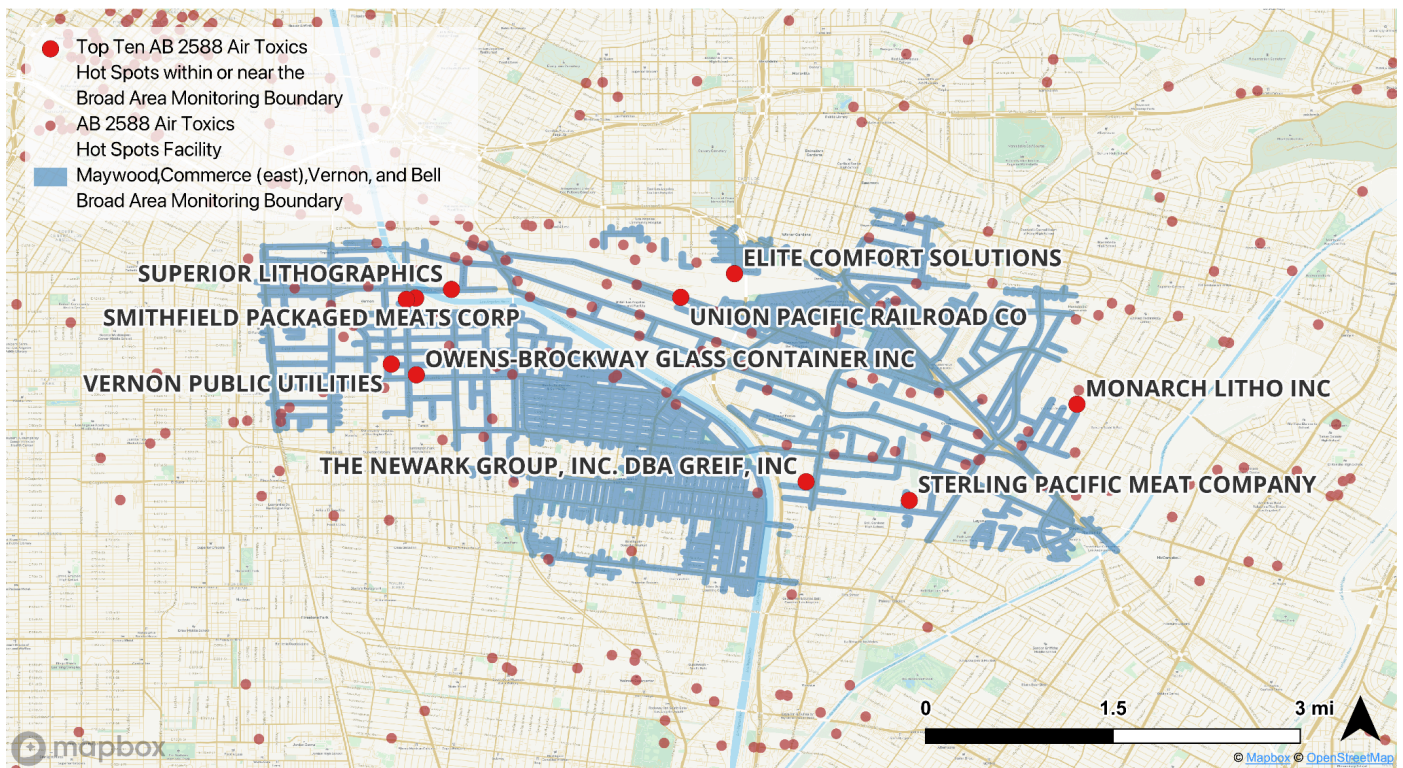
Figure 8.4: Map of AB 2588 Air Toxics Hot Spots within and near the Maywood, Commerce (east), Vernon, and Bell broad area monitoring boundary. The top 10 hot spots, based on total toxicity-weighted emissions (TWE), are emphasized. These sources include meat processing facilities, glass manufacturing sites, public utility companies, electricity generation plants, and a railroad yard.
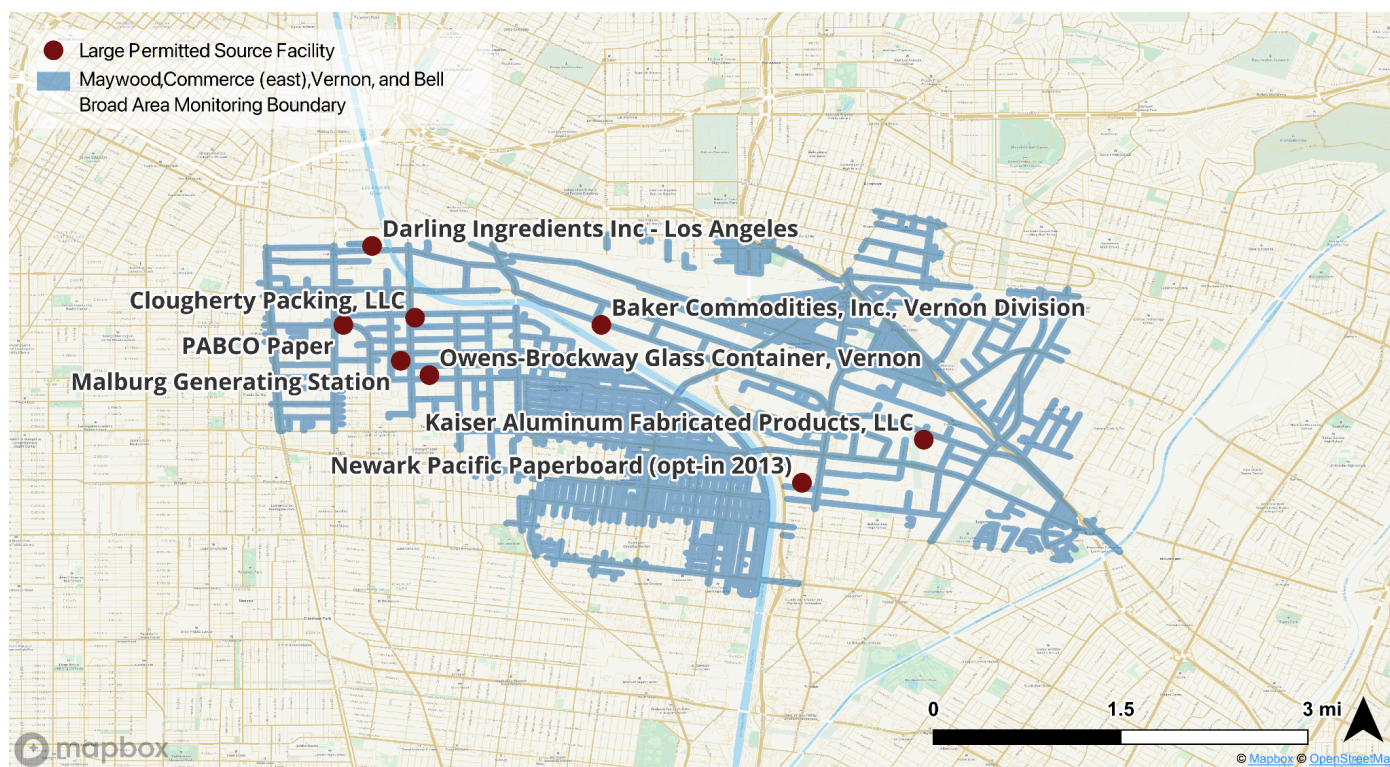
Figure 8.5: Map of large permitted facilities within and near the Maywood, Commerce (east), Vernon, and Bell broad area monitoring boundary. Facility activities include electricity generation, paperboard, glass, and aluminum manufacturing, and other assorted industrial operations.

8.3 Targeted Area Monitoring

Targeted area monitoring studies are designed to flexibly address specific air quality concerns raised by communities. The monitoring method, data analysis approach, and visualization approach will be customized to collect, visualize, and interpret the data in a way that is most effective for providing results that can ultimately be used to take action to address the air pollution concern. Aclima and UC Riverside, with guidance from the PEG, have developed a method that draws from a modular set of predetermined monitoring, analysis, and visualization approaches that can be combined in unique ways to address a number of different concern types and monitoring objectives.

The air quality survey, community meetings conducted by ELs, and other outreach conducted with community members and air district representatives identified and prioritized the community air quality concerns (detailed in Section 2.3).

From the concern and monitoring objectives, a monitoring, analysis, and visualization approach is selected that is most appropriate for providing actionable results to help address the community air quality concerns.

The targeted area study for Maywood, Commerce (east), Vernon, Bell will be conducted by UC Riverside and will address the community identified concern of World Oil Refiners and the impact on nearby air quality. The primary monitoring objective for this targeted area study is source characterization of the refinery. Some of the key pollutants that will be of focus include methane/ethane, benzene, toluene, xylenes, other aromatics, 1,3-butadiene,

formaldehyde, black carbon, and PM2.5. This targeted area study will be conducted using the following monitoring approaches:

- **Fenceline** Monitoring while driving around the perimeter of a facility or other stationary point source of air pollution.

- **Stationary Sampling** If the source type is a VOC or particulate matter source, stationary measurements at the downwind fenceline will be made (if suitable parking is available) in order to allow for full chemical characterization of the plume. Stationary data allows the slower-timescale instruments to collect more meaningful data.

The Riverside mobile lab team will drive downwind of World Oil Refining to identify any enhancements in measured concentrations. Wind conditions and road access will dictate when a given source is attempted and which routes are taken. When possible, a full circle around the facility will be measured so that any interfering upwind sources can be ruled out. The priority target will be visited on approximately 50% of the days

In addition to the primary target (World Oil Refiners), Riverside will consult a prioritized list of sources which consists of 1) community concerns and 2) additional industrial facilities from regulatory databases, as identified in Section 2 and displayed in Figures 8.2-8.5. The Riverside mobile lab is able to visit about two point sources per day, including repeats to top-priority sources. Daily wind conditions and downwind road access will dictate which day(s) a source or concern is visited. Clusters of sources with favorable sampling conditions can often be visited together, maximizing our sampling time. Repeat visits (multiple days) to the top priority sources will be attempted. Riverside will attempt independent visits to high priority point sources on at least 50% of the days allocated to a given CNC, and each visit will attempt to collect 3-5 mobile plumes. If the source is a VOC or particulate matter source, a stationary measurement in the plume enhancement will be attempted. Riverside will spend approximately 1 week (either contiguous or spread across a wider time window while alternating visits across multiple SMMI communities) monitoring in Maywood, Commerce (east), Vernon, Bell. Aclima and the Riverside team will be in touch with the Breathe Southern California engagement leads when plans are finalized in order to alert the community. Community specific information about the local concerns and sources as well as the accessibility of certain roads can be discussed at this point in order to inform the mapping routes.

The map below shows the priority focus area for this targeted area study. Additional sources targeted are shown in Figures 8.2-8.5.
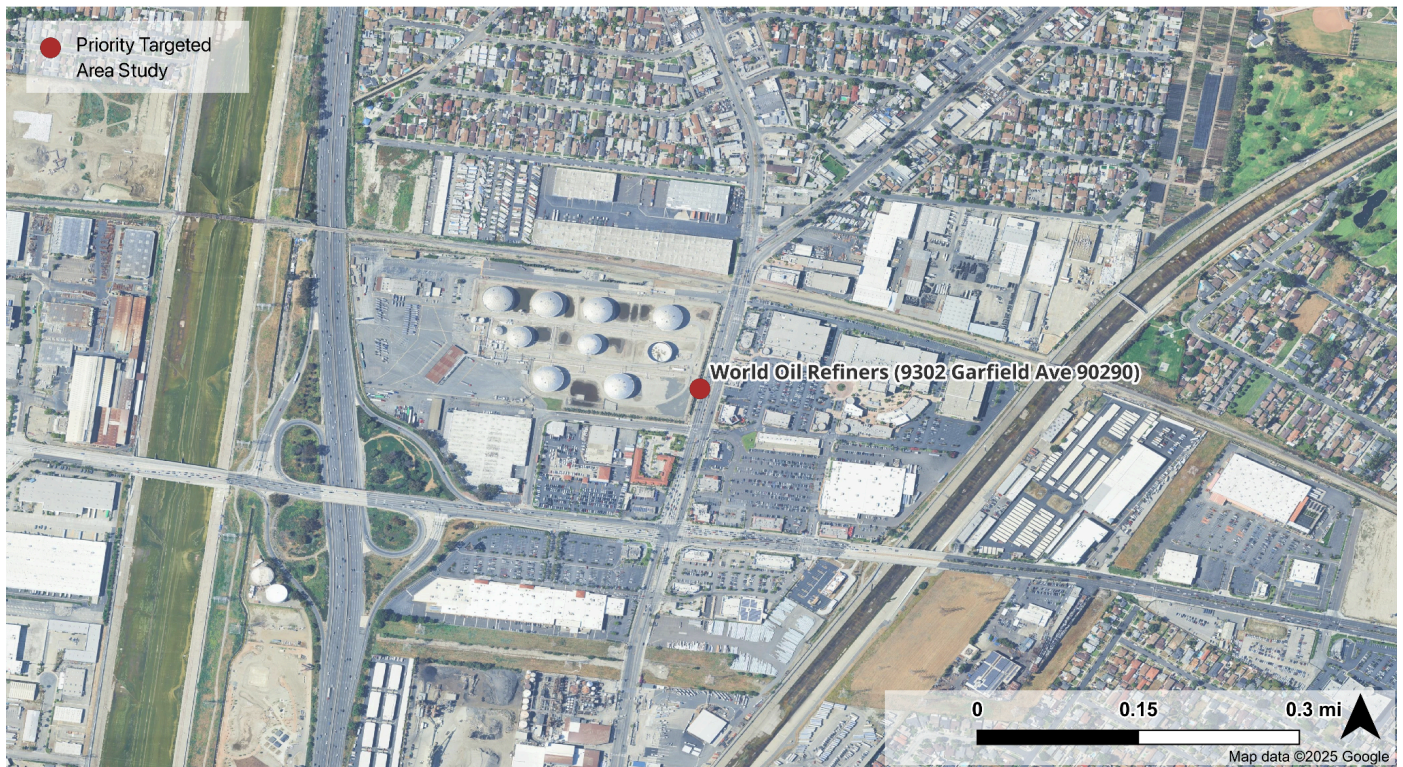
Figure 8.6: Map showing the primary community concern, World Oil Refiners, that will be the focus of the targeted area study. The facility is located to the southeast of the broad area monitoring boundary. Additional concerns and emission sources shown in Figures 8.2-8.5 will be included in the monitoring plan as secondary targets. Actual drive plan and extent of monitoring is to be determined.

9. Quality control procedures

Quality control procedures are an important part of all air monitoring plans because they outline the work that will be done before, during, and after the measurement period to make sure that the data collected meet Aclima's data quality objectives.

9.1 Aclima's Quality Assurance and Quality Control Procedures

Aclima has a comprehensive set of quality control (QC) procedures in place throughout the entire monitoring process, from the moment the sensors are installed into vehicles up until the final data is analyzed. These procedures help us track and minimize uncertainty, ensuring that the data collected is appropriate for the intended monitoring objectives. The following is a brief overview of these procedures. A full description of these procedures is included in accompanying documents in Appendices C, D, and E, including the frequency of QC checks conducted.

Ensuring Sensors Measure Accurately: Calibration

Calibration is a critical part of Aclima's quality control process. Aclima compares its sensors against trusted reference instruments and standards to make sure they are reporting the correct pollutant levels. Aclima does this at several stages:

- **Before Deployment (Pre-deployment Calibration):** Before mobile monitoring vehicles start collecting data in the community, each sensor undergoes a thorough calibration process.
- **During and After Deployment (Calibration Check):** During and after a mobile monitoring period, the sensors are brought back to Aclima's calibration facilities and recalibrated using the same methods as before deployment. This helps the team see if the sensors have drifted or changed their readings during the monitoring period. Calibration checks will occur approximately once every 6-8 weeks over the 9-month monitoring period.
- **Addressing Calibration Drift:** If Aclima finds that a sensor's calibration has shifted between any two calibration events, the team carefully reviews the data and may apply adjustments to ensure the accuracy of the measurements taken during the monitoring period. The way Aclima corrects for drift depends on the pollutant and the type of data product (e.g., long-term averages vs. short-term spikes).

Ongoing Checks During Monitoring:

There are several ongoing checks that occur while mobile monitoring vehicles are in the field:

- **Driver Checks:** Aclima's trained drivers perform daily visual inspections of the monitoring system, including checking sample lines and performing **PM zero checks** to ensure the system is operating correctly. They also monitor data connectivity and clean the black carbon sensor inlet.
- **Automated System Checks:** Aclima's mobile platform continuously monitors various **system status indicators**, such as temperature, pressure, humidity, and flow rates within the sensors. If these indicators fall outside of acceptable ranges, the data is automatically flagged for review. This helps us identify potential issues early on.
- **Manual Data Review:** Aclima's technical staff remotely monitor the incoming data and system diagnostics on a weekly basis to look for trends, unusual patterns, or potential sensor issues that automated checks might miss. Aclima may compare its data to that from nearby regulatory air monitoring stations to provide context for how pollutants are generally behaving over time in the region.

Addressing and Correcting Issues:

If any issues are detected during quality control checks, Aclima has the following procedures in place to address them:

- **Troubleshooting and Repairs:** For minor issues, drivers may be able to perform simple repairs in the field. For more complex problems, sensors or even the entire Aclima Mobile Node (AMN) may be returned to the calibration facilities for repair, recalibration, or replacement.
- **Data Flagging and Exclusion:** If Aclima identifies data that is likely inaccurate due to a sensor malfunction or other issue, Aclima flags this data in the system. Severely compromised data is excluded from further

analysis to prevent it from affecting the final data products. Data that may have slightly higher uncertainty is noted and may be handled with more caution. Both the severity and the reason for flagging will be indicated

- **Data Adjustments:** If a calibration check reveals a consistent drift in a sensor's readings since the previous calibration, Aclima may apply adjustments to the data collected during the deployment to improve its accuracy over that time period. All data modifications are carefully tracked in Aclima's database. During calibration checks, the sensors also undergo recalibrations to derive the next set of calibration parameters for the next phase of data collection.

Table 9.1: Summary of Aclima QC Procedures and Frequency

Quality Control Activity	Frequency
Driver system checks (PM zeros, data connectivity, tubing and cable checks)	Daily
Manual data review	Weekly
Calibration checks (and subsequent recalibration)	Every 6-8 weeks
Routine Maintenance (internal filter or other consumables swaps, leak checks)	Every 6-8 weeks at calibration checks
Installation and Uninstall Checks (Flow checks, sample line cleaning, sample line filter swaps, etc)	Every 6-8 weeks at calibration checks
On-demand maintenance	As needed

Collocation of Aclima AMN at Regulatory Sites

Aclima AMNs will be installed at 2 regulatory monitoring sites operated by CARB or local air districts across California for long term intercomparisons in order to directly compare Aclima's measurements to regulatory measurements in different regions of the state. There are two motivations for this inter-comparison:

1. Provide transparency about how Aclima's measurements compare to FEM/FRM measurements of the key criteria pollutants (NO2, O3, CO, and PM2.5).

2. Identify any region-specific biases in the comparison of the AMN PM2.5 measurement with FEM methods. Aclima will consult with CARB to determine whether any systematic adjustment to Aclima's PM2.5 data should be performed based on the results of this intercomparison (see Appendices C and D for more details on the treatment of systematic bias).

These intercomparisons will be evaluated and quantified using various Data Quality Indicators (DQIs) (e.g. bias, precision, mean bias error, R2, etc). As of the publication of this CAMP, an AMN has been installed at a regulatory site in Sacramento (Downtown Sacramento – T Street, 1309 T Street, Sacramento, CA) and in Fresno (Fresno – Garland, 3727 N. 1st Street, Ste. 104, Fresno, CA). These sites were selected based on availability of space as well as the desire to collect AMN data in the Central Valley for characterizing regional differences in PM2.5. This data will be included in the data set released to the public at the conclusion of SMMI and the results of the intercomparison will be summarized in the final report.

Documentation and Oversight

Aclima maintains detailed records of all quality control activities. This includes calibration records, maintenance logs, data review notes, and any data adjustments made. The Quality Assurance Manager is responsible for overseeing Aclima's quality assurance system, ensuring that company procedures are followed and that Aclima's data meets high quality standards. Results from calibration records will be summarized in the project final report.

9.2 Partner Mobile Laboratories Quality Assurance and Quality Control Procedures

The quality assurance and quality control (QA/QC) procedures for the Riverside/Baylor/Houston Mobile Air Quality Lab #3 (MAQL3) involve various checks for both gas and aerosol instruments. For trace gas measurements (O3, NO, NOx, NOy, CO, SO2, Reactive Alkenes), zero and span checks are performed prior to sampling drives, with multipoint calibrations done weekly or after instrument repair. Hourly zero checks are also conducted for some chemiluminescent instruments.

Aerosol and volatile organic compound (VOC) instruments are continuously monitored. VOC instruments undergo calibration curve assessments every 1-3 days, including five concentration points and a zero air point. The HR-ToF-AMS and Condensation Particle Counter (CPC) are calibrated weekly (or as needed) with HEPA filter zeros. The nephelometer is calibrated approximately every 15 days using CO2, and the tricolor absorption photometer (TAP) is calibrated with each new filter, typically every 3-7 days. Table 9.2 shows the QA activities and their frequency. Additionally, the data undergoes a thorough review process. This includes visual inspection by trained personnel, alongside the application of screening tools such as calculating ratios (e.g., NOx:NOy) and evaluating instrument responses to known events like O3 response to NO plumes, to ensure data quality and identify any suspect or erroneous measurements.

Table 9.2: Summary of Riverside/Baylor/Houston QA Procedures and Frequency

Measurement	Zeros (nominal minimum frequency)	Span (nominal minimum frequency)	Multipoint (nominal minimum frequency)
O3	With spans, multipoint, and hourly (chemiluminescent only)	Prior to sampling drives	Weekly or after instrument repair
NO	With spans, multipoint, and hourly	Prior to sampling drives	Weekly or after instrument repair
NOx	With spans, multipoint, and hourly (chemiluminescent only)	Prior to sampling drives	Weekly or after instrument repair
NOy	With spans, multipoint, and hourly (chemiluminescent only)	Prior to sampling drives	Weekly or after instrument repair
CO	With spans and multipoint	Prior to sampling drives	Weekly or after instrument repair

SO2	With spans and multipoint	Prior to sampling drives	Weekly or after instrument repair
Reactive Alkenes	With spans and multipoint	Prior to sampling drives	Weekly or after instrument repair
PTRMS	Prior to sampling drives	Minimum of every three days	Weekly or after instrument repair
TAP	Prior to sampling drives and with white filter check	White filter check at filter change	
Neph	Prior to sampling drives	Every 15 days or after instrument repair	Every 15 days or after instrument repair (single point)
AROMA	Prior to sampling drives	Minimum of every three days	Weekly or after instrument repair
AMS	Prior to sampling drives	Minimum of every three days	Weekly or after instrument repair
Picarro	Prior to sampling drives	Minimum of every three days	Weekly or after instrument repair

An Aclima AMN will be installed in the PML for intercomparisons of PML measurements with Aclima measurements. Additionally, inter-comparison exercises are planned between different PML teams participating in SMMI, which are expected to include cross-comparisons of reference gases and parked collocations.

10. Data management

The section briefly outlines how Aclima's system manages data from Aclima Mobile Nodes (AMNs) and Partner Mobile Laboratories (PMLs) throughout the SMMI campaign, fulfilling specific Scope of Work elements related to data management procedures and transfer mechanisms. A detailed description of Data Management can be found in Appendix F.

10.1 Data categories and levels

Data collected as part of this CAMP will range from 1-second measurements used for analysis, combinations or summaries of data collected throughout the observation period, and more rapid notification of the detection of high concentrations. Aclima organizes these data further into levels reflecting the degree of processing, from the lowest level (Level 0, or L0) at sensor readout to high level (Level 4, or L4) modeled analyses which synthesize individual data points into actionable insights and data summaries for dissemination through visualization and reporting.

Table 10.1: Aclima's Data Processing Levels. Asterisks (*) indicate data levels provided to CARB or in support of non-scientific communication and community visualization.

Data Level	Name	Definition	Example
0	Raw Signal	Original signal produced by the sensor.	Voltage, digital number, raw mass spectra data
1	Intermediate geophysical quantities	Derived from Level 0 data using basic physical principles or calibration equations.	Concentration in ppb or ug/m3
2a*	Standard geophysical quantities	Estimate using sensor plus associated physical measurements directly related to measurement principle.	NO2 derived from O3 and Ox (O3+NO2) Temperature and humidity correction to sensor estimates. Methane and speciated air toxics peaks derived from time series data.
2b	Standard geophysical quantities, extended	Level 2a but using external data sources for artifact correction & directly related to measurement principle.	Not planned for use in the SMMI effort.
3*	Advanced geophysical quantities	Aggregated geospatial products using standard statistical methods.	Basic average concentration maps. Maps of enhancement events.
4*	Spatially continuous geophysical quantities, modeled spatio-temporal phenomenology	Aggregated geospatial products using advanced statistical models and potentially external data	Statistically reconstructed concentration maps with confidence intervals. Maps of locations of persistently elevated concentrations

10.2 Data management pipeline

The Data Management Pipeline includes five stages that manage data from collection to analysis. First, 1-Hz sensor data and accompanying metadata are **published** to remote (cloud) systems. Next, the sensor data and metadata are **ingested** into Aclima cloud storage. This Level 0 data is archived to ensure it is never altered. PML data is processed separately but in compatible formats. The raw, Level 0 data is **transformed** into calibrated physical quantities (Level 1) and further refined standard measurements (Level 2a), applying necessary corrections, time-shifting adjustments for sensor lag, and performing both automated and manual data quality flagging. Next, the **models** are used to aggregate L1/L2a information into higher-level geospatial data products (Level 3 using standard statistical methods

and Level 4 employing advanced modeling techniques) to identify emission sources and disproportionately affected areas. Lastly, the data in all levels are labeled and **stored** using scalable cloud data storage. The original collected data is always preserved and snapshots are taken at critical states. CARB will have access for a three-month period post-contract.

10.3 Data review and quality assurance

The data management system incorporates support for data review checks, defined as the manual or automated flagging of automated signals from sensor time series. Scientific details of data review can be found in the Appendices C, D, E, and F. Different data review and QA activities take place at different stages.

During the active deployment of a monitoring device and as data is streaming to the cloud, the monitoring team periodically checks (through a combination of manual and automated processes) the data being ingested to flag any sensor or data quality issues as they arise. Wherever possible, issues are resolved quickly in the field. Data that must be omitted from use for any reason (e.g. leaks, sensor failure, flow blockage, etc) is flagged.

After the deployment of a monitoring device is over (once the device returns to its home base), the monitoring team conducts a full review of all sensor data collected during that device's deployment, to ensure any issues that may have slipped through the cracks during the deployment period are detected before data is finally verified. Once again, any well-characterized data issues are flagged and any omissions from use are marked.

Once the deployment of all monitoring devices in the fleet is over (once all devices return to home base and the monitoring period is over), all collected data is re-processed to take account of flags and omissions and to prepare data for handing over to CARB and the community.

The original data coming from the sensors is always preserved, as well as all annotations from the various review and QA steps, so that the inclusion or omission of specific data can be properly traced.

10.4 Data transfer

Finalized L2a data from Aclima and the PMLs will be transferred to CARB via secure cloud storage, following a defined schema compatible with EPA's AQS where applicable. The delivery cadence of finalized data to CARB will be monthly beginning 4 months after data collection. File formatting and other details are specified in Appendix F.

10.5 Data visualization

Data will be used to create datasets and visualizations (e.g., Esri StoryMaps) focused on identifying pollution sources and areas of disproportionate impact, with templates and specific data layers described. Aclima will develop these, but CARB will own and host the final StoryMaps.

11. Work plan for conducting field measurements

The plan must describe field procedures that will be followed by those conducting measurements and provide the timeline for community air monitoring. Field procedures spell out individual tasks with enough detail so that air district staff or community members with the necessary training can complete the tasks. Examples of specific field

procedures include documenting actions in logbooks, completing chain of custody forms, and conducting specific quality control procedures. The timeline needs to establish the duration of field measurements and denote milestones for completing key tasks. The plan will also describe communication and coordination steps to ensure field personnel know whom to contact for questions and how work products are delivered. Relevant safety considerations should also be documented.

The work plan for field measurements is distinguished by the monitoring approach.

11.1 Broad area monitoring

11.1.1 Field materials and procedures

Broad area monitoring principally involves the Aclima fleet (Aclima Mobile Platforms, or AMPs). Each vehicle is operated by an Aclima driver, who begins their shift at a local hub powering up instruments, a safety check, and troubleshooting. Their driving day is managed by a mobile application in their vehicle and includes mandated breaks. The day ends back at the local hub and with an instrument shutdown routine. During the day, each AMP is active on a route, constantly collecting data at 1 second intervals.

11.1.2 Communication and coordination

The operations team uses a range of software applications for communication, fleet management, safety, and navigation:

- Information for each operator starting their shift is communicated via a messaging application.
- Each operator can access online resources (written and video instructions) that describe specific standard operating procedures and provide resources for a range of encountered situations.
- Any photos or notes that the operator takes during the day are captured via a dedicated fleet management application.
- A sensor/instrument interface gives basic information to the operator on data reporting status.
- A dashboard mapping application loads the monitoring plan for the day and provides guidance on the route the operator must follow
- For general communication, a dispatch phone line is maintained.
- Operators can also file tickets for issues that cannot be immediately resolved.
- Safety training and issues are handled via a dedicated platform.

11.1.3 Timeline: duration, frequency, milestones, and deadlines

Broad area monitoring will be conducted by Aclima mobile platforms (AMPs) from June 2025 through the end of February 2026, for a total of approximately nine months of monitoring.

11.2 Targeted area monitoring

In addition to the Broad Area Monitoring, the following section details the work plan for Targeted area monitoring that will be conducted in Maywood, Commerce (east), Vernon, Bell.

11.2.1 Field materials and procedures

The UC-Riverside/Baylor University/University of Houston Partner Mobile Lab (Riverside PML) is operated by a team of faculty, staff, and students who begin their shift at a local hub, typically the University of California at Riverside campus. Each day the team will conduct and review instrument performance and safety checks. If issues are identified troubleshooting will occur and if the issue is not quickly resolved a decision will be made whether to cancel the drive and further address the issue, or if the impacted measurement is not key to the day's objective the drive may continue as planned and the issue addressed at a later date. The driving day is managed by the university lead's and driver in the vehicle and includes mandated breaks as required by California and/or Federal commercial driving regulations. The day typically ends back at the UC-Riverside campus and power is transferred back to shore power connections.

The Riverside PML instrumentation typically generates data at 1-second intervals, although some instrumentation reports values more slowly. All data is collected at the fastest reasonable rate and is a balance between spatial/temporal resolution and sensitivity.

11.2.2 Field communication and coordination

- The Riverside PML team uses a range of software applications for communication, fleet management, safety, and navigation:

- Driving routes are determined through consultation with the university leads, driver, staff, and Aclima team and evaluated for suitability for the PML (i.e. height, weight, or truck restricted areas).

- Each operator can access online resources (written and video instructions) that describe specific standard operating procedures and provide resources for a range of encountered situations.

- Photos are automatically collected every second from 5 cameras to document the surroundings. Written notes are recorded in text files by each instrument operator and included in the data backup.

- The faculty, staff, and students aboard the PML discuss their instrument responses in real time and relay this information and proposed route to the driver. Coordination outside of the PML may be desirable in some situations and will be managed by non-drivers.

- Three workstations, one in the front seat and two in the back seat, provide connections to the various data systems and instruments. The faculty, staff, and students aboard the PML monitor the instrument measurements and performance indicators.

- All operations are conducted in compliance with the appropriate state, federal, and respective university guidelines.

- Prior to conducting monitoring, the Riverside PML team will meet with project representatives from Breathe Southern California in order to gain a proper understanding of the local context around the air quality concerns specified in the CAMP for targeted area monitoring. Communication channels may also be established during this meeting in order to provide real-time updates from community members about current air quality conditions or expected events that may impact air quality during the monitoring period.

11.2.3 Timeline: duration, frequency, milestones, and deadlines

Targeted area monitoring will be conducted in Maywood, Commerce (east), Vernon, Bell for a duration of approximately 1 week over a time period to be determined between September - November 2025. See Section 8.3 for details on the duration and frequency of monitoring.

How will data be used to take action?

12. Evaluating effectiveness

The monitoring work plan and data will be evaluated across all stages of the monitoring phase of SMMI to ensure that air monitoring objectives are being met. These evaluations include on-going processes during monitoring, data review while collection is ongoing, and at data verification at the end of the monitoring period after all data has been collected. For additional details on these processes, see Aclima's detailed QA documentation in Appendices C, D, E, and G. Additional details about the public data release can be found in Section 14.2 and Section 10 of Appendix F.

12.1 Evaluating effectiveness during the monitoring period:

Effectiveness will be continuously evaluated during the active data collection phase to ensure the monitoring is progressing as planned and that potential issues are identified and addressed promptly. This ongoing evaluation will involve several key components:

- **Manual Data Review:** Aclima staff will conduct weekly assessments of vehicle and sensor performance, as well as overall data quality. These reviews consist of visual review of time series data from all sensors on each deployed vehicle, responding to automated alerts for specific known patterns of device issues (e.g. sample line leaks) and addressing through corrective actions as needed, and a review of other associated diagnostic data. The Riverside team conducts manual data review using an approach outlined in Appendix G.

- **Automated Data Quality Checks:** The data processing pipeline includes automatic status indicator flags that signal when measurements fall outside predefined environmental or physical specifications for the sensors. These flags serve as immediate alerts for potential sensor malfunctions, data anomalies (e.g., negative values or concentrations outside the sensor's range), or issues with supporting systems like flow rates. These checks occur as data streams through the data processing pipeline, in near real-time.

- **Contextual Data Review:** Where available, data from regulatory monitoring sites within the mapping area will be used to provide context for large-scale air quality trends over time. This allows for a comparison of Aclima's sensor data with established networks, helping to identify whether observed patterns are consistent with broader trends or potentially indicative of issues with Aclima's measurements. Factors such as distance between mobile and stationary measurements, road type, site type, and temporal aggregation will be

54

considered during these comparisons. These evaluations occur on a weekly basis as part of the manual review process.

- **Measurement Quality Objectives:** Acceptable quantitative criteria for data quality indicators at the individual sensors (e.g., precision and bias) will serve as benchmarks for evaluating effectiveness. These are referred to as calibration acceptance criteria in our detailed Quality Assurance document (Appendix C) In addition to calibration prior to the start of monitoring, all AMNs will receive calibration checks (and subsequent recalibrations) on a 6-8 week basis over the 9-month monitoring period, including at the end of monitoring. The Riverside team will evaluate their QA checks according to acceptance criteria detailed in Appendix G.

- **Data Verification:** A thorough data verification process will be conducted on an ongoing basis throughout the monitoring period in order to produce finalized data in monthly increments with a 3 month lag time. The data verification process consists of 1) a manual data review process, 2) a review of calibration results, 3) the application (where necessary) of adjusted calibration parameters and data quality flags for data reprocessing, and 4) a final review of the reprocessed data with applied calibration adjustments and data quality flags. During this process, all of the above data quality checks described above are re-evaluated just prior to and immediately after any reprocessing of data occurs. This is the final stage before data is finalized and will occur in monthly increments no more than 3 months after the data is collected. The Riverside team conducts a similar data verification process as Aclima and on the same delivery cadence; specifics are outlined in Appendix G.

- **Evaluating Broad Area Monitoring Completeness:** Aclima mobile monitoring campaigns are designed to repeatedly drive roads in a monitoring area such that the roads are visited 20 times on average. An automated drive planning system evaluates the amount of driving coverage throughout a region on a daily basis and directs drivers to prioritize visiting roads in relatively underdriven regions. Additionally, Aclima analysts continuously monitor temporal and spatial driving coverage in the event that manual drive routing is needed to prevent regions with unexpectedly low numbers of visits. This is tracked by measuring the average number of measurements on each road by census block group.

- **Evaluating Targeted Area Monitoring Completeness:** The Riverside team will evaluate the completeness and representativeness in a way that is appropriate and responsive to the targeted area study conducted. In Maywood, Commerce (east), Vernon, Bell, the approach is a general survey of areas in the vicinity of community concerns and known sources. The number of repeat passes will be analysed along with pass-to-pass variability by scientists in charge of the data collection to evaluate the completeness of monitoring.

12.2 Evaluating effectiveness at the end of the Monitoring Period:

A comprehensive evaluation of the overall effectiveness of the community air monitoring initiative will be conducted at the conclusion of the data collection and verification phases. This final evaluation will be documented in the SMMI final report and will provide an overall assessment of the uncertainty associated with the collected data and derived data products. This will encompass various sources of error, including intra-network variability (uncertainty between

different monitoring platforms), inter-network comparability (comparison with other monitoring networks, such as regulatory sites), sensor specific measurement errors, and modeling and sampling errors.

- **Comparison with External Data:** The report will include comparisons between Aclima's measurements and data from regulatory stationary monitoring sites. These comparisons will evaluate the accuracy and precision of Aclima's mobile measurements against established reference methods over various timescales. Metrics such as Mean Bias Error (MBE), Mean Absolute Error (MAE), and R^2 will be used to quantify the agreement between the datasets. Additionally, comparisons of the modeled ambient concentration estimates with annual averages from nearby regulatory monitors will be included to assess the overall performance of the data products.

- **Aclima and PML Calibration Results:** Results from the calibration events conducted on Aclima's Mobile Nodes (AMNs) and the PML team, both before, during, and after their deployment. These results will help characterize the typical measurement error at the device level by comparing sensor readings to reference instruments and amongst themselves.

- **Stationary Comparison with Regulatory data:** This evaluation will compare data from Aclima's stationary AMNs, collocated at regulatory monitoring sites, with the measurements from those regulatory monitors. This comparison will help determine the measurement error and how Aclima's data aligns with the established regulatory network's data.

- **Mobile Comparison with Regulatory data:** This analysis will involve comparing in situ measurements collected by Aclima's mobile monitoring fleet near regulatory sites with the concurrent data from those stationary sites. This will provide insight into the agreement between mobile and stationary measurements, considering both measurement errors and the natural spatial and temporal variability of pollutants. This is only relevant for Aclima's data, not the PML data.

- **Ambient Concentration Comparison with Regulatory data:** The hyperlocal ambient concentration estimates will be compared with long term average concentrations from regulatory stationary monitors. This will help assess the overall uncertainty in Aclima's estimates, including factors like modeling and the temporal sparseness of mobile measurements. This is only relevant for Aclima's data, not the PML data.

- **Analysis of completeness and representativeness:** Analysis will be performed to show how well distributed data collection is across times of day, days of week, and season. Additionally, the number of passes in each location will be reported. Similar analyses will be conducted in similar ways for both the targeted and broad area monitoring approaches.

12.3 End of monitoring

Monitoring ends when deployments for all vehicles (AMPs and PMLs) are complete. Given the fixed time constraints for the SMMI final report to be completed by May of 2026, the broad area monitoring period will end after 9 months of data collection. In order to determine successful completion at the end of 9 months the monitoring team will evaluate whether:

- Monitoring coverage has exceeded the required minimum percentage coverage requirement for priority communities within the SMMI-wide monitoring areas (i.e. across all CNCs, not just Maywood, Commerce (east), Vernon, Bell)
- Data gathered is sufficiently representative of the seasonal, time of day, and day of week variation across the monitored area (i.e. not biased by data collection at one specific time),, such that they can support the objectives, sub-objectives and presentation plans as uniquely defined in this monitoring plan
- Data gathered is sufficiently representative of the spatial variation in air quality across the monitored area, such that they can support the objectives, sub-objectives and presentation plans as uniquely defined in this monitoring plan

The results of all quantitative evaluations of effectiveness listed above will be included in a Quality Assurance report to accompany the final project report. Details on the above activities will be included for both Aclima and the PML teams.

13. Data analysis and interpretation

13.1 Preparation of finalized datasets

As described in Section 10 on data management (and in detail in the Data Management documentation in Appendix F), 1-second "finalized" data collected by all sensors and instruments will go through several data verification and validation protocols, and transformation steps before they are described as finalized and made available to CARB.

"Finalized" data is defined as sensor signals transformed to geophysical quantities of measurement (Level 2a), calculated using the sensor signal plus associated physical measurements directly related to the measurement principle such as temperature and relative humidity measurements. Data flagged for artifacts will also be included.

13.2 Aclima analysis, interpretation, and visualization of data

Mobile monitoring data gathered under this CAMP are intended to facilitate focused actions by communities and CARB, including any future work to identify and prioritize locations for more comprehensive community-scale air monitoring, or develop Community Emissions Reduction Programs (CERPs).

To support this potential future work, the monitoring team will generate a series of additional datasets that can help communities better understand and interpret the data in the context of the concerns detailed in this CAMP. These datasets will be in addition to the finalized 1-second data provided directly to CARB and require further processing as described in Section 10 in this monitoring plan. Appendix E Section 2.3 discusses the additional data that will be reported including the quantitative metrics that will be associated with enhancements). These datasets can support identifying and characterizing sources or identifying disproportionate spatial and temporal impacts within a community.

The following is a brief description of the different possible analysis and visualization approaches used by SMMI. In some cases, the analysis approaches are matched with specific monitoring approaches, but there can be various combinations of monitoring and analysis approaches that could be selected to appropriately achieve the desired monitoring objectives.

- **Clusters of enhancement detections on a map** - Identifying locations of pollutant enhancements (high concentrations above background levels) on a map. Clustering or grouping of pollutant enhancements refers

to identifying locations where multiple enhancements of the same pollutants are detected at multiple different times over the course of monitoring.

- **Statistics on enhancement detections** - Statistical values that describe how often enhancements were detected in a specific location. Examples include number of detections, the number of detections per visit, or the number of distinct days of detections.
- **Chemical speciation bar graph or pie chart** - A bar chart or pie graph that indicates the relative concentration of different key pollutants of interest in a specific location. This can represent the pollutants within an enhancement detection, averaged across an enhancement cluster (i.e. multiple enhancements in the same location), or in ambient concentrations of background air.
- **Diurnal plot of enhancement detection events** - This analysis shows the frequency of enhancement detections in a particular location by hour of day. This analysis requires balanced sampling across different times of day in the same location.
- **Ambient concentration gradients over plume transects** - Displaying ambient concentrations as they vary in space in the downwind region of an air pollution plume. This type of analysis is generally paired with the plume transect monitoring approach, but a general survey approach may also be appropriate in certain situations.
- **Ambient concentration map of key pollutants -** Displaying a map of ambient concentrations that are generally representative over the time period that monitoring takes place. Typically, the general survey monitoring method or broad area monitoring is required for this type of analysis.
- **Area-wide chemical breakdown bar graph or pie chart -** A bar graph or pie chart showing the relative proportion of different pollutant concentrations detected on overage over a particular area of covered. Typically, the general survey monitoring method is most useful for this type of analysis

These example visualizations can help address the community specific concerns in Maywood, Commerce (east), Vernon, Bell for the concerns assigned monitoring objectives in Table 4.1. The map of ambient concentration estimates shown in Figure 13.1, below, is directly responsive to the monitoring objective of identifying disproportionate impacts (e.g. mobile source emissions around freeways). The heat map of locations of persistently elevated concentrations of TVOCs (Figure 13.2) is responsive to the monitoring objectives of characterizing sources (e.g. toxic air contaminants from specific industrial facilities such as refineries or commercial sterilizers). Note that broad area monitoring may result in visualizations that provide information (for example clusters of enhancements) about additional concerns not specifically assigned monitoring objectives or unknown sources not listed specifically as community concerns here.

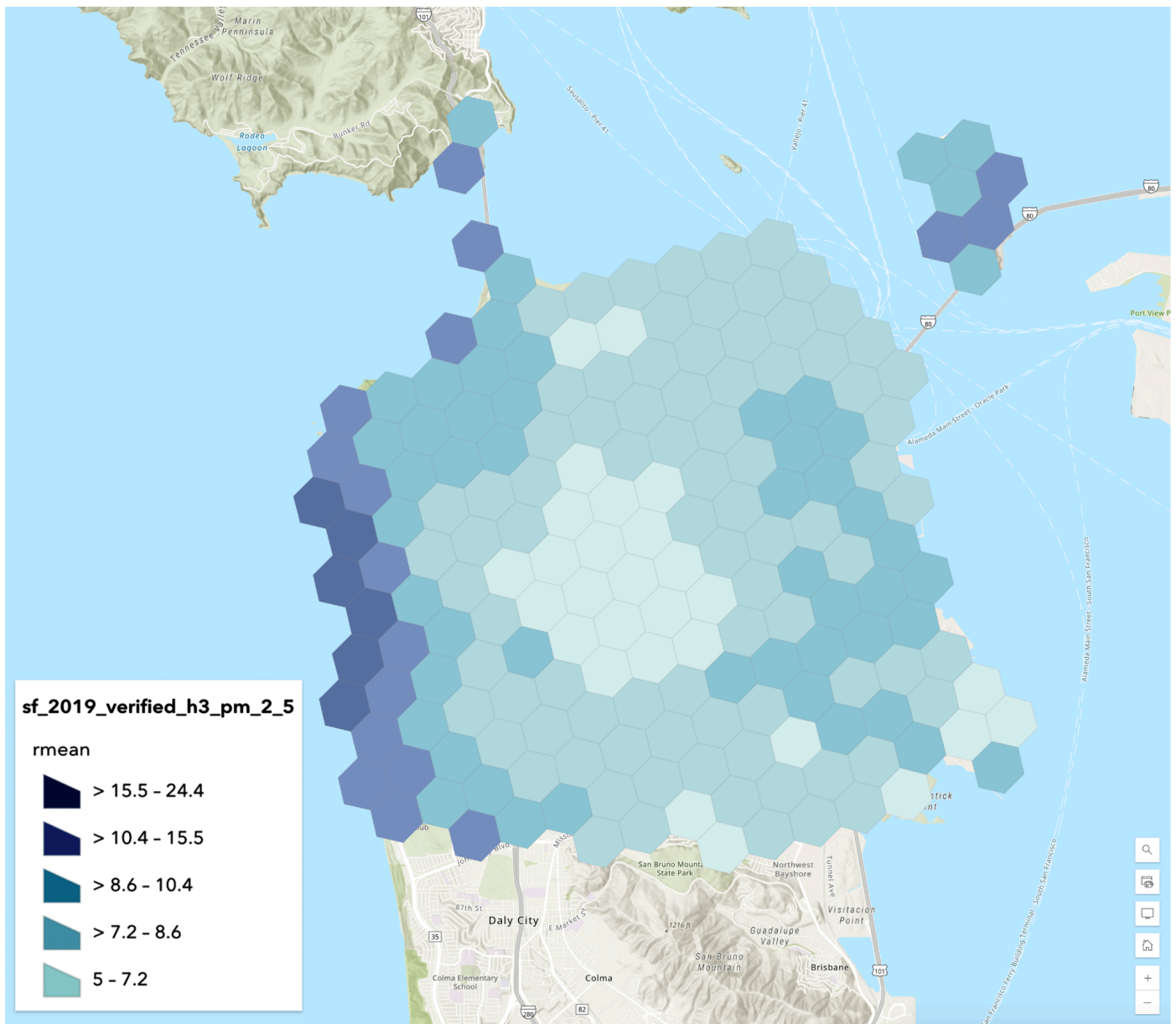Some example forms of final data visualizations are shown below.

Figure 13.1: Example of a map of ambient concentration of PM$_{2.5}$ over a specific area plotted using hexbins. In this type of map, the color indicates pollutant concentration. In this example, colors indicate PM2.5 concentrations for data collected over a 1-year time period in San Francisco, CA. Map data © Mapbox, © OpenStreetMap.
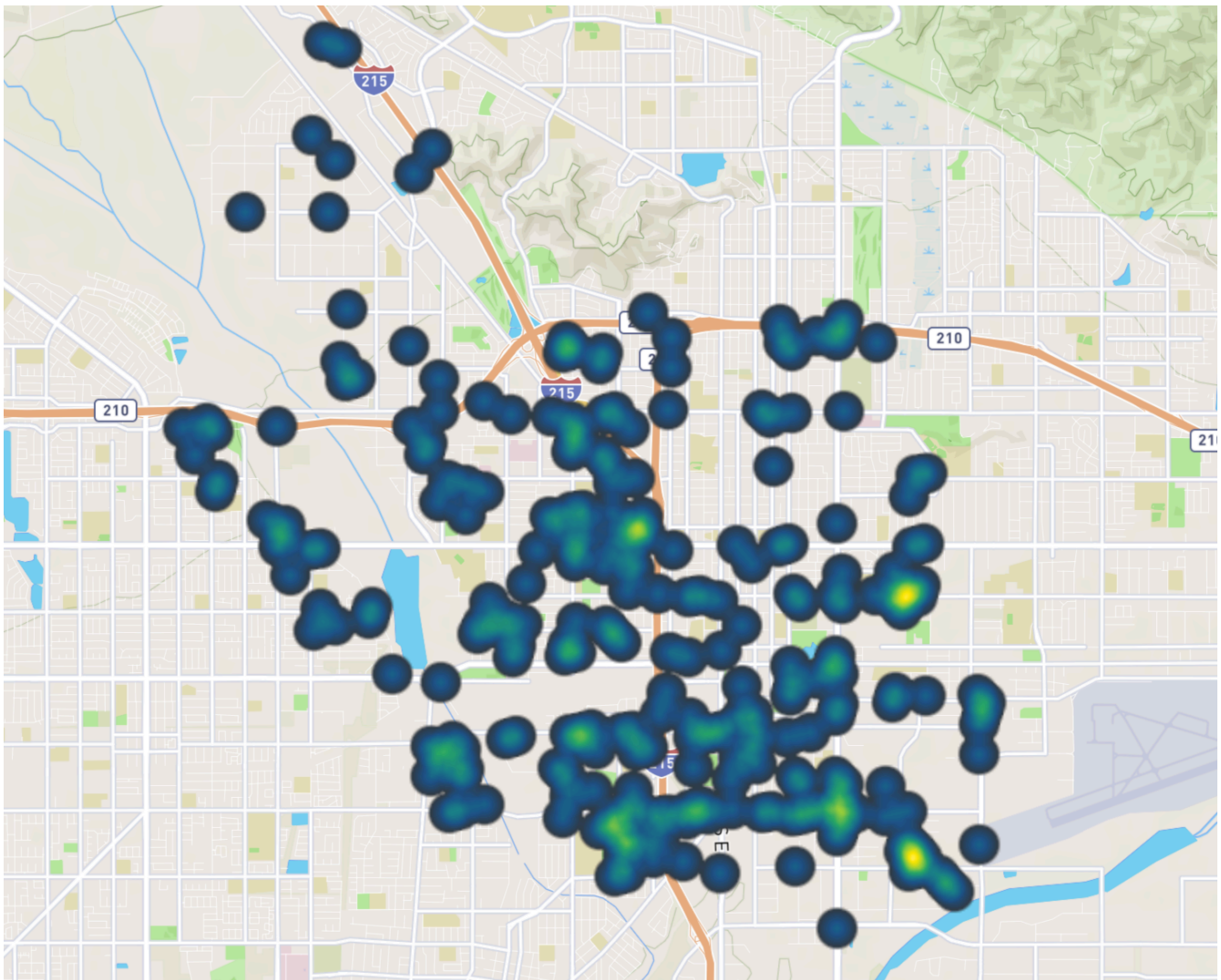
Figure 13.2: Example of plotting an enhancement-based dataset (TVOCs) as a heatmap. In this type of map, the density of individual enhancement events are shown, where the brighter colors indicate a higher density of detected enhancements. In this example, data collected over a 3-month period in San Bernardino, CA are shown. Map data © Mapbox, © OpenStreetMap.

For the concerns assigned specific monitoring objectives in this monitoring plan, the analysis approaches are specified in Table 4.1, in Section 4.3. Appendices D and E provide more detailed descriptions of how different analyses are performed and the different implementations of the approaches that are possible. These appendices also list important limitations that will be taken into account at the analysis stage and will be communicated in the public presentation of results. The specific implementation of these approaches will be determined after the data is collected and evaluated. Data from both Aclima platforms and the UC Riverside PML will be analyzed according to the general approaches outlined above.

14. Communication of results to support action

The mobile monitoring data collected in this community will be analyzed and presented to support focused action to reduce emissions or exposure. This requires an accessible visualization, of which Aclima has many. CARB has selected ESRI StoryMaps as their visualization platform.

The project offers Engagement Leads supplemental budgets for capacity building and relationship building to foster the partnerships necessary for translating data into emissions reduction actions.

14.1 Reporting of high concentrations prior to the end of the contract

The primary intent of the SMMI is not for real-time notification. However, during data collection, there may be instances where pollutant concentrations significantly exceed expected levels. To address these situations, a response protocol has been established to ensure that such anomalies are promptly reviewed and assessed in coordination with relevant agencies and shared with community stakeholders. If concentrations exceed the thresholds (defined below), and the detection is deemed viable after analysis and assessment by Aclima or a Partner Mobile Lab, Aclima will inform the local Air Districts or other relevant local authorities. Not every detection will trigger a report. Only after in-depth investigation by scientists in the field or remotely via data analysis will a detected event be deemed viable for reporting. Table 14.1 provides the overall framework of the assessment process and reporting structure.

The purpose of reporting observed high concentrations is to protect public health and safety, and while no regulatory action will occur as a direct result of data collected by SMMI, local regulators may decide to conduct additional monitoring or other types of investigations based on these reports. Additionally, while health-based thresholds are used in the notification framework, it should be emphasized that this process will not definitively determine whether a health threshold has been officially exceeded.

Table 14.1: Overall framework of the assessment process and reporting structure

Pollutant	Initial Assessment Protocol	Data Reporting and Communication to Local Air Districts or Other Relevant Local Authorities by Aclima	Community Updates

Methane/Ethane
 	
Relevant threshold: 100 ppm methane[a]
	Aclima:
	● Initial Detection
	  ○ Detection above threshold
	● Investigation
	  ○ See Section 14.1 text for description
		Aclima:
		● If detection qualifies – Prepare and Submit Report:
		  ○ Location/Time of Event
		  ○ Historical detections in the area
		  ○ Classification of methane source (thermogenic or biogenic)
		  ○ Description of the local environment (land use, sources, notable features)
		  ○ Placeholder for Summary of findings and next steps
		● Notify local utility company (or air district as appropriate based on source) within 2-3 business days of verification
		● Email the completed report to designated CARB contacts within 2-3 business days of verification
			CARB:
			● Monthly Summary Reports will be posted to the CARB website and will include:
			  ○ A summary of reports generated
			  ○ Locations and timestamps of detections
			  ○ Results of preliminary analysis
			  ○ Actions taken or recommended follow-up steps
			
			Aclima:
			● A comprehensive summary will be included in the End-of-Campaign Report, covering:
			  ○ All events detected over the course of the campaign
			  ○ Historical patterns and trends
			  ○ Overall progress and response efforts

Toxic Air Contaminants
 	
(see table 14.2 for additional details)
	PMLs:
	Initial detection
	● Detection above California OEHHA acute RELs at least twice in the same location
	Investigation:
	● See Section 14.1 text for description
		PMLs:
		If detection is deemed viable event after analysis and repeated monitoring:
		● Air district will be notified by Aclima immediately upon verification of the event
		● PMLs will prepare and submit report within 3 days of verification:
		  ○ Location/Time of Event
		  ○ Pollutant and concentration
			CARB:
			● Monthly Summary Reports will be posted to the CARB website and will include:
			  ○ A summary of reports generated
			  ○ Locations and timestamps of detections
			  ○ Results of preliminary analysis
			  ○ Actions taken
			
			Aclima:

		○ Historical detections in the area ○ Description of the local environment (land use, sources, notable features) Note: Reporting timelines may vary based on the instrumentation used, QA/QC protocols, and time required to validate findings.	● A comprehensive summary will be included in the End-of-Campaign Report, covering: ○ All events detected over the course of the campaign ○ Historical patterns and trends ○ Overall progress and response efforts

a) Threshold for methane is not based on a specific health-based action limit, but is based on historical data collected by Aclima, indicating values typically associated with large significant natural gas leaks.

b) Air toxics contaminants are those that may be measured PMLs and monitored in real time by scientists aboard the mobile platform.

The following provides additional details on the investigation process that will occur after an initial detection above the indicated threshold concentrations. For methane, Aclima analysts initiate this investigation remotely typically within 24 hours of the initial detection. Follow up monitoring, if needed, may take days to weeks to complete. For air toxics (or methane detected on the PMLs), the PML teams have technical staff on-board to follow up in real time in most cases. Otherwise, the follow up monitoring will occur as soon as possible. The purpose of this process is to identify anomalously high pollution events and sources and Aclima reserves the right to revise the listed thresholds based on data collected over the course of monitoring (in collaboration with CARB) in cases where exceedances are frequent and follow up monitoring significantly detracts from the planned targeted area monitoring or the reporting of frequent exceedances as individual events become infeasible.

Methane

Detection of methane at the 100 ppm threshold or above typically (but not always) indicates a natural gas leak from residential distribution systems. The following process will be followed to investigate each triggering methane detection:

1. Measurement diagnostics check
2. Evaluate source type using ethane/methane ratio and presence of CO
   a. For Thermogenic (i.e. fossil in origin) source type (ethane/methane ratio between 1-10% and no concurrent CO enhancement)
      i. Check historical data and count the number of distinct days with enhancements > 5 ppm
      ii. Report locations where number of days is 3 or higher
      iii. Track locations with less than 3 days and follow up weekly
      iv. Check contextual information about location to determine whether there are obvious sources otherwise assume coming from underground natural gas distribution lines
      v. Report to local utility if gas distribution system suspected, otherwise to the air district
   b. For Biogenic source type (ethane/methane ratio <1% or no concurrent ethane detected):
      i. Check whether there is any correlation between ethane/methane to determine whether the source is a biomethane or renewable natural gas blend (biogenic methane blended with

traditional natural gas), which typically has an ethane/methane ratio less than 1%. Follow instructions for natural gas source types above.

  ii. Check historical data and count distinct days with enhancements > 5 ppm
  iii. Check contextual information about location to determine whether there are obvious sources
  iv. Use scientific judgement and contextual information to determine whether to report to local air district

  c. For mobile source type (strong concurrent CO enhancement):
    i. No further action

Air Toxics

Detection of individual air toxics above the notification threshold (as indicated in Table 14.2) will trigger a follow up investigation according to the following process:

1. Measurement diagnostics check
2. On-board technical operations team determines whether the likely source is transient (e.g. a passing vehicle) or a possibly persistent stationary source or unknown source.
   a. Likely persistent stationary source or unknown source:
      i. Vehicle operator returns to location of initial detection as soon as possible to do follow-on measurements. The vehicle operator will consider whether immediate follow-up measurements would adversely impact the ability to measure a priority source and will schedule a follow-up accordingly.
      ii. If the threshold is exceeded at least twice in the same location, a 1 hour average measurement will be collected in the vicinity of the initial detections. The measurement may be collected while parked or in motion to better characterize the plume extent, at the discretion of the on-board technical team.
      iii. The local air district is notified if 1 hour average concentrations of any pollutant measured reaches or exceeds an acute recommended exposure limit (CA OEHHA Acute REL), listed in Table 14.2. *Note that for benzene, toluene, and acrolein the uncertainty of these measurements in real-time (prior to post-processing and final QA/QC) may be as high as a factor of 2. Exceedance determinations for all species will also include uncertainties due to calibrations and ambient conditions (humidity, temperature, pressure), and judgement from the scientific team will be used to determine whether borderline cases should be reported or not.*
   b. Mobile or other transient source (for example, an exceedance detected while refueling the vehicle at a gas station):
      i. No further action is required

Table 14.2: Thresholds used for air toxics event notification

Pollutant	Action Threshold[a,b]
formaldehyde	45 ppb
benzene	8.5 ppb

toluene	1.3 ppm
acrolein	1.1 ppb
carbon monoxide	20 ppm

a) The thresholds are based on health action limits (California OEHHA Acute REL), however, it should be noted that these are limits only used as a benchmark to trigger follow up investigation and do not indicate that these health action limits have actually been exceeded. The event will only be reported if the scientists deem the detection to be a viable event based on their investigation. Additionally, the species detected by this method will be uncalibrated signals that may have high uncertainties (up to a factor of 2 in some cases)

b) Aclima reserves the right to update the action thresholds over the course of monitoring based on data collected over the course of monitoring, for example, if it is found that the number of threshold exceedances are higher than anticipated.

14.2 Public Data Access

Upon completion of the contract, CARB will make the finalized monitoring data available for public access through the CARB AQview website. Data for each region and pollutant will be provided in standardized, comma-separated values (CSV) format to ensure broad compatibility with commonly used data analysis tools and software. This approach supports transparency, encourages independent analysis, and facilitates community and academic engagement with the air monitoring results.

14.3 Community Story Maps

Aclima will deploy the finalized raw data and appropriately-selected data analyses (described in Sections 13.2 and 13.3) in accessible online, public, interactive and free-to-use visualizations built on the Esri platform. These visualizations will be in the format of a customized platform built with Esri StoryMaps and hosted by CARB. A range of analyses are available to identify potential sources and to identify locations of disproportionate impact, drawing on data collected through both targeted area monitoring conducted by UC Riverside and broad area monitoring conducted by Aclima. Only finalized quality assured data will be incorporated into public facing visualizations.

14.4 Final Report

A final report will be delivered to CARB at the end of the contract, May 19, 2026. This report will provide a comprehensive analysis of the data collected by Aclima and the Partner Mobile Laboratories during the SMMI and will include the following sections:

Executive Summary: The report will include an executive summary to highlight the key takeaways, recommendations, or limitations of the report.

Summary and Timeline of Air Monitoring: The report will provide a summary of the air monitoring activities conducted and a timeline of when these activities took place. This will offer context and background on the project.

Discussion of Data Collection, Validation, and Analysis: The report will detail how the air quality data were collected using Aclima's mobile monitoring platforms and partner mobile laboratories. It will also explain the quality assurance and quality control (QA/QC) procedures implemented to ensure the data's integrity, including how the data were validated. Furthermore, the report will describe the methods used to analyze the collected data, potentially including analyses for identifying pollution sources and areas of disproportionate impact like diesel indications, locations of persistently elevated toxic air contaminants, and natural gas leaks.

Summary of Significant Findings and Conclusions: The report will present a summary of the key findings from the air monitoring campaign. This will include ambient concentrations and any identified pollution enhancements. These findings will be presented in a manner understandable to a non-scientific audience.

Recommendations and Next Steps: Based on the findings, the report will offer recommendations for potential next steps. This may include suggestions for tracking progress or verifying results achieved by community emissions reduction programs, or for future, more comprehensive monitoring efforts.

Dissemination Plan: The report will outline how the data and the findings will be disseminated and discussed with appropriate decision-makers so that the information can lead to the intended actions for emissions reduction and public health improvement. This will include the use of publicly accessible data visualizations such as ESRI StoryMaps. The report will also mention the virtual public meeting organized to explain project results and discuss possible next steps.

Public Meeting: To better help community members understand the content of the final report in an accessible manner, Aclima and California Air Resources Board staff will organize online meetings by air district (or sub-group within air district if necessary) to explain project results, answer questions, have community members share their experiences engaging with the project, and discuss possible next steps. Breathe Southern California will play a major role in outreach and promoting community attendance at this meeting. This meeting will be conducted in English with Spanish interpretation and designated Spanish breakout rooms. To ensure further accessibility to results, Aclima will provide one-page result summaries for each community in both English and Spanish that Breathe Southern California can distribute physically or via Whatsapp or text.

Input from Stakeholders: The final technical report will incorporate input from stakeholders across the initiative, including the Project Expert Group, community representatives, air quality officers, and environmental justice leaders.

Accessibility: Aclima will consider accessibility needs for the print document, such as alt text and color design.

The report will be provided to CARB in both PDF and the original electronic format.

Appendices

Full appendices are available here: https://aclima.earth/smmi-camp-appendixes

- Appendix A: SMMI Community Engagement Plan (CEP)
- Appendix B: SMMI Community Mileage Allocation
- Appendix C: Aclima Quality Assurance System
- Appendix D: Aclima Hyperlocal Ambient Concentration Estimate Validation and Quality Assurance System
- Appendix E: Aclima Hyperlocal Enhancement-based Data Products Quality Assurance System
- Appendix F: Aclima Data Management Plan
- Appendix G: Partner Mobile Laboratory Quality Assurance Project Plan (QAPPs) and Data Management Plans
- Appendix H: Approach for Assigning Targeted Area Studies
- Appendix I: Complete Table of Pollutants and Instrumentation
- Appendix J: Public Comment and Response Documentation
- Appendix K: Community Meeting Evaluations