AGENDA: 4

Bay Area Air District

# Update on the East Oakland Air Monitoring Project

## Community Equity, Health, and Justice Committee

**February 11, 2026**

**Adele Watts**
**NorCal Program Co-Director**
**Communities for a Better Environment**

**Dan Alrick**
**Principal Air and Meteorological Monitoring Specialist**

# Overview – East Oakland Air Monitoring Project

- Partnership between the Air District, Communities for a Better Environment (CBE), and the University of California – Berkeley (UCB)
- Two project components:
  - Community-based network for fine particulate matter ($PM_{2.5}$)
  - Measurements with the Air District's air monitoring van

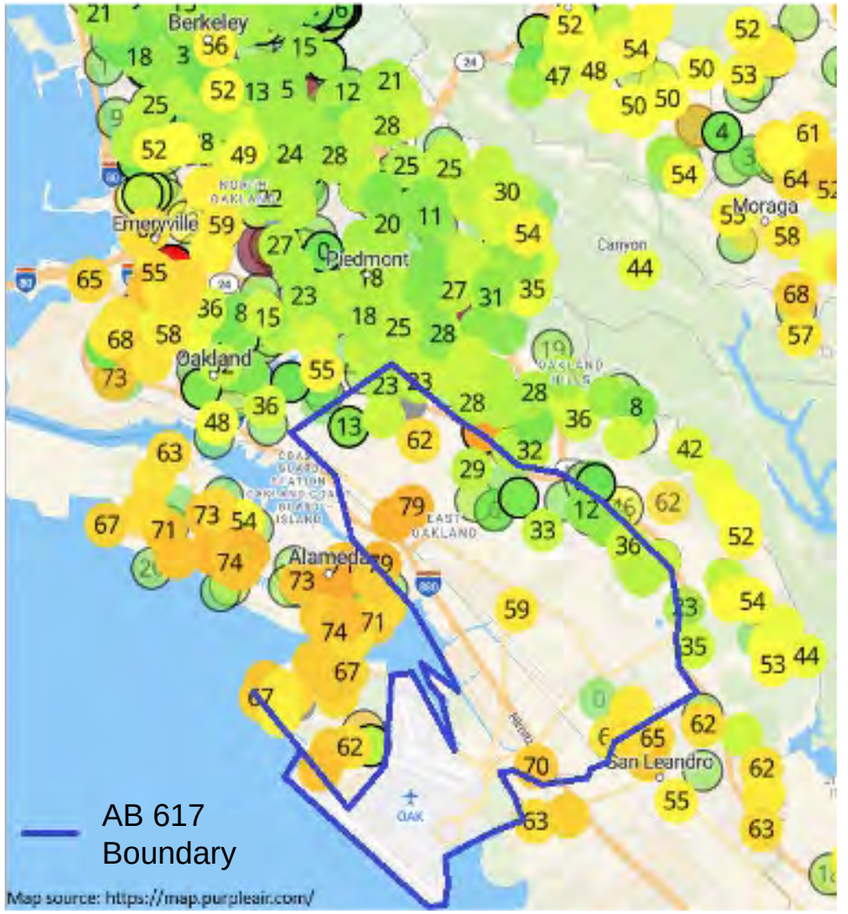

Logos for Communities for a Better Environment (top), the Bay Area Air District (lower left), and the University of California – Berkeley (lower right)

# Project Motivation

- Disparate impacts in overburdened communities such as East Oakland are not always captured by long-term ambient air monitoring stations or modeling efforts
- There are information gaps in our understanding of certain sources and their impacts, and gaps in availability of air monitoring data
- Air monitoring studies with different approaches can provide data in more places and to help inform key questions and development of effective strategies to reduce emissions and exposure

# $PM_{2.5}$ Sensor Network – Purpose

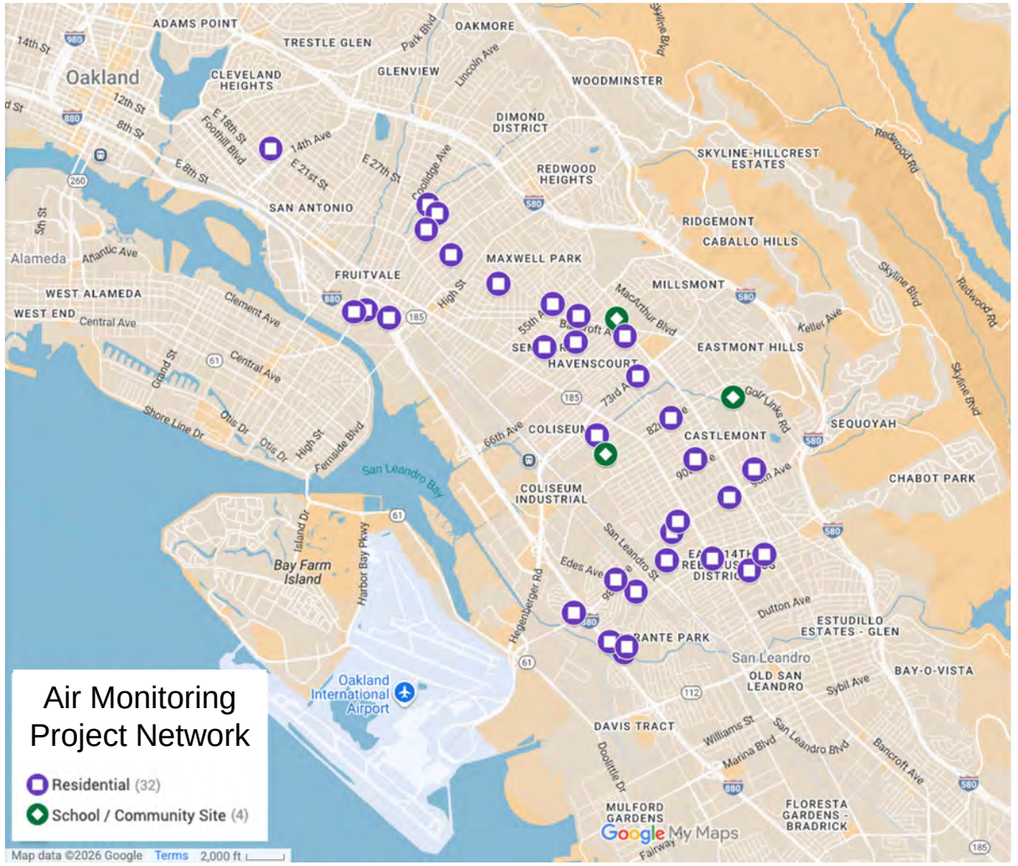
- Make real-time $PM_{2.5}$ data available in more places in East Oakland
- Train community members to interpret air quality data and respond to air quality events
- Build community ownership in air pollution monitoring




A map of the Oakland Area and locations of PurpleAir sensors prior to the East Oakland Air Monitoring Project. Image source: PurpleAir

# $PM_{2.5}$ Sensor Network – Recruitment

- CBE has been recruiting participants in a variety of ways
- Residences host an indoor and outdoor sensor pairs and are provided an indoor portable air purifier and stipend
- Sensors are also being deployed at up to five schools in East Oakland



Map of locations where PurpleAir sensors have been deployed during the East Oakland Air Monitoring Project

# $PM_{2.5}$ Sensor Network – Installation

- CBE and UCB have been installing sensors since May 2025
- 60 sensors have been deployed as of December 2025, including at:
  - 32 residential locations
  - 3 schools
  - 1 community location
- Expecting to complete installations in the next few weeks

Photo of PurpleAir monitor installed at an East Oakland resident's home

# $PM_{2.5}$ Sensor Network – Ongoing Outreach

- Community training and informational sessions
- Participants learn about air pollution, hosting the $PM_{2.5}$ sensors, accessing and understanding the collected data, and using the portable air purifiers

## Best Ways to Use Your Air Cleaner / Las mejores formas de usar su purificador de aire

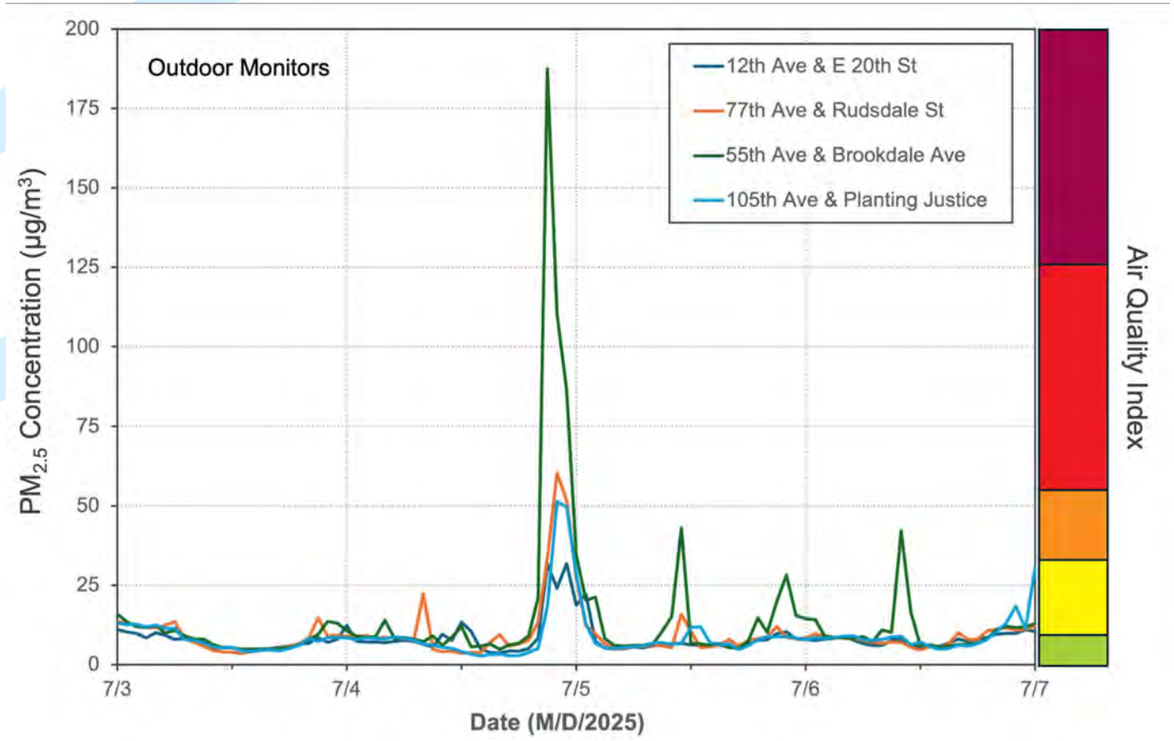
- For indoor use only / Solo para uso en espacios interiores
- Best in closed spaces, windows and doors are shut / Mejor en espacios cerrados, ventanas y puertas cerradas
- Recommend running the air cleaner on low all the time / Se recomienda mantener el limpiador de aire en baja todo el tiempo
- Turn the air cleaner on high if indoor $PM_{2.5}$ levels increase after cooking, cleaning, using incense, etc. / Encienda el limpiador de aire en alto si los niveles de $PM_{2.5}$ en interiores aumentan después de cocinar, limpiar, usar incienso, etc.
- When outdoor $PM_{2.5}$ levels are unhealthy, run the air cleaner on high / Encienda el limpiador de aire en alta cuando los niveles de $PM_{2.5}$ son dañinas en áreas exteriores.
- Replace filter every 6–8 months / Reemplace el filtro cada 6–8 meses



Slide from East Oakland Air Monitoring Project Training & Information Session #1- 8/26/2025

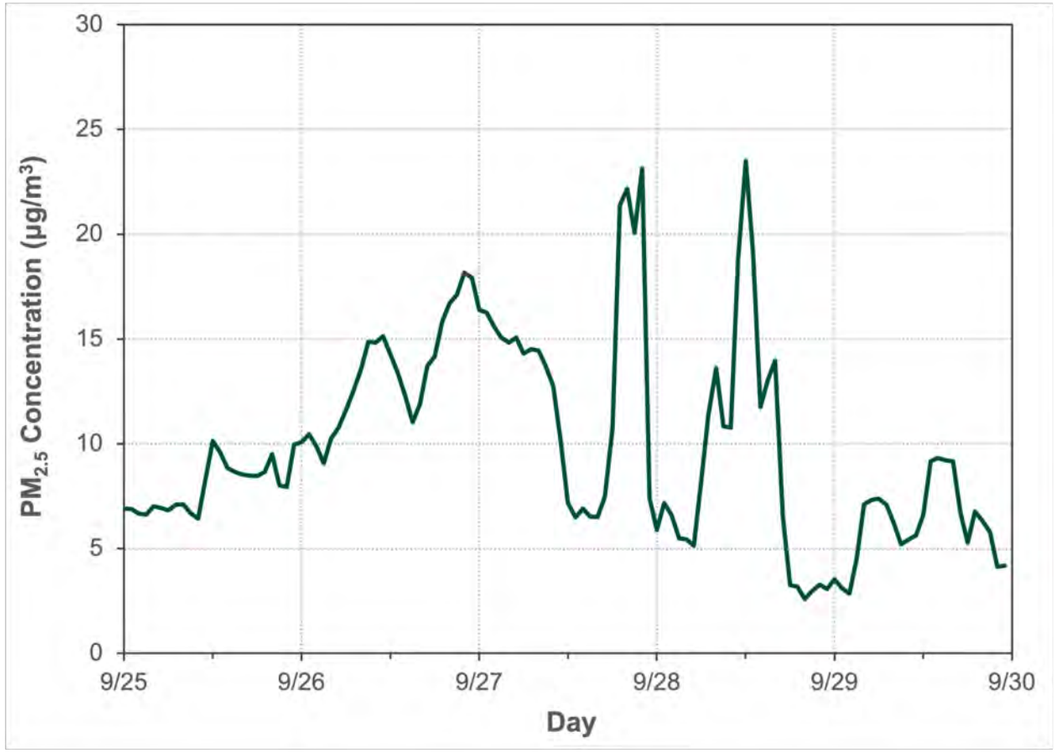
# $PM_{2.5}$ Sensor Network – Data Examples

Sensors showed large increases in $PM_{2.5}$ levels on July 4, 2025, due to fireworks




Graph of hourly $PM_{2.5}$ concentrations measured at different sensor locations in early July 2025.

Periods of increased $PM_{2.5}$ levels in late September 2025 due to smoke transported from Oregon wildfires




Graph of hourly $PM_{2.5}$ concentrations measured at a sensor in late September 2025.

# Mobile Air Monitoring – Purpose

- Measure levels of multiple air pollutants with high spatial resolution
- Characterize air quality impacts from key pollution sources in East Oakland
- Reveal areas with persistently elevated pollutant concentrations
- Identify opportunities for emissions and exposure reductions

Photo of the Air District's air monitoring van near the Oakland Airport

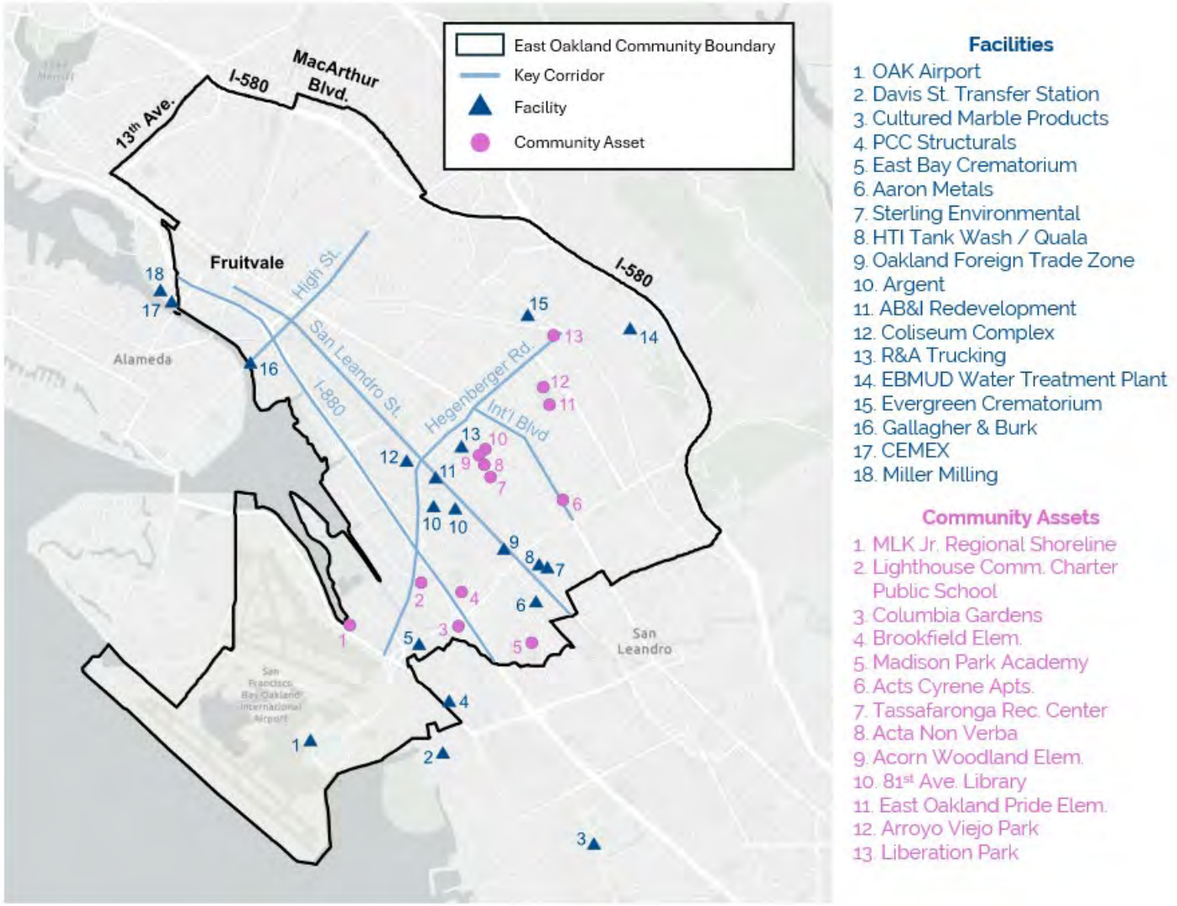
# Mobile Air Monitoring – Capabilities

- Includes specialized instruments to measure multiple gas and particle pollutants
  - Volatile Organic Compounds (VOCs)
  - Particulate Matter (PM)
- Provides measurements at high spatial resolution
- Collects meteorological data at designated stops

Air monitoring equipment in the Air District's air monitoring van

# Mobile Air Monitoring – Project Design

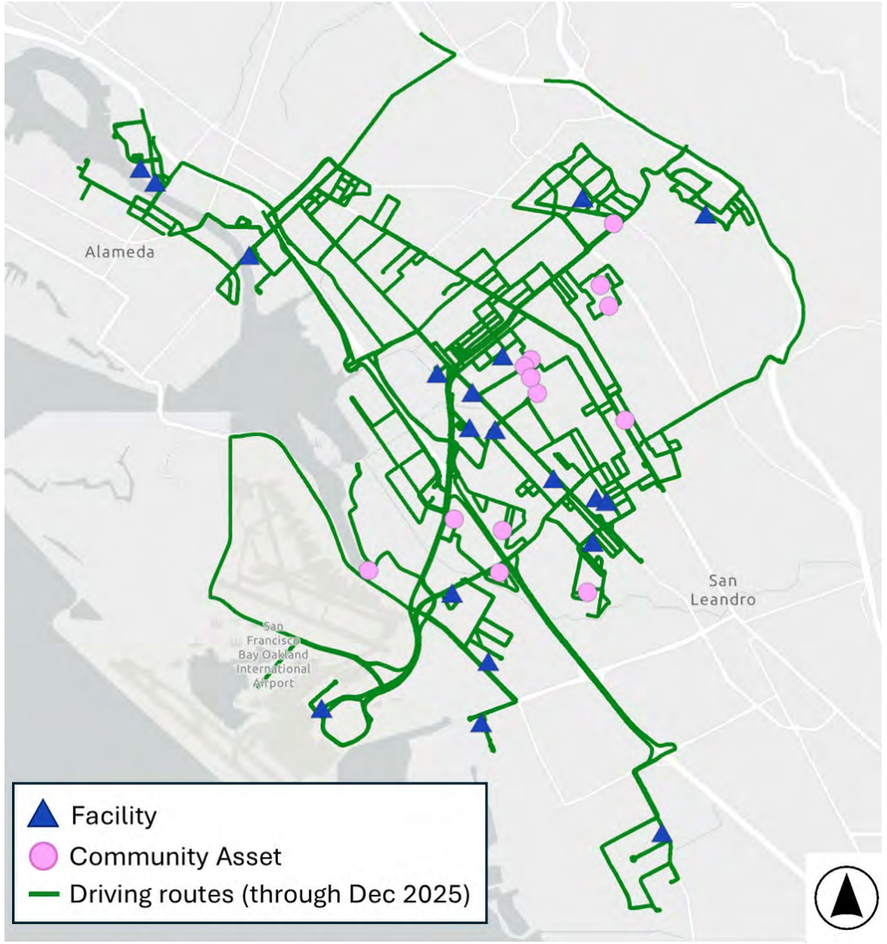
- CBE led community engagement efforts to identify key pollution sources of concern and community assets
- Community air quality concerns served as the foundation for designing the air monitoring project




Map of community-identified key pollution sources of concern and community assets for the East Oakland air monitoring project

# Mobile Air Monitoring – Current Status

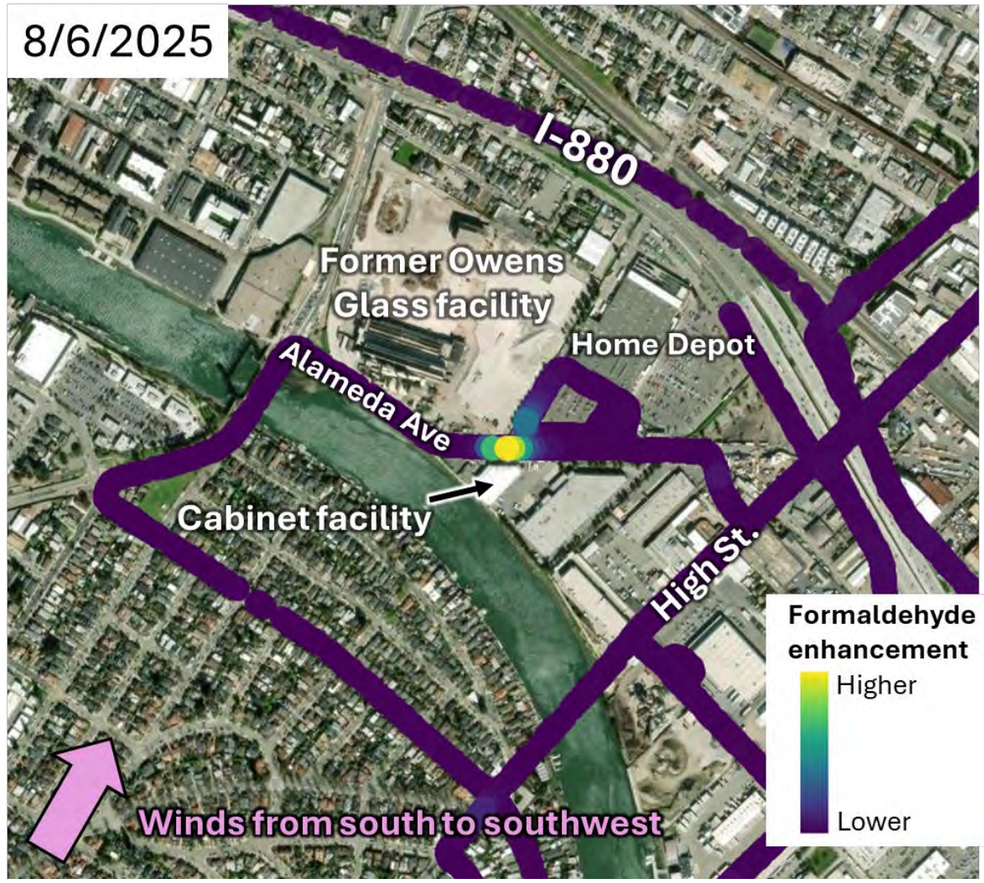
- The project team held a community event in East Oakland in July 2025 to mark the start of mobile air monitoring
- Data collection, review, and analysis has been ongoing and will continue into Spring 2026




Map of the East Oakland area showing where the air monitoring van has collected data

# Mobile Air Monitoring – Using the Data

- Enhancements in concentrations of certain VOCs found along Alameda Ave.
- Nearby cabinet facility (unpermitted) is a possible source
- Coordination with inspection staff to review facility operations, material usage, and recordkeeping
- Investigation is ongoing to determine permitting and violations




Map showing enhancements in formaldehyde concentrations measured by the air monitoring van

# Mobile Air Monitoring – Using the Data (cont.)

- The Air District can take targeted actions in response to air quality issues that are identified in the air monitoring data
- Some identified issues may need more investigation
- The Air District is building internal collaboration and processes to coordinate timely response

# Project Next Steps

- Complete deployment of the sensor network and data analysis
- Complete mobile air monitoring and data analysis
- Engage with community members to help contextualize and interpret the collected data and shape reporting of findings
- Share project information through public-facing, interactive materials, community meetings, technical reports, and accessible datasets

# Funding Acknowledgement

This project has been funded in part by the United States Environmental Protection Agency (US EPA) under assistance agreement 0X-98T56701 to the Bay Area Air District. The contents of this document do not necessarily reflect the views and policies of the US EPA, nor does the US EPA endorse trade names or recommend the use of commercial products mentioned in this document.

# Questions & Discussion

**For more information:**

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AGENDA: 5

Bay Area Air District

# Study Proposal: Bay Area Regional Evaluation of Air Toxics and Health Effects: B(A)REATHE

## Community Equity, Health, and Justice Committee

**February 11, 2026**

**Andrea Polidori, PhD**

**Deputy Executive Officer of Science**

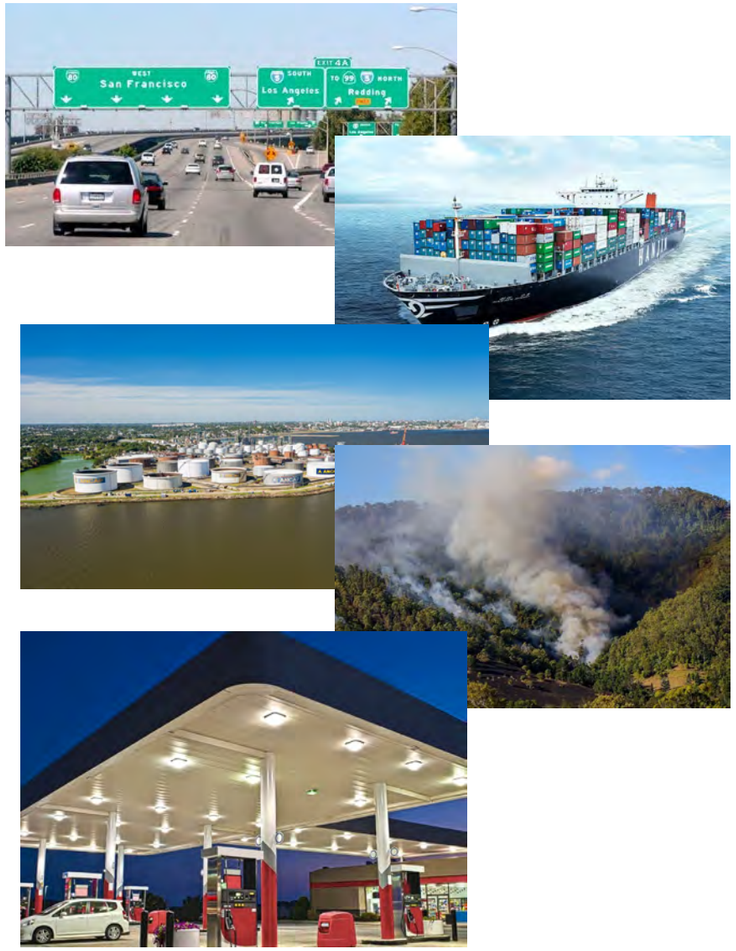
# Criteria Pollutants

- Six criteria pollutants designated by the United States Environmental Protection Agency (US EPA):
  - Carbon Monoxide (CO)
  - Ozone ($O_3$)
  - Particulate Matter ($PM_{2.5}$ and $PM_{10}$)
  - Nitrogen Dioxide ($NO_2$)
    Sulfur Dioxide ($SO_2$)
  - Lead (Pb)
- They have National Ambient Air Quality Standards (NAAQS) to protect human health and welfare
- State, local, and tribal governments monitor these pollutants to determine if NAAQS are met
- In nonattainment areas, local and state agencies are required to take action to meet standards

Photos courtesy of bing via Creative Commons license

# Air Toxics Pollutants

- The US EPA lists 188 Hazardous Air Pollutants (HAPs) These include diesel PM, benzene and other Volatile Organic Compounds (VOCs), and metals
- California identified over 200 Toxic Air Contaminants (TACs)
- HAPs and TACs can cause cancer or other serious health effects
- No NAAQS, but health-based thresholds are often available
- Multiple biogenic/anthropogenic and indoor/outdoor sources
- Exposure to HAPs/TACs is generally localized and not evenly distributed; higher impacts along transportation corridors, industrial areas, and Environmental Justice (EJ) communities

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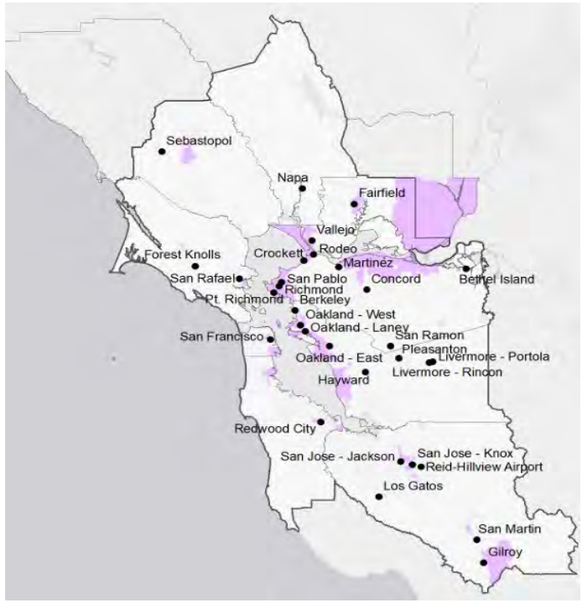
# Ambient Air Monitoring

## Criteria

- Measured at multiple network locations throughout a wide region
- Use of well-established, but relatively old technology




## Air Toxics

- Typically, measured as part of national programs (e.g., NATTS), at/near specific sources, and in communities
- Use of recently available state-of-the-art and research-grade technology


# Air Toxics Efforts in the Bay Area

- Existing programs include:
  - Assembly Bill (AB) 617 community monitoring (e.g., mobile monitoring surveys) and exposure modeling
  - Refinery-focused monitoring (e.g., Regulation 12, Rule 15)
  - Facility- and neighborhood-scale investigations
  - Compliance investigations
  - Incident response and special projects
  - 2025 Air Toxics Program Assessment (coming soon)
  - B(A)REATHE will be highlighted in future Annual Reports
- Current challenges and key limitations:
  - Air toxic gradients are typically localized with episodic peaks
  - Persistent disparities in overburdened communities
  - Sporadic air toxic measurements (limited spatial and temporal coverage)

***There is a need for an integrated basin-wide exposure and risk framework for air toxics***

# South Coast AQMD's MATES Program

- **MATES:** Multiple Air Toxics Exposure Study
- Broad EJ initiative
- National benchmark for regional air toxics exposure studies
- Demonstrated ability to:
  - Quantify cancer and chronic risk drivers
  - Track progress over time
  - Identify major sources and hotspots
- Started in 1986; conducted every 5-10 years (MATES VI is underway)
- Resource-intensive
  - Sample collection (every 6 to 12 days) and laboratory analysis
  - Limited continuous or real-time data


Photos courtesy of South Coast Air Quality Management District (AQMD) website

# MATES V: Summary of Results
## (2018-2019 Monitoring; 2021 Report)

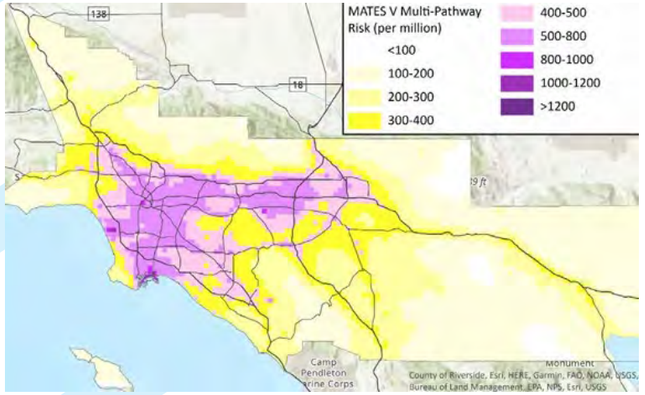
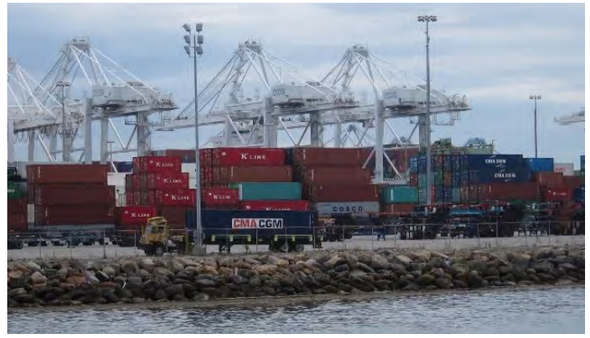



Photo courtesy of South Coast Air Quality Management District

Total air toxics cancer risk decreased by ~50% from 2012 to 2018, but risks are still high

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Highest air toxics cancer risk in/around the ports, but also along goods movement corridors, and major freeways

Photo courtesy of bing via Creative Commons license

Diesel PM is the largest contributor to cancer risk. Benzene, 1,3 butadiene, carbonyls, and arsenic are also major contributors

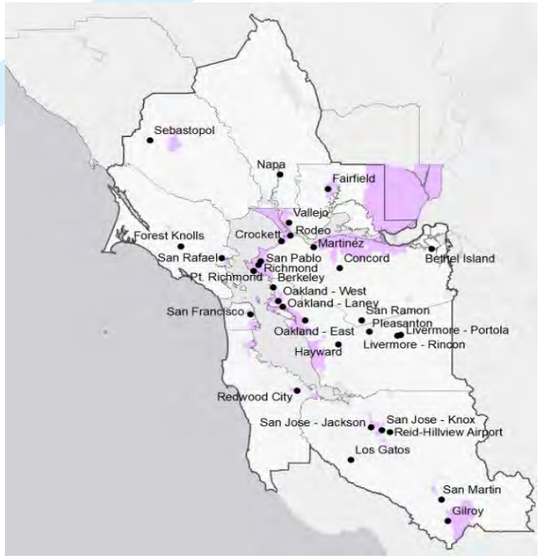
Photo by Rick Loomis of the Los Angeles Times

Air toxics levels in EJ communities were higher compared to Basin averages

*All results refer to conditions experienced in the South Coast Air Basin*

# Proposed B(A)REATHE Study

- Form a Technical/Community Advisory Group (TAG) to guide study design and provide technical oversight



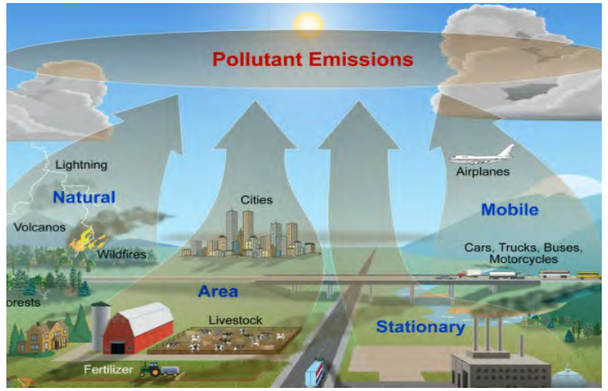

- Use advanced technology
- Continuous air monitoring (year-round) at existing air monitoring locations

# Proposed B(A)REATHE Study (cont.)


- Modeling of air toxics cancer risk
- Updated emission inventory

- Evaluate regional exposure to air toxic pollutants
- Quantify associated cancer and non-cancer risks






Photos courtesy of NPS.gov (https://www.nps.gov/subjects/air/sources.htm)

- Identify sources driving these risks

# B(A)REATHE Study - Site Selection


- Start at five (5) air monitoring locations representative of a basin-wide population exposure
- Prioritize areas with known or suspected elevated air toxics risk
- Leverage existing and planned Air District air monitoring infrastructure, including refinery community monitoring sites
- Potential site locations: Redwood City, Bayview-Hunters Point (BVHP), San Jose-Jackson, West Oakland, East Oakland, Vallejo, San Pablo (or other community site near a refinery)

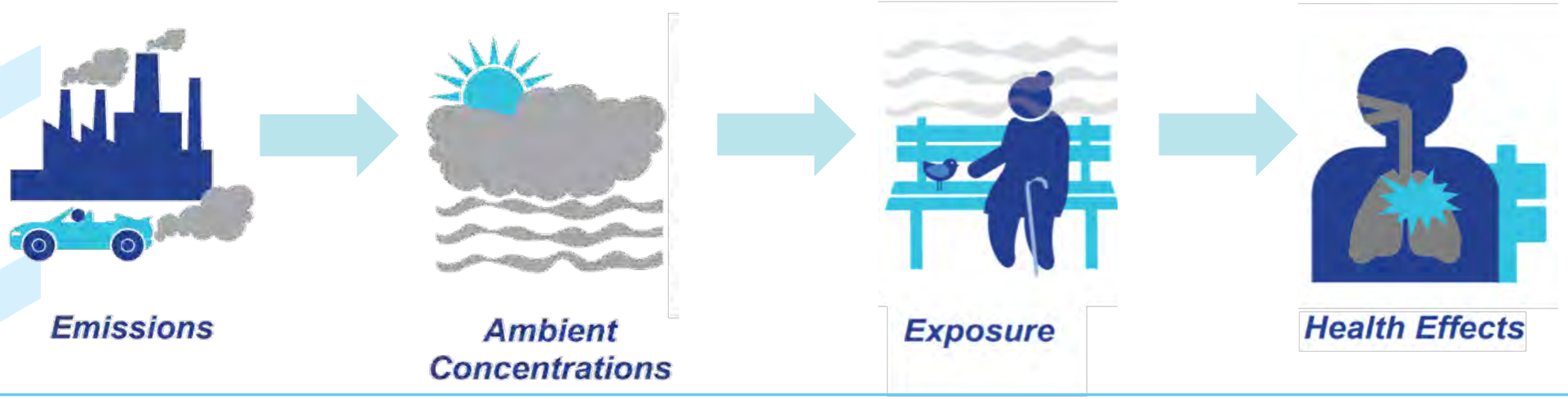
# B(A)REATHE Study – Continuous Monitoring


*Images represent instruments typically used for air toxics monitoring and do not necessarily depict the exact equipment proposed for this study*

Photos courtesy of air quality monitoring vendors' websites

- High time resolution (1-min to 1-hour)
- Low detection limit for all relevant air toxic pollutants
- Ability to measure diesel PM, Benzene, other VOCs, Carbonyls, Metals, and other risk drivers
- Higher capital costs, but no sample collection and lab analysis costs
- Ability to capture episodic peaks missed by traditional sampling/analysis methods
- Combined with meteorological data, can be used for source attribution and a more refined characterization of air toxics exposure

# B(A)REATHE Study – Emission Inventory, Modeling, and Health Effects




*(Emission Inventory)* *(Modeling, Validated by Monitoring)* *(Cancer Risk & Chronic Non-Cancer Health Impact)*

- Updated air toxics emissions inventory to support modeling and risk assessment
- Regional (basin-wide) modeling of all key air toxic pollutants (based on continuous data)
- Exposure and health risk assessment to characterize cancer risk and chronic hazard indices
- Assess new methodologies for estimating cumulative impact

# B(A)REATHE Study – Proposed Budget (Fiscal Year 2027)

*Option 1*

- Five (5) fully instrumented air monitoring sites (NOT including San Pablo station)
- Measure ALL key air toxic pollutants (VOCs, Metals, and Black Carbon)

**TOTAL: $4,100,000**

*Option 2*

- Five (5) fully instrumented air monitoring sites (including San Pablo station)
- Measure ALL key air toxic pollutants (VOCs, Metals, and Black Carbon)

**TOTAL: $3,640,000**

*Option 3*

- Five (5) fully instrumented air monitoring sites (including San Pablo station)
- Measure MOST key air toxic pollutants (VOCs and Black Carbon; use modeling for Metals)

**TOTAL: $2,600,000**

*Two or three Limited Term Contract Employees (LTCEs) may be required to support this study*

# B(A)REATHE Study – Cost Breakdown (Option 2)

*Instrument Cost Breakdown (Per Site)*

- Continuous VOC Monitor: $350,000
- Continuous Metal Monitor: $200,000
- Continuous Black Carbon monitor: $50,000
- Misc. Supporting Hardware: $60,000

TOTAL: $660,000 per site or **$2,840,000** for five (5) sites

(One VOC and Black Carbon monitor set, and supporting hardware, will be purchased for the San Pablo station under Regulation 12 Rule 15)

*Emission Inventory, Modeling, and Risk Assessment*

- Data Purchases for updated emissions, activity, socio-economic, demographic, and health datasets: $200,000
- Consultant support to configure emissions and photochemical models for additional toxic species: $100,000

TOTAL: **$300,000**

*Other Instrument-Related Costs*

- Services and supplies
  - Consumables and field supplies: $150,000
  - Instrument maintenance and repair: $50,000
- Contract(s): $300,000

TOTAL: **$500,000**

TOTAL BUDGET FOR PROPOSED STUDY**:** **$3,640,000**

*Two or three LTCEs may be required to support this study*

# B(A)REATHE Study – Potential Timeline

## *2026-2027 (Planning and Preparation)*

- Consultation with TAG
- Procuring equipment
- Prepare air monitoring sites
- Deploy and test instruments

## *2027-2028 (Measurements and Modeling)*

- Baseline year
- Quality Assurance/Quality Control conducted as data is collected
- Quarterly updates on measured data
- Emission inventory preparation
- Air toxics modeling

## *2028-2029 (Data Analysis and Report Writing)*

- Measured and modeled data comparison
- Cancer and chronic risk calculation
- Source apportionment
- Assessment of new cumulative impact methodologies
- Draft and final report
- Public outreach

*B(A)REATHE is a scalable project that can be expanded over time as resources allow. Instruments can be redeployed to other priority communities. This long-term investment will support ongoing risk and cumulative impact assessment efforts.*

# B(A)REATHE Study – Strengths and Benefits

- Unique opportunity to conduct the first comprehensive air toxics exposure study in the Bay Area; and the first ever to use continuous air toxic measurements year-round

- Continued modernization of the existing air monitoring network. Additional B(A)REATHE sites can be added over time

- Will provide context for localized community monitoring (e.g., AB 617), near-source measurements (e.g., Regulation 12 Rule 15), and past, present, and future air toxics studies

# B(A)REATHE Study – Strengths and Benefits (cont.)

- Will help identify unknown air toxics sources, and address public questions on air toxics impacts
- Will provide defensible science for future policy and control strategies, including cumulative impact considerations
- Will support EJ and strategic planning priorities
  - Strategy 1.1 – Change Approach to Air Quality
  - Strategy 2.2 – Collect Community Data
  - Strategy 2.4 – Community Health Data
  - Strategy 2.7 – Understand Local Air Pollution
  - Strategy 2.11 – Cumulative Health Impacts
  - Strategy 4.4 – Improve Air Monitoring

# Questions & Discussion

**For more information:**

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