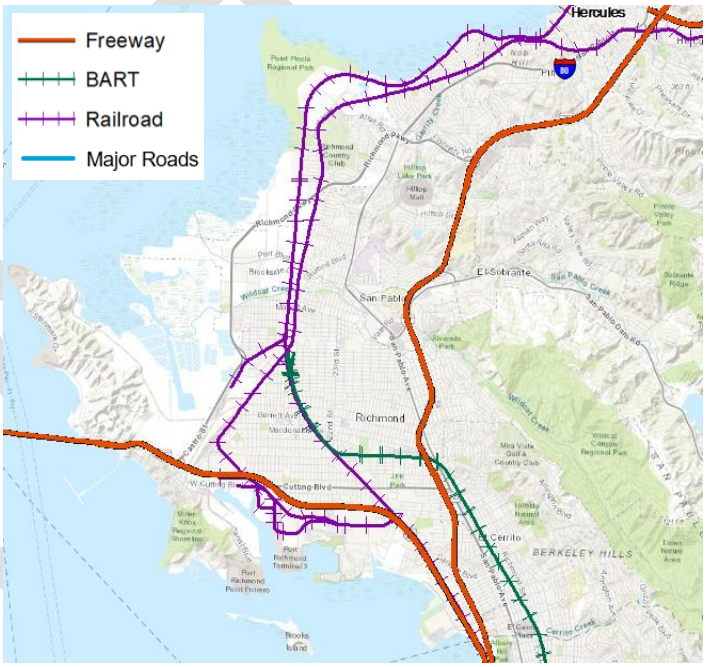
Monitoring Project Option #1: $PM_{2.5}$ Hotspots from Traffic

The Steering Committee identified several questions and air quality concerns related to traffic in the Richmond-San Pablo area, including:

- What is air quality like in neighborhoods along I-80 and I-580 compared to neighborhoods farther from the freeways?
- What are pollution levels on streets adjacent to schools, senior centers, or other locations with vulnerable populations?
- What impact do diesel trucks have on air quality through neighborhoods and near vulnerable populations?
- What impact do traffic backups, such as freeway onramps or at blocked railroad crossings, have on neighborhood air quality?

An air monitoring project that uses multiple measurement methodologies to locate and evaluate hotspots in particulate matter (PM) can help provide data that inform the questions described above. PM measurements for this project would focus on $PM_{2.5}$ (particulate matter with diameter of 2.5 micrometers or less), since fuel combustion is a key source of these smaller particles, which also have significant health impacts. The initial monitoring efforts are providing data that can help identify $PM_{2.5}$ hotspots across the Richmond-San Pablo area. Additional monitoring may be needed to help inform more specific questions about those hotspots, such as their frequency, or contribution from diesel trucks or other specific sources. Those additional measurements may include black carbon or other particle properties like particle size, shape, and chemical makeup.



Freeways, major roads, and railways in the Richmond-San Pablo area.

Potential Monitoring Objectives

- Locate and better understand $PM_{2.5}$ hotspots near roadways
- Determine if $PM_{2.5}$ hotspots are near schools, childcare centers, senior centers, recreational areas, or other outdoor locations where people gather
- Compare air quality in neighborhoods near freeways to neighborhoods farther away
- Evaluate $PM_{2.5}$ characteristics to help determine the amount of the total $PM_{2.5}$ levels coming from diesel combustion or other specific sources

Desired Actions

- Use knowledge of areas or times of $PM_{2.5}$ hotspots to support health-based decision making
- Use results to inform and prioritize strategies to reduce emissions and exposure around identified $PM_{2.5}$ hotspots, particularly those near vulnerable populations

Measurement Approaches and Instrumentation

- Mobile air monitoring using the Air District van to drive through communities to measure $PM_{2.5}$, black carbon (BC), and other particle properties or gases that help differentiate various sources.
- Monitoring at a specific location for multiple hours or days using filter-based sample collection and other instruments not suited to mobile monitoring. For example, in addition to measuring $PM_{2.5}$ levels and BC, PM samples could be collected on filters for other chemical analysis, and PM levels could be tracked for changes from day to day throughout the study, which could help identify the contributing sources in complicated areas.
- Meteorological measurements (wind speed and direction, temperature, humidity)

Considerations and Expected Challenges

- There are many sources of PM in the Richmond-San Pablo area in addition to traffic, such as industrial operations and residential wood smoke. PM measured in Richmond-San Pablo is expected to be a combination of local emissions and pollution transported into the community.
- Robustly characterizing hotspots that are not clearly attributable to traffic may require monitoring for up to a year. However, if impact is quickly apparent and appropriate weather conditions occur, preliminary data could be informative in three months.
- Weather conditions, such as wind direction and precipitation, may not be conducive for short-term studies, possibly requiring additional time to collect sufficient measurement data.
- Logistical considerations such as availability and access to possible monitoring locations, should portable or short-term stationary measurements be needed.

Project Phases

PHASE 0: Project planning and evaluating existing monitoring data (approximately 1-3 months)

- Define specific data objectives needed to inform health-based decision-making efforts and strategize traffic emissions reduction efforts
- Gather and evaluate existing non-measurement data sets, such as traffic and modeling data
- Evaluate PM data from existing air monitoring networks or projects, including from the three initial monitoring projects, to identify areas/times with higher than average PM near roadways
- If possible, use those existing data to determine the likely source(s) of those PM hotspots
- Design detailed plan for measurements for remaining hotspot areas that need more information. This plan includes timeline, location and duration of monitoring, instrumentation, analysis methods, quality assurance and quality control measures, data reporting and intended data uses.

PHASE 1: Follow-up measurements (approximately 3-12 months)

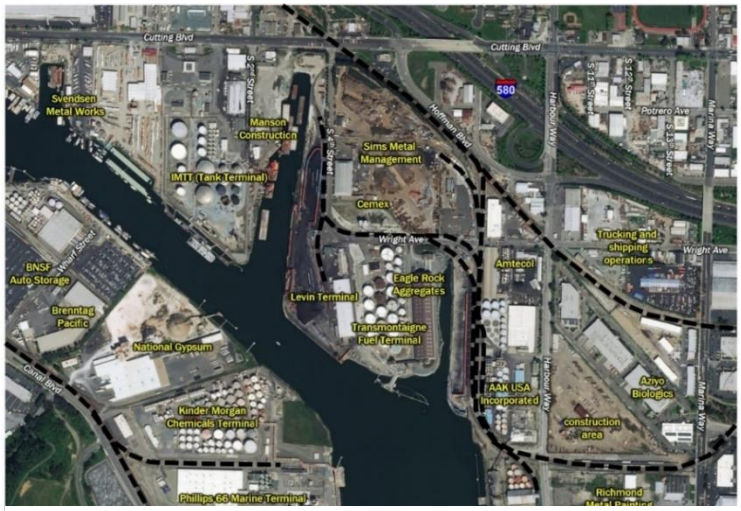
Use the Air District van, portable samplers, and/or short-term monitoring platforms to collect information on PM physical and chemical characteristics, black carbon and ultrafine particle levels, meteorological conditions, and data on other pollutants to:

a. Help characterize hotspots that are not well understood after evaluating data from existing monitoring projects, as this characterization may require measurement methodologies that were not part of those existing projects
b. Help characterize hotspots identified near sensitive or vulnerable populations
c. Distinguish between gasoline and diesel combustion
d. Evaluate specific sources or areas of concern as directed by the Steering Committee

Monitoring Project Option #2: PM Impacts from Coal and Petroleum Coke Operations

The Steering Committee identified questions and air quality concerns around coal and petroleum coke operations in the Richmond-San Pablo area, including:

- What impact do Levin Terminal and related coal and petroleum coke operations have on local air quality? Some specific concerns at the terminal include loading and unloading operations, windblown dust from coal and petroleum coke piles, and marine operations.
- Can coal and/or petroleum coke dust be detected in the air along railways that transport these materials to the terminal?



Map of the area around Levin Terminal, including adjacent rail lines and shipping waterways. Numerous other potential sources of PM are also located in this area. The exact monitoring project study area will be defined as the project plan is developed.

The air monitoring project outlined below uses multiple measurement methodologies to help inform these concerns by evaluating the impact that coal and petroleum coke operations have on particulate matter (PM). PM related to coal and petroleum dust is expected to have certain chemical and physical properties, such as its elemental makeup and particle size distribution. Monitoring the PM using the Air District van and short-term sites can help provide information on those properties.

Monitoring Objective

Quantify the contribution of coal and petroleum coke dust emissions from trains transporting these materials and from Levin Terminal operations on ambient PM concentrations near those activities

Desired Action

Inform development and implementation of PM emissions reduction efforts on coal and petroleum coke operations

Measurement Approaches and Instrumentation

- Mobile air monitoring using the Air District van to drive through communities to measure $PM_{2.5}$, black carbon (BC), and other particle properties or gases that help differentiate various sources.
- Monitoring at a specific location for multiple hours or days using filter-based sample collection and other instruments not suited to mobile monitoring. For example, in addition to measuring $PM_{2.5}$ levels and BC, PM samples could be collected on filters for other chemical analyses, and PM levels could be tracked for changes from day to day throughout the study.
- Meteorological conditions (wind speed and direction, temperature, humidity) associated with air quality measurements

Considerations and Expected Challenges

- Robustly characterizing PM impacts from coal and petroleum coke operations may require monitoring for up to a year. However, preliminary data could be informative in three months depending on conditions during the study time.

- There are many sources of PM in the area including: coal and petroleum terminal and operations, metal recycling facility, aggregate facilities, tank terminals, a cement plant, a gypsum facility, a wastewater plant, traffic (including I-580 and I-80), rail operations, other port and shipping operations, and housing construction.
- Discerning between coal and petroleum coke dust, and between fresh fugitive coal and petroleum coke dust emissions and re-suspended dust from historical emissions, are challenging objectives, and methodologies to do so are not well proven and come with increased data uncertainty.
- Weather conditions, such as wind direction and precipitation, may not be conducive for short-term studies, possibly requiring additional time to collect sufficient measurement data.
- Logistical considerations such as availability and access to possible monitoring locations.

Project Phases

PHASE 0: Project planning (approximately 1-2 months)

- Define a study area and specific data objectives needed to inform development and implementation of emissions reduction efforts on coal and petroleum coke operations
- Evaluate potential PM emission sources in the study area and chemical and physical properties of those PM emissions
- Design a detailed plan for PM measurements related to coal and petroleum coke operations that includes a project timeline, locations and duration of monitoring, instrumentation, monitoring and analysis methods, quality assurance and quality control measures, data reporting and intended data uses

PHASE 1: Screen for detailed PM information (approximately 3-6 months)

- Mobile measurements using the Air District's mobile van will take place throughout the defined study area. When possible, data will be collected during a mix of meteorological conditions, and upwind and downwind of facilities, to provide information about air pollutants coming from a specific facility or characterize the local background concentration of pollutants.
- Areas of higher concentrations, either identified by Air District mobile monitoring or by the initial monitoring efforts will be investigated further by making repeat monitoring passes. Short-duration (on the order of minutes) stationary monitoring by the mobile lab may be employed to check intermittence of high concentrations and collect meteorology data at the location.
- Measure physical and chemical characteristics of PM coal and petroleum coke dust through other types of sample analyses, source testing, or materials testing.

PHASE 2: Verification and short-term trends of PM (approximately 3-12 months)

- Measurements using portable monitors and/or short-term monitoring platforms may collect samples over longer periods of time at areas of high PM concentration identified in Phase 1 to provide additional information that can help characterize coal contribution to PM, such as how the levels change through time. Further analyses of the collected samples could also identify specific elements or compounds in the PM and other physical properties that could help distinguish between contributing sources.
- Portable monitors may be deployed at locations upwind of facilities to provide information on local background of pollutants, or in areas of low pollutant concentration identified in Phase 1 to evaluate potential differences in pollutant speciation and investigate whether low concentrations continue over time.

Monitoring Project Option #3: Identify Air Toxics Hotspots

The Steering Committee identified several air quality questions and concerns related to stationary pollution sources in the Richmond-San Pablo area, including:

- What are pollution levels in neighborhoods adjacent to large industrial facilities? Some example large facilities include Chevron and refinery-related operations, waste and water management facilities, and metal scrapyards.
- Where are pollution levels unusually high, especially near vulnerable populations or where people spend time outdoors, and what sources contribute to those pollution hotspots?
- What impact do certain small businesses have on neighborhood air quality, such as auto body shops, restaurants, gas stations, and dry cleaners?
- What sources are odors coming from and what pollutants are associated with them?

An air monitoring project using multiple measurement technologies to identify and better understand areas with higher levels of air toxics can help inform the concerns described above. Air toxics are a group of pollutants that may cause serious health effects. This monitoring project would focus on gaseous air toxics, such as the gases listed on CARB's Toxic Air Contaminant[1] page. Air toxics can be emitted by a wide range of sources and operations[2], many of which exist in the Richmond-San Pablo area and were identified by the Steering Committee. Currently, some refinery-related air toxics are measured along the Chevron fenceline with three open-path monitors and at three community monitoring stations[3]. In addition, the Air District operates two monitors in Richmond-San Pablo designed to assess longer-term trends in air toxics. These existing monitors do not provide the hyperlocal air toxics data that would be needed to help identify hotspots and inform air quality concerns highlighted by the Steering Committee.

Potential Monitoring Objectives

- Identify where air toxics levels are unusually high and determine if those hotspots are near schools, childcare centers, senior centers, and recreational areas.
- Evaluate air toxics levels around facilities identified and prioritized by the Steering Committee. This may include facilities like wastewater treatment plants, landfills, metal facilities, refinery operations, or small businesses like auto body shops, restaurants, dry cleaners, and gas stations.
- Identify sources and pollutants associated with odors.

Desired Actions

- Identify and implement measures to reduce emissions that contribute to identified hotspots
- Develop additional emissions reductions actions

Measurement Approaches and Instrumentation

- Mobile air monitoring using the Air District van to drive through communities and near facilities to measure levels of air toxics. The Air District monitoring van can detect low levels of hundreds of different gaseous air toxics at one-second frequency.
- Monitoring air toxics at a specific location for multiple hours or days using the van or canister sampling with subsequent chemical analyses to track changes from day to day throughout the study, to help identify the contributing sources in complicated areas.
- Meteorological conditions (wind speed and direction, temperature, humidity)

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[1] CARB's Toxic Air Contaminant website: https://ww3.arb.ca.gov/toxics/id/summary/summary.htm

[2] EPA's Air Toxics websites: https://www.epa.gov/haps; https://www.epa.gov/urban-air-toxics/area-sources-urban-air-toxics

[3] Chevron fenceline monitoring data: https://www.richmondairmonitoring.org/measurements.html

Considerations and Expected Challenges

- There are many potential and overlapping sources of air toxics in the Richmond-San Pablo area, which may complicate the identification of individual sources.
- Some air toxics hotspots may be short in duration and/or frequency, making them more difficult to characterize and trace.
- Weather conditions, such as wind direction and precipitation, may not be conducive for short-term studies, possibly requiring additional time to collect sufficient measurement data.
- Logistical considerations such as access to possible monitoring locations, should portable or short-term stationary measurements be needed.

Project Phases

PHASE 0: Project planning (approximately 1-2 months)

- Define specific monitoring objectives needed to inform emissions reduction efforts, including specific measurement area or facilities
- Gather updated air toxics emissions inventory data for the facilities in the study area
- Design detailed measurement plan for air toxics hotspots that includes selected monitoring objectives, timeline, location and duration of monitoring, instrumentation, analysis methods, quality assurance and quality control measures, data reporting and intended data uses

PHASE 1: Hotspot screening measurements (approximately 3-6 months)

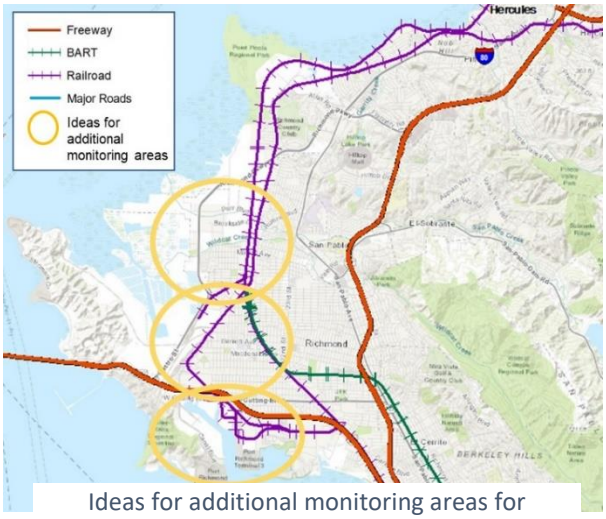
- Measure gaseous air toxics throughout the study area using the Air District's mobile van
- Analyze those data to locate hotspots and evaluate potential sources
- Determine if identified hotspots are near schools, childcare centers, senior centers, recreational areas, or other locations where people gather
- Refer identified hotspots to Air District enforcement when applicable to an emissions limit

PHASE 2: Follow-up measurements (approximately 3-12 months)

- Understanding some hotspots may require data over longer periods of time to understand the variability of the issue or more specific pollutant information from analysis methods that are not feasible using the Air District's mobile van. Portable samplers and/or short-term monitoring platforms may be deployed to obtain additional measurements
- Instrumentation and duration for follow-up measurements will be determined based on what variability and/or source contribution is being investigated

Defining a Study Area

The Steering Committee will define the study area for this project. Study areas could include communities where there are several large industrial sources near residential areas, such as North Richmond, the Iron Triangle, and around Richmond Harbor. While there are many uncertainties, the Air District expects initial monitoring of one area to take approximately two months. This project may be able to cover more than one area depending on how quickly results are achievable.



Ideas for additional monitoring areas for identifying air toxics hotspots